District Municipality of Muskoka

Bracebridge North Transportation Corridor Class Environmental Assessment Study

Prepared by:

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Project Number:

60241537

Date:

August, 2014

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August 22, 2014

Mr. A. J. White, P. Eng.
Commissioner of Engineering and Public Works
District Municipality of Bracebridge
70 Pine Street
Bracebridge, ON P1L 1N3

Dear Mr. White:

Project No: 60241537

Regarding: Bracebridge North Transportation Corridor Class Environmental Assessment Study

The final Environmental Study Report for the Bracebridge North Transportation Corridor incorporating comments from the District of Muskoka is attached and is now ready for public review.

The members of the Study Team would like to thank you and your colleagues at the District for the opportunity to undertake this study. We would also like to thank the agencies, businesses and members of the public who took an interest in this work and contributed to the results.

Sincerely,
AECOM Canada Ltd.

Original Signed by:

Chris Stilwell, P. Eng.
Manager, Bracebridge Office
Chris.stilwell@aecom.com

CS:vm
Encl.
cc: Valerie McGirr, AECOM
Craig Douglas, DMM
Kevin Austin, DMM

Distribution List

# of Hard Copies	PDF Required	Association / Company Name
1	1	District Municipality of Muskoka
1		Bracebridge Library
1	1	Town of Bracebridge
1	1	Township of Muskoka Lakes

Revision Log

Revision #	Revised By	Date	Issue / Revision Description
0	CG/VM	March 2014	Draft for review
1	VM	August 2014	Final for public review

AECOM Signatures

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Original Signed by:

Valerie McGirr, P. Eng.
Manager of Transportation Planning

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Report Reviewed By:

Original Signed by:

Chris Stilwell, P. Eng.
Manager, Bracebridge office

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Executive Summary

A Class Environmental Assessment (EA) study was undertaken in accordance with the *Municipal Class Environmental Assessment, 2000 as amended in 2007 & 2011,* for a proposed transportation corridor north of the Town of Bracebridge urban area between Highway 11 and Muskoka Road 118. This study was initiated by the District Municipality of Muskoka and undertaken by AECOM. The purpose of this study was to examine the existing and future transportation needs associated with the growing population in the Town of Bracebridge (the Town), and the surrounding area that contributes to regular traffic congestion through the urban area of Bracebridge, to assess impacts and to obtain environmental clearance for the required infrastructure. The purpose of the project (the "undertaking") was to plan for future needs for adequate transportation capacity in the study area and support the growth of Bracebridge and the surrounding area.

Description of the Problem

The need for the Bracebridge North Transportation Corridor was first identified in the 1994 Town of Bracebridge Transportation Study, and has since been incorporated into the Town's Official Plan. As part of this study, both existing and future traffic operations and safety were reviewed and confirmed that the need for the corridor still exists. There is limited capacity in the downtown area of Bracebridge, with the route between the Taylor Road/Highway 11 interchange and MR 118 nearing capacity; limited connectivity across the Muskoka River barrier and a need to maintain access to areas adjacent to Highway 11 when the direct access is closed by the Ministry of Transportation. In addition to addressing travel demand, a new corridor will provide an opportunity for enhanced connection to Highway 11 and the provision of an alternative route for traffic to and from new developments.

Preferred Solution

The alternative solutions generated to address identified needs were:

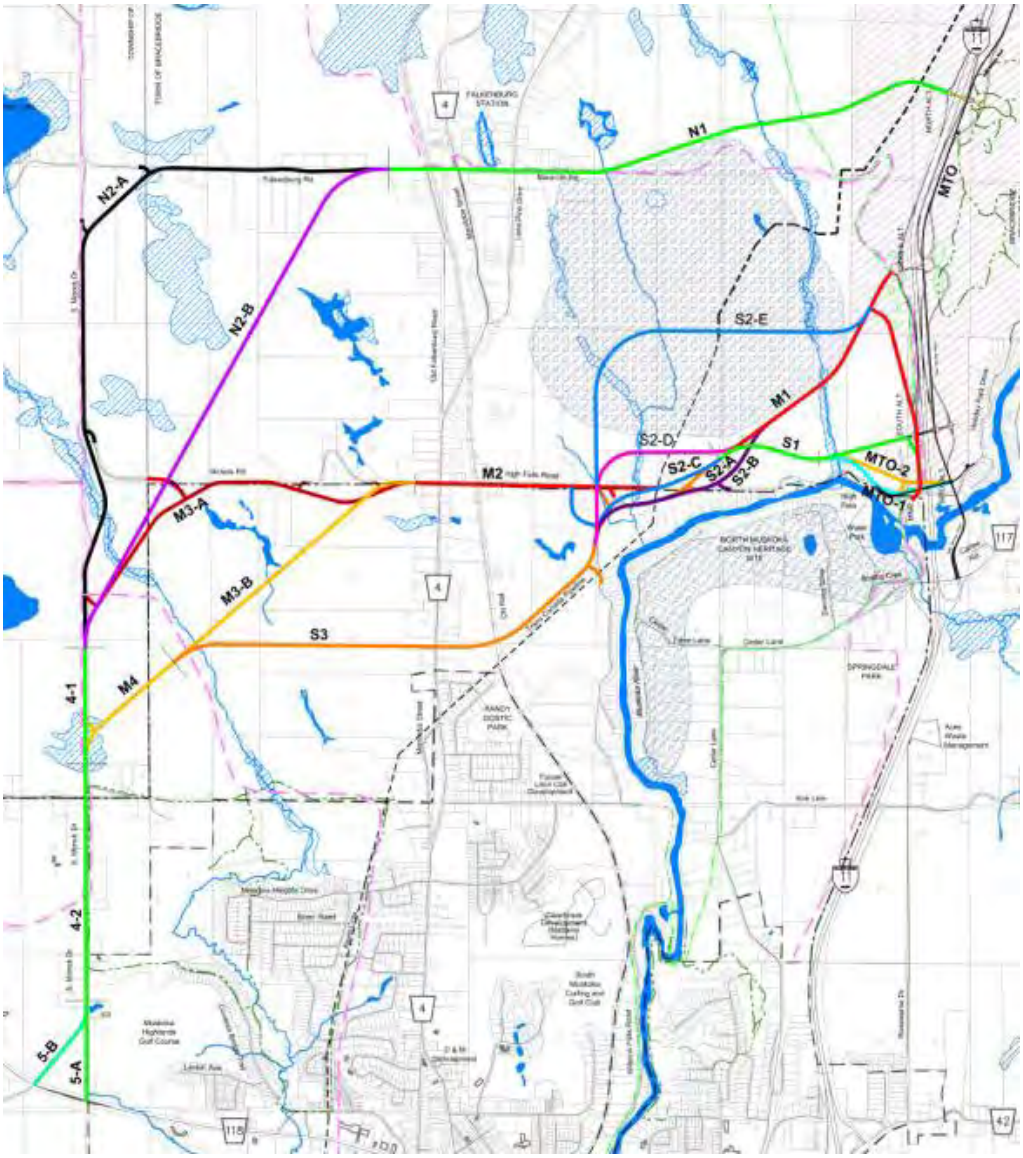
- Do nothing;
- Improve existing routes through realignment, intersection improvements, removing parking, and/or widening; and
- Build a new corridor.

A new corridor was selected as the only alternative solution that will solve the transportation needs identified for the north side of Bracebridge. It was carried forward for the consideration of Alternative Routes.

Alternative Routes

The defined study area for the investigation of route alternatives was generally from Highway 11 in the east to South Monck Drive in the west; from Falkenburg Road in the north to MR 118/Bracebridge urban area in the south. Portions of existing roads were considered in the development of route alternatives where feasible.

Figure E-1. Alternative Routes – Bracebridge North Transportation Corridor



Alternative Designs

The alternative routes identified were assessed and evaluated and considered mutually exclusive portions of alignment (i.e. portions that are alternatives to each other). The sections to be evaluated independently were the North, Middle, South and MTO Alternative Routes. Following a systematic and traceable evaluation process, the preferred alternative was determined to be the middle interchange combined with the south route alternative.

Public Consultation and Concerns Raised by the Public

Concerns and requirements expressed by agencies such as the Ministry of Transportation and Ministry of Natural Resources, various Town of Bracebridge departments, members of the public, interest groups and the business community were considered in the development, assessment and evaluation of alternatives.

Based on analysis and investigation of comments received, the following items were included in the Recommended Plan:

- Revisions to the alignment were made to better avoid the Red Oak research stands and to reflect the revised boundary of the Deer Yard;
- Alignment of Preferred Route was moved northerly on South Monck Road to start the curvature on the north side of the valley;
- An additional route alternative was evaluated (Route S2-E) and later added to the Recommended Plan; and
- Corrections were made in project drawings to the limits of the Crown Land.

Recommended Plan

At Highway 11, a new interchange is provided that satisfies the MTO interchange separation requirements. The interchange has a diamond configuration with roundabouts providing traffic control at the ramp terminal intersections to provide speed management and to safely assign right-of-way between all directions of travel.

The Ministry of Transportation had determined in their 2010 Highway 11 Access Review study that the existing Muskoka Road 117/Cedar Lane interchange met provincial requirements, and that an additional interchange within the study limits was unnecessary. While they had no concerns with the proposed Bracebridge North Transportation Corridor that would prevent its future development, the MTO felt that the long-term nature of both studies made it unnecessary to update their preferred plan as shown in the study to include the interchange proposed by the DMM. Correspondence with the MTO confirmed that the needs identified in both studies will be reviewed closer to implementation and consultation between the MTO and the DMM will be ongoing to ensure the needs of the province and the District are met.

On the east side of Highway 11, the East Service Road that forms part of the MTO Recommended Plan for Highway 11 is connected to the roundabout. The East Service Road extends from Holiday Park Drive in the south to Alpine Ranch Road in the north.

West of Highway 11, the route alignment heads south and west to the property line between Concession 7 and 8 and then curves south to intersect High Falls Road at Bonnell Road. The route continues south along the Bonnell Road right-of-way, then curves to the southwest north of the intersection of Bonnell Road and the pipeline. The route continues southwest roughly parallel to the pipeline. In the vicinity of the CN railway, the route curves west to intersect with Manitoba Street north of the Bracebridge urban boundary and existing subdivision development. A future grade separation of the railway and the arterial road would be feasible.

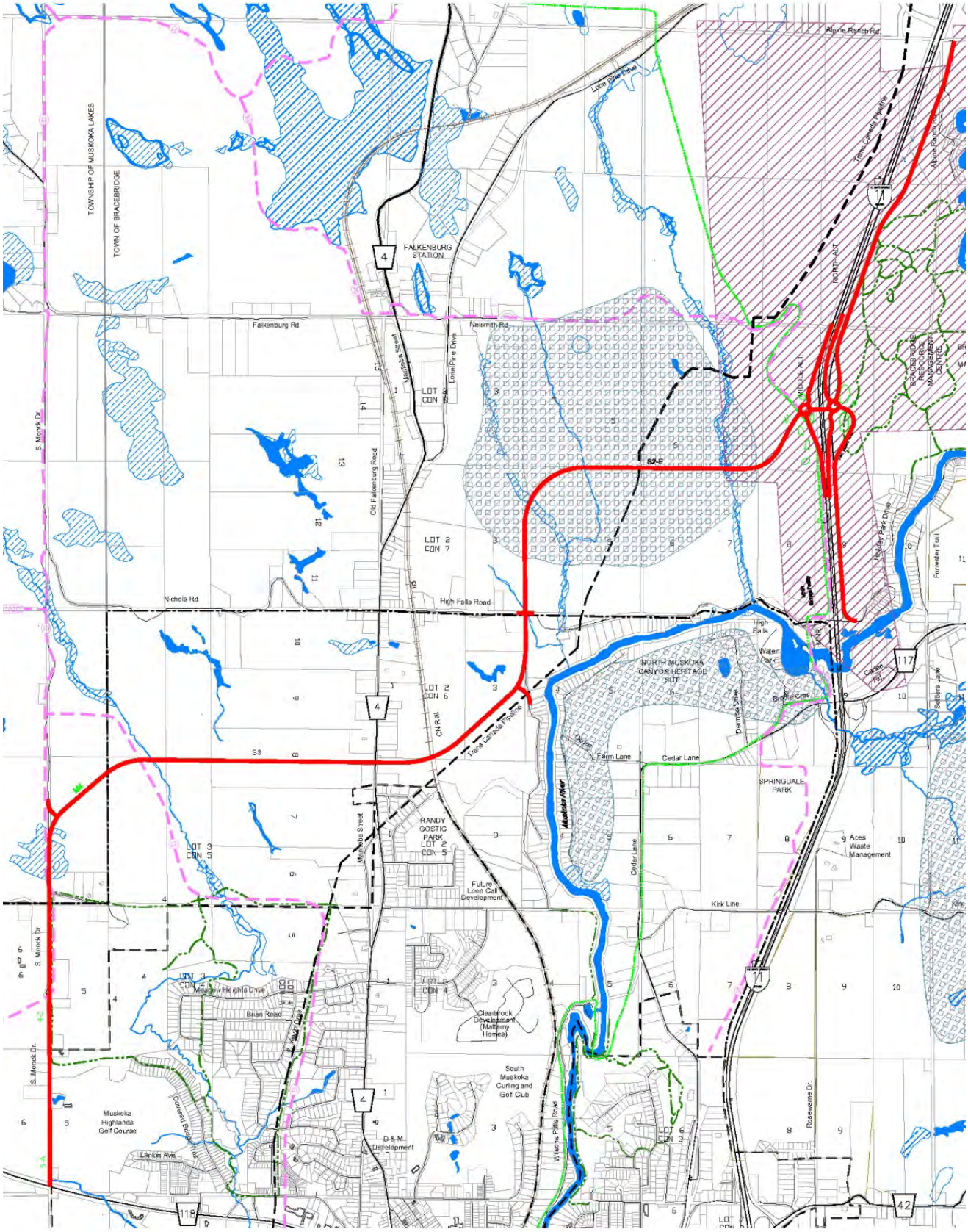
The route alignment continues west of Manitoba Street before curving southwest in the vicinity of the Bracebridge-Township of Muskoka Lakes boundary. The route then curves south to intersect with South Monck Drive.

The route alignment follows South Monck Drive to MR 118. A new connection to South Monck Drive north of the corridor (seasonal road segment) is included in the plan. The kink in the road within the area of Concession 4, Lot 6 would be straightened.

The cost of construction is estimated at over $58 million.

Figure E-2 illustrates the Recommended Plan corridor.

Figure E-2. Recommended Plan – Bracebridge North Transportation Corridor



Principal Environmental Impacts and Mitigating Measures

Table E-1 summarizes the principal potential effects and mitigation measures during construction and during operation, associated with the corridor.

Table E-1. Principal Potential Effects and Recommended Mitigation Measures

Environmental Component and Potential Environmental Effects	Recommended Mitigation Measures
Aquatic Species and Habitat • Loss of aquatic habitat and function at 5 new watercourse crossings containing coldwater habitat	• While not anticipated, any required in-water works will require appropriate DFO approvals and a Fisheries Habitat Compensation Plan (authorizations will be explored during detail design) • Any required in-water works must be conducted in the dry within the appropriate fisheries timing window • During detail design, appropriate MNR timing windows will be identified • Install, use, and maintain sedimentation and erosion control measures • Finished slopes will be graded to an acceptable slope minimum and completed with plantings. Large cuts will be terraced to minimize erosion. • All excavated materials requiring stockpiling should be in accordance with OPSS 180.07.06 and placed in pre-determined locations. The perimeters of stockpiles will be encircled with silt fencing, according to OPSD 219.110. • Adhere to cold water construction timing window (July 1 - September 15); • Permit(s) to Take Water during construction will be obtained if required; • Ensure bridge/culvert span maximizes light penetration if feasible to encourage riparian vegetation growth underneath the structure; and, • Replace riparian vegetation lost during construction of bridge abutments and re-naturalize as soon as possible after construction to minimize erosion of bare riparian sections. • Work area will be isolated using construction fencing • Where vegetation has been removed post-construction restoration will include locally sourced native plants appropriate for site conditions, such as fast-growing trees and/or shrubs • Prepare a contingency plan for accidental sediment release, and include an emergency spill kit on-site
Terrestrial Species and Habitat	• Trees or large shrubs identified for preservation shall be protected with appropriate hoarding (fence or similar structure using OPSD 220.01) at an appropriate distance from the tree stem, as determined by a qualified professional. • In sensitive areas, higher quality tree protection fencing will be used. Tree wells may be necessary where significant grading affects soil levels surrounding large trees. In the event that roots or branches of trees to be protected are inadvertently damaged during construction, they shall be pruned clean as soon as possible. Exposed roots shall then be covered with topsoil. • Trees identified for removal shall be properly inventoried at the Detailed Design stage in order to quantify and plan for compensation with an appropriate landscape planting plan. • At the time of construction, trees shall be marked and felled into the work area to avoid damage to adjacent vegetation. • A restoration/landscaping plan will be prepared during Detailed Design. • Vegetation removal will be scheduled to occur outside the breeding bird period (May 1st to July 31st). • Should avoidance of the breeding bird period not be possible, and removal is scheduled within this period, active nest surveys prior to construction shall be undertaken. • Riparian trees identified for removal shall be inventoried at the Detailed Design stage. • All restoration plantings shall be an appropriate species for the growing conditions at the site. • Where construction is to occur within 30m of a naturally vegetated feature, install and maintain protective fencing to clearly define the construction area and prevent accidental damage to vegetation or intrusion into the natural feature. • All exposed surfaces susceptible to erosion shall be revegetated immediately upon completion of construction activities or within 45 days of exposure and with sufficient time to allow for successful establishment prior to winter. Native plants and seeds shall be favoured in all restoration. • Vegetation restoration plans can be developed to replace lost vegetation with new vegetation and opportunities to replace trees at a higher rate than the removal can be explored as part of the Detail Design. • The planting of new vegetation in areas that would not be affected by the future transportation corridor in advance of the construction activities would grow prior to the new corridor being required. • Areas for potential vegetative restoration would be defined in consultation with review agencies and municipal departments during the preliminary design phase for the preferred corridor. • Develop and implement an erosion and sediment control plan before commencement of construction. • Utilize erosion blankets, erosion control fencing, straw bales, siltation bags, etc. for construction activities within 30 m of a wetland, woodland or water body, to mitigate potential excessive erosion and

Environmental Component and Potential Environmental Effects	Recommended Mitigation Measures
	sedimentation. Extra erosion and sediment control materials shall be kept on hand, (i.e., heavy-duty silt fencing, straw bales). • Check that sediment and erosion controls are in good repair and properly functioning prior to conducting daily work and re-install or repair as required prior to commencing daily construction activities. Check sediment and erosion controls before and after significant rainfall events to ensure they are effective. • Keep sediment and erosion control measures in place until disturbed areas have been stabilized (i.e., re-vegetated). • To avoid sedimentation in wetlands and watercourses, schedule grading within 30 m of a watercourse or wetland to avoid times of high runoff volumes, wherever possible. Temporarily suspend work if high runoff volume is noted or excessive flows of sediment discharges occur until contingency measures are in place. • Re-vegetate temporary disturbance areas (i.e. roads, laydown areas, etc.) to pre-construction conditions as soon as possible after construction activities are complete using species native to the area in naturally vegetated areas.
Wildlife	• Wildlife fencing and crossings will be established in key areas to allow the safe passage of wildlife across the highway. • The provision of suitable culverts and structures to allow for wildlife passage shall be considered on a site specific basis. • Considerations to prevent wildlife and vehicular interactions shall be considered. Specific details of these crossings will be determined during Detail Design in consultation with the MNR and the District Municipality of Muskoka • Select sizeable roadway and linkage alignments to avoid unsafe intersections (e.g. at curves); • Use plantings and wing-walls to direct wildlife using the linkage to culvert/structure crossings; • Install wildlife fencing along primary linkages and deer wintering areas to direct wildlife to the culvert/structure crossing; and • Design culverts/structures to accommodate wildlife movement. • During construction, speed limits (30km/h) shall be clearly posted. Install and maintain wildlife crossing and speed limit signs on access roads. • Locate project components outside of natural features, to the extent possible, to avoid direct impacts to wildlife habitat. • Schedule vegetation removal to occur outside the breeding bird period (May 1 to July 31). Undertake active nest surveys prior to construction if clearing of vegetation must take place during this period. • Further surveys shall be conducted at the Detailed Design phase to confirm presence or absence of Significant Wildlife Habitat and or Species at Risk. • If any species are found during these surveys, appropriate mitigation or compensation plans will be developed in consultation with the MNR.
Land Use	• Provision for a level at-grade crossing and relocation of the Trans Canada Trail and collector snowmobile trail will be required in the vicinity of the Highway 11 interchange on the west side of Highway 11. • Relocation of one trail in the Bracebridge Resource Management Centre will be required on the east side of Highway 11. • Between Manitoba Street and South Monck Drive, a provision shall be included for a level crossing of the main snowmobile trail (TOP D). • Between South Monck Drive and MR 118, the collector snowmobile trail shall be relocated to the ditch adjacent to the road.
Noise	• Mitigation measures will be investigated during the Detail Design phase and may includes measures such as noise walls or berms.
Archaeology	• Stage 2 archaeological assessments shall be required in all areas where archaeological potential exists and will include a combination of pedestrian survey and test pit survey, where appropriate. • Should the proposed work extend beyond the current study area, then further Stage 1 archaeological assessments must be conducted to determine the archaeological potential of such additional areas. • In the event that archaeological remains are found during subsequent construction activities, the consultant archaeological, approval authority, and the Cultural Programs Unit of the MTCS shall be notified immediately.
Geotechnical	• Foundations for bridge abutments and piers in areas with shallow bedrock are likely to consist of spread footings on bedrock. • Some rock excavation is likely to be required to remove loose and weathered rock from beneath foundations and to provide a level bearing surface. • Driven steel piles may be the preferred foundation option for structures located in areas underlain by sand and gravel deposits. • The soil and bedrock conditions at the proposed foundation locations will be assessed in detail design, including assessment of the bedrock profile.

Environmental Component and Potential Environmental Effects	Recommended Mitigation Measures
	• Where the route crosses poor soils, the soft organic soils shall be removed from beneath road embankments and structures and replaced with compactable granular material. • The use of geosynthetic support materials will be investigated in detail design. • Increased granular thicknesses and/or geosynthetic materials may be required in order to create a stable pavement structure where there are poor subgrade materials. Additional geotechnical investigation will be required along the selected route during the detail design. • The potential for liquefaction must be verified as part of the design stage. The risk of liquefaction can be managed by densification of the sand and gravel prior to embankment construction. • Excavations that extend below the groundwater level will likely require excavation support (e.g. sheet piles) and dewatering.
Contamination	• An assessment of the soil and groundwater quality (where excavation depths are anticipated to extend below the groundwater table) within the project footprint shall be completed to confirm the presence/absence of environmental impacts from the area of potential environmental concern identified at 1350 High Falls Rd.

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1. Introduction

The District Municipality of Muskoka (DMM or the District) is the proponent of a Class Environmental Assessment (EA) Study for a proposed transportation corridor north of the Town of Bracebridge urban area between Highway 11 and Muskoka Road 118. DMM initiated this study in January 2012.

The purpose of this Class EA study is to examine the existing and future transportation needs associated with the growing population in the Town of Bracebridge (the Town), and the surrounding area that contributes to regular traffic congestion through the urban area of Bracebridge, to assess impacts and to obtain environmental clearance for the required infrastructure. The purpose of the project (the "undertaking") was to plan for future needs for adequate transportation capacity in the study area and support the growth of Bracebridge and the surrounding area.

The Official Plans of the Town and District provide the basis for the Class EA process. Under provincial legislation, an Environmental Assessment study is required prior to construction of a new corridor or widening of an existing road. This Class EA Study culminated in the Recommended Plan illustrated in **Appendix A**.

1.1 Background and Earlier Studies

A number of studies have been undertaken in the area over the last two decades. The 1992 Ontario Ministry of Transportation (MTO) Preliminary Design Study for the Ultimate Freeway Design for Highway 11 from Muskoka Road 169 in Gravenhurst to the north junction of Muskoka Road 3 in Hunstville concluded that the existing interchange at Muskoka Road 117 should be retained and that a new interchange should be constructed north of High Falls Road with a new entrance to the Bracebridge Resource Management Centre.

The 1994 Town of Bracebridge Transportation Study recommended the development of two new arterial routes around the urban core of Bracebridge: one to the south-west and one to the north. The northern route was to connect to Highway 11 via the interchange north of High Falls Road that was proposed in the MTO's 1992 study. At the time that the MTO study report was published, the Town of Bracebridge study was sufficiently far advanced that the north route was identified in the MTO report. Both the south-west route and the north route were incorporated into the Town's Official Plan. Schedule "C1" of the Official Plan illustrates conceptual layouts for the two routes.

The 2010 Transportation Environmental Study Report prepared by the MTO for Highway 11 Access Review of High Falls Road/Holiday Park Drive identified a new preferred solution for access to Highway 11 that did not include a new interchange. Specifically, the preferred alternative, alternative 5b, involves the connection of Holiday Park Drive to Muskoka Road 117 via a new bridge over the Muskoka River on the east side of Highway 11, and the connection of High Falls Road to Holiday Park Drive by an overpass on Highway 11.

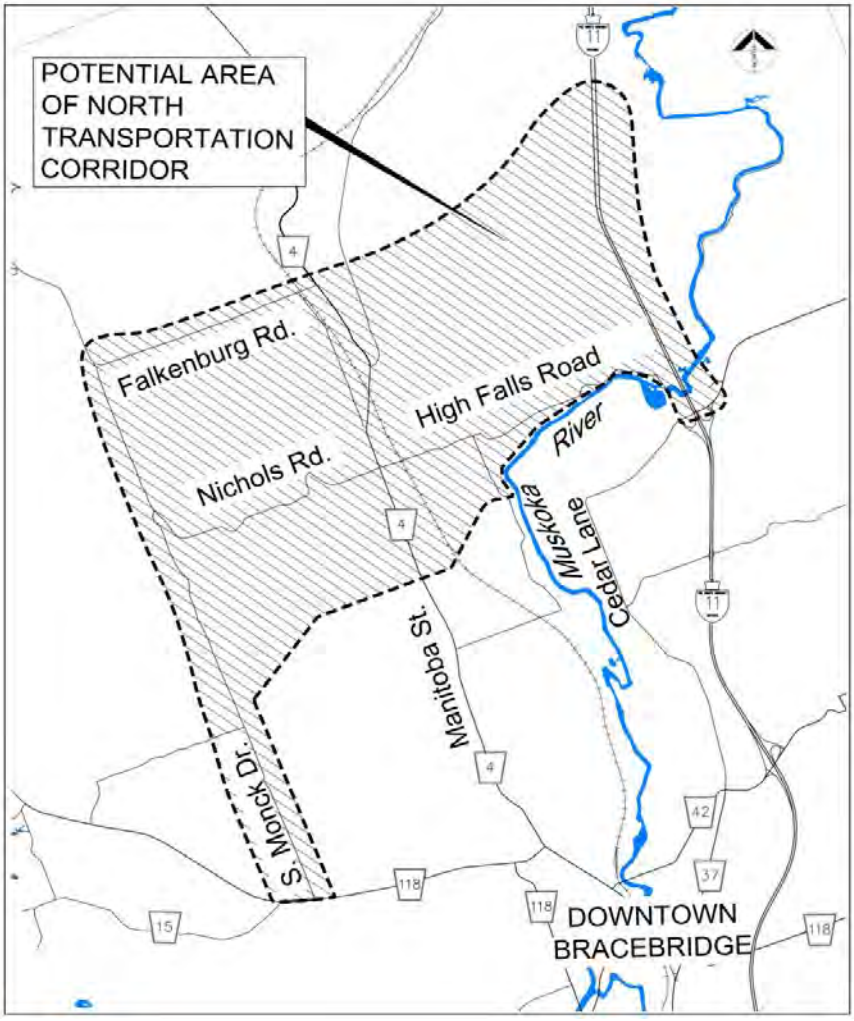
In August 2010 DMM submitted a motion to MTO noting their preference for a new interchange similar to the one recommended in the MTO's 1992 study. They also supported several of MTO's other alternatives that were not recommended in the 2010 study.

Following the DMM motions summarized above, the MTO submitted their TESR with alternative 5b as the recommended plan. The DMM requested an order under Part II of the Environmental Assessment Act (a "bump-up" request) but this was denied by the Minister of the Environment. MTO noted to DMM that it would be necessary to undertake a Municipal Engineers Association (MEA) Municipal Class EA for the North Transportation Corridor to identify the preferred alternative from a municipal perspective and recommend a location for a connection with Highway 11. The DMM retained AECOM to complete this Class EA study.

1.2 Study Area

The Study Area is located in the Town of Bracebridge and the Township of Muskoka Lakes within The District Municipality of Muskoka and is illustrated in **Figure 1**.

Figure 1. Study Area



1.3 Class Environmental Assessment Process

Class EA studies for municipal infrastructure projects are undertaken in accordance with the Municipal Class Environmental Assessment, as amended in 2007, which is an approved process under the Ontario Environmental Assessment Act. This long term transportation planning study followed the requirements for a Schedule 'C' project.

Class EA studies are undertaken for projects with similar types of problems and a common set of alternatives to the undertaking and alternatives designs. In addition, the range of environmental impacts and approaches to mitigation are similar in nature for Class EA projects.

The phases of work that were undertaken as part of this study are outlined below.

Phase 1: Problem or Opportunity

- Review existing and future traffic and road conditions
- Identify problems and opportunities

Phase 2: Alternative Solutions

- Identify alternative solutions to address problems
- Develop and refine evaluation criteria
- Assess and evaluate Alternative Solutions
- Present the Problem, Alternative Solutions and the Preferred Solution at Public Open House (POH) #1
- Summarize and consider POH#1 input
- Finalize selection of Preferred Alternative Solution

Phase 3: Alternative Design

- Undertake environmental & engineering field work
- Generate Alternative Routes/Designs
- Assess and evaluate Alternative Routes
- Identify the Technically Preferred Alternative (TPA) route
- Prepare functional design drawings
- Present Alternative Routes and TPA at POH #2
- Obtain approvals in principle from regulatory agencies
- Develop project cost estimate

Phase 4: Environmental Study Report

- Prepare Environmental Study Report (ESR)
- Prepare Study Completion Notice
- Provide ESR for public and agency review

Phase 5: Implementation (not included in this particular study)

- Complete contract drawings and tender documents

2. Consultation

All consultation information referenced in this section can be found in **Appendix B** to this report.

2.1 Consultation Process

The Class EA process encourages effective consultation as a key component of EA planning. Three mandatory points of contact are identified for Schedule C projects. For this project, points of contact included a notice of study commencement, two Public Open Houses (POHs), formal public review of study documentation and presentation to councils.

2.2 Notices

One of the key objectives of the environmental planning process is to provide the public, interested parties and affected agencies with opportunities for meaningful input. To meet this objective, public and agency notification of study commencement and POH's was undertaken that included the publication of notices in the local newspapers and on the project website.

The Notice of Study Commencement was placed in the Muskoka Weekender on Friday, February 17 and 24, 2012 and in the Bracebridge Examiner on Wednesday, February 22 and 29, 2012.

The Notice of Public Open House #1 was placed in the Muskoka Weekender on Friday, August 10 and 17, 2012 and in the Bracebridge Examiner on Wednesday, August 15 and 22, 2012.

The Notice of Public Open House #2 was placed in the Muskoka Weekender on Thursday, October 10 and 17, 2013 and in What's Up Muskoka on Wednesday, October 16, 2013.

A Notice of Study Completion noting the availability of the Environmental Study Report was placed in the Muskoka Weekender and in What's Up Muskoka/The Bracebridge Examiner prior to the commencement of the formal 30-day public review period.

Notices were also mailed or emailed to people on the project mailing list.

Copies of the notices are provided in **Appendix B**.

2.3 Project Website

A website was developed and maintained for the Bracebridge North Transportation Corridor EA Study at the following address:

www.bracebridge-ntc.ca

Public notices advising of Public Open House meetings, display material presented at the meetings and project updates were available online throughout the study. Contact information was also provided to allow the public to comment throughout the study process.

2.4 Public Open Houses

Two Public Open Houses (POH's) were held during the course of this study. The District Municipality of Muskoka and consultant representatives were available at all of the meetings to discuss the study and respond to inquiries. Summary reports for each POH are provided in **Appendix B**.

2.4.1 Public Open House #1

The first Public Open House (POH) was held on:

Thursday, August 23, 2012 from 4:00 p.m. to 7:00 p.m.
Bracebridge Sportsplex, Conference Room, 110 Clearbrook Trail, Bracebridge.

The first POH provided attendees the opportunity to:

- Learn about the study scope and the need for a north transportation corridor;
- Review and comment on proposed and preferred alternative solution(s); and
- Comment on the proposed evaluation criteria that would be used to identify a recommended plan

The POH provided an opportunity for members of the public to view the display material and to discuss the project with the District Municipality of Muskoka and consultant representatives. Attendees were encouraged to provide written comments. The members of the project team in attendance consisted of:

- Craig Douglas Manager of Engineering, District Municipality of Muskoka
- Chris Stilwell Consultant Project Manager, AECOM
- Vanessa Skelton Consultant Transportation Engineer, AECOM
- Wendy Hiles Consultant Administrative Staff, AECOM

The display material presented at the Public Open House is provided in the Public Open House Summary Report #1 in **Appendix B** of this report and dealt with the following topics:

- Welcome
- Introduction and Background
- Study Background and Study Purpose
- Study Area Map
- Class EA Study Process
- Evaluation Factors
- Consultation
- Schedule
- Existing Traffic Conditions
- Transportation Conditions
- Problems and Opportunities
- Environmental Constraints Map
- Environmental Conditions – Terrestrial
- Terrestrial Conditions Map
- Environmental Conditions – Aquatic
- Aquatic Conditions Map
- Assessment and Evaluation of Alternative Solutions
- Next Steps
- Thank you for attending

A newsletter was prepared for this study and copies were made available to the public at the POH and on the project website.

Following notification and prior to the Public Open House meeting, 2 comments were received from the public. A total of 67 people signed the registration sheet at the POH and 10 comment sheets were submitted at the meeting on August 23, 2012. An additional 5 comments were received prior to the September 6, 2012 final submission date for comments to be incorporated into the summary report for the POH. Comments received after this date were still considered and are documented below.

A general summary of the comments received are listed below in **Table 1**.

Table 1. Summary of Comments from POH #1

Description of Comments	# of Respondents	Comment Sheet #
Does not support use of High Falls Road	2	1, 16
Concerned about increase in noise levels	1	1
Safety concerns	3	1, 14, 16
Concerned about impacts on and loss of natural habitat	2	1, 4
Concerned about increasing traffic volumes on High Falls Road	2	1, 16
Select new route in the southern half of the Study Area	1	2

Description of Comments	# of Respondents	Comment Sheet #
Request copies of reports	2	3, 15
Does not support this study	1	4
Concerned about impacts on hunt camps	1	4
Concerned about impacts on recreational and/or snowmobile trails	2	4,18
Inquired about how north and south corridor will be connected to Muskoka Road 118	1	4
Concerned about impacts on businesses	2	4, 5
Inquired about status of Southern corridor	2	4, 5
Concerned about impact on rural lifestyle	2	4, 14
Inquired about timing of project	1	5
Inquired about cost of project and if traffic volumes justified the cost	1	5
Add to mailing list	6	6, 7, 8, 9, 10, 17
Concerned about impact or loss of land	3	11, 13, 14
Does not support location of venue for POH meeting	1	12
Does not support use of South Monck Drive	1	14
Concerned about impacts during construction	1	14
Suggested alternative route locations intersecting further west along Muskoka Road 118	1	14
Felt that not enough information was provided	1	15

Many people who attended the Public Open House provided input with concerns and questions. Attendees reviewed the information available on the presentation boards and many took a copy of the presentation material home with them. Many people were interested in the alternative designs that would be presented at the next Public Open House and they were not aware that the Municipal Class EA process requires evaluation of alternative solutions before the alternative designs are prepared. The long-term nature of this project and the need to plan for the future was not accepted by some people in attendance. Potential impacts to the natural environment and rural lifestyle were issues that were raised as well as the cost of the project and the perceived lack of need for the project. In summary, the people who attended the Public Open House had many comments regarding the project that were either discussed at the Public Open House or were addressed through the commenting process.

2.4.2 Public Open House #2

The second Public Open House (POH) was held on:

Thursday, October 17, 2013 from 4:00 p.m. to 7:00 p.m.
Bracebridge Sportsplex Conference Room, 110 Clearbrook Trail, Bracebridge.

The second POH provided attendees the opportunity to:

- Learn about the alternative routes examined;
- Review and comment on the assessment and evaluation of the alternative routes;
- Comment on the technically preferred route; and
- Ask questions and discuss the project with members of the Study Team.

As at the first POH, members of the public were able to view the display material and to discuss the project with the District Municipality of Muskoka and consultant representatives. Attendees were encouraged to provide written comments. The members of the project team in attendance consisted of:

- Kevin Austin Director of Transportation and Engineering Services, District Municipality of Muskoka
- Chris Stilwell Consultant Project Manager, AECOM
- Valerie McGirr Consultant Manager of Transportation Planning, AECOM
- Wendy Hiles Consultant Administrative Staff, AECOM

The display material presented at the second Public Open House dealt with the following topics:

- Welcome
- Background and Purpose of Study
- Study Area Map
- Study Process
- Evaluation Factors
- Consultation
- Schedule
- Alternative Routes
- Evaluation Process and Results
- Technically Preferred Route Plan and Profile
- Next Steps
- Thank you for attending

A newsletter was prepared for this study and copies were made available to the public at the POH and on the project website.

Following notification and prior to the Public Open House meeting, 2 comments were received from the public. A total of 54 people signed the registration sheet at the POH and no comment sheets were submitted at the meeting on October 17, 2013. An additional 6 comments were received prior to the November 1, 2013 final submission date for comments to be incorporated into the summary report for the POH. Comments received after this date were still considered and are documented below.

A general summary of the comments received are listed below in **Table 2**.

Table 2. Summary of Comments from POH #2

Description of Comments	# of Respondents	Comment #
Concerned about property value impacts	4	2-2, 2-3, 2-4, 2-6
Concerned about property impacts (i.e. severing, access, distance of house from roadway)	4	2-2, 2-3, 2-4, 2-5
Concerns about the consultation/notification process (direct notification of property owners, etc.)	4	2-2, 2-4, 2-5, 2-6
Concerned about impacts on and loss of natural habitat	3	2-2, 2-4, 2-5
Concerned about increasing traffic volumes on High Falls Road	2	1-1, 2-2
Does not support a corridor in such close proximity to an existing road (i.e. High Falls Road)	2	2-2, 2-3
Request copies of reports and files	2	1-2, 2-1
Concerned about length of time available for comment	2	2-2, 2-5
Does not see a need for the project based on current traffic volumes	1	1-1
Supports the “preferred route”	1	2-3
Glad to see that the wetlands have been avoided wherever possible	1	2-3
Suggests moving S. Monck Drive intersection slightly to the north	1	2-3
Concerned about dropping High Falls Road as the preferred route	1	2-4
Concerned about increase in noise levels	1	2-2
Safety concerns	1	2-2
Concerned about drainage at High Falls Road/Bonnell Road	1	2-2

Description of Comments	# of Respondents	Comment #
Concerned about cost of railway over/underpass	1	2-2
Select new, more northerly route	1	2-2
Does not support this study	1	1-1
Feels that a more localized solution can be found if MTO eliminates access points to Hwy 11	1	1-1
Concerned about traffic impacts on Partridge Ave. from commuters trying to short-cut	1	1-1
Concerned about route location limiting the area of infilling and development	1	2-2
Concerned about the implications of such a long timeframe on the project	1	2-4
Concerned that the cost of project is not justified by the traffic volumes	1	1-1

Attendees expressed interest in the plans for future transportation in Bracebridge. The long-term nature of this project left some residents unconcerned about the study and others worried that their property values would be negatively affected for decades to come. Potential impacts to the natural environment and to properties were issues that were raised. As well, some attendees felt that property owners along the preferred route should have been specifically contacted in advance of the Open House. The majority of written comments received were from potentially impacted property owners who had many comments regarding the project that were either discussed at the Public Open House or were addressed through the commenting process.

2.5 Comments Received Since Open House #2

Following Public Open House #2, letters were sent to property owners that lived within 200 m of the preferred alternative route (as shown at the Public Open House, and later revised as noted in Section 7.1.4) to ensure they had all necessary information as presented at Open House #2. This letter was mailed on November 12, 2013. Five separate comments were received from three parties following the November 1st deadline for comments to be incorporated in the Open House #2 Summary Report. A general summary of the comments received are listed below in **Table 3**. All comments received to date have been provided a response.

Table 3. Comments Received since Open House #2

Description of Comments	# of Respondents	Comment #
Concerned about property impacts (ie. severing, access, distance of house from roadway)	1	1
Concerned about impacts on and loss of natural habitat, particularly in the portion of the preferred route south along South Monck Road	1	2
Does not support a corridor in such close proximity to an existing road (ie. High Falls Road)	1	1
Concerned about length of time available for comment	1	1
Concerned about the accuracy and completeness of outside technical studies (ie. Provincial studies/statistics)	1	1
Concerned about property access from High Falls Road	1	1
Questions about traffic volume predictions	1	1
Questions about the feasibility of an Interchange at Hwy 11 if High Falls Road is used as a Northern Corridor	1	1
Concerned about fragmentation and diminished rural character	1	1
Questions about the “shelf life” of an approved Municipal Class EA project	1	1

Description of Comments	# of Respondents	Comment #
Concerned that the “best alternative” from the TSH Bracebridge Transportation Planning Study (1994) was not included in this study	1	1
Wants to see cost figures for the recommendations	1	1
Asked to receive a copy of the Deer Yard Study	1	3

After receiving feedback from the property owners within 200 m, a revision was made to the preferred alternative route in early 2014. Property owners adjacent to the revised section of the route were contacted via letter on March 5, 2014 to make them aware of the proposed change to the recommended plan.

2.6 Individual Meetings

A meeting was held with Craig Douglas of the District Municipality of Muskoka, Chris Stilwell of AECOM and a local resident at the AECOM Bracebridge office on Friday, November 22nd, 2013. The meeting was held at the request of the resident and was to discuss the comments they had sent for consideration on October 31, 2013, and the response sent by AECOM on November 12, 2013. Some of the issues included property impacts, property value impacts and the consultation process. Discussions surrounding the MNR Deer Yard revealed that there may be an error in the limits of the Crown Land shown on various project drawings. Subsequent to the meeting, the District Municipality of Muskoka confirmed that this was the case; these corrections were incorporated into all subsequent reports (including this ESR).

AECOM and the District confirmed with the resident that meetings were planned to be held with MNR in the coming days to discuss the Deer Yard in further detail.

The resident indicated that he would continue to oppose the recommended preferred technical solution.

A second meeting was held with the same public resident, as well as three other neighbours, Tony White of the District Municipality of Muskoka and Chris Stilwell of AECOM on Friday, December 13, 2013 to discuss concerns about consultation with property owners adjacent to the preferred route, the Class EA Process, the limits of the deer yard, and potential for property value impacts.

2.7 Agency Consultation

Meetings with the Agency Stakeholders were held early on in the study, and continued throughout.

Meetings with the Ministry of Transportation were held on April 17, 2012, November 19, 2012 and September 25, 2013. The first meeting allowed the District and MTO to review the study background including past studies by both parties that have an impact on the current work. Data collection, existing conditions and next steps in the process were also discussed. MTO emphasized their design criteria for a new interchange. At the second meeting, the study team illustrated how the requirements of the MTO with respect to interchange spacing and other constraints were incorporated into the development of alternative alignments and the process to be used for the evaluation was discussed. Prior to the third meeting with MTO, the Study Team submitted the detailed evaluation results for the alternatives to allow MTO staff to review this material in advance of the meeting. Comments discussed at the meeting were then incorporated into the evaluation presented to the public.

Following the September meeting, the Ministry of Transportation confirmed via letter (dated November 5, 2013) that their 2010 Highway 11 Access Review study "did not identify the need for an additional interchange within the study limits" and they would not update their preferred plan shown in the study to include the interchange proposed by the DMM. Their position is that "the needs identified in both studies will need to be reviewed once the projects are closer to implementation"…and that "the ministry will consult the District prior to implementing our 2010 plan, should [they] initiate detail design before the District implements their Plan".

Meetings with the Ministry of Natural Resources were held at key points throughout the study process, beginning in April 2012 to discuss the purpose of the study, existing conditions in the study area, locations of environmental concern and alternatives solutions to be considered. The April 10, 2012 meeting also included representatives from the Town of Bracebridge. Other meetings with MNR were held as follows:

- January 3, 2013 – Discussed Red Oak research stands and deer yard within the study area
- March 20, 2013 – Discussed the findings of AECOM's deer yard survey (conference call)
- November 25, 2013 – Discussed the deer yard area

In addition to these formal meetings, correspondence between all agencies, the District Municipality of Muskoka and AECOM was ongoing throughout the study. Details of correspondence, including copies of written correspondence can be found in **Appendix B**.

As noted above, representatives from the Town of Bracebridge were involved at the meeting with MNR on April 10, 2012. Following the April agency meetings, a meeting was held on December 20, 2012 with the Town of Bracebridge to solicit their feedback on potential impacts to the Bracebridge Resource Management Centre as a result of two of the interchange alternatives being proposed. Feedback from that meeting was used as part of the evaluation criteria for selection of the preferred alternative route and interchange. Other meetings with the Town of Bracebridge were held as follows:

- February 5, 2013 – General Committee meeting to discuss the project background, status and next steps
- October 3, 2013 – Met with the Town Engineer to provide a project update on work done since February 2013 meeting
- October 16, 2013 – General Committee meeting to present the material for the October 17, 2013 Public Open House

As was the case for the MTO, MNR and the Town of Bracebridge, a meeting was held on June 19, 2012 with the Township of Muskoka Lakes to discuss the purpose of the study, existing conditions in the study area, locations of environmental concern and alternatives solutions to be considered.

2.8 Other Consultation

Following the presentation of the technically "preferred" alternative at the Public Open House held on October 17, 2013, feedback from some property owners expressed concern about the fragmentation of their lands. This feedback was used to prepare a new route segment in the area of concern (as noted in Section 0 and detailed in Section 7.1.4). Letters were sent notifying any adjacent property owners of the proposed new preferred alternative route on March 5, 2014. The letter included a map of the revised preferred alternative route. Letters were also sent to all agencies on the mailing list, including the MNR.

2.9 Changes Made as a Result of Consultation

Concerns and requirements expressed by agencies such as MTO, MNR, Town of Bracebridge, members of the public and interest groups were considered in the development, assessment and evaluation of alternatives. Based on analysis and investigation of comments received, the following changes were made:

- Revisions to the alignment were made to better avoid the Red Oak research stands and to reflect the revised boundary of the Deer Yard;
- Alignment of Preferred Route was moved northerly on South Monck Road to start the curvature on the north side of the valley;
- An additional route alternative was evaluated (Route S2-E). See Section 7.1.4 for details. Following the revised evaluation with inclusion of this route, Route S2-E was added to the Recommended Plan; and
- Corrections were made in project drawings to the limits of the Crown Land.

Following the second round of consultation, changes were made to the Technically Preferred Alternative Route to reflect input received.

2.10 Council Resolution

This study was approved by Engineering and Public Works Committee on July 23, 2014 and by District of Muskoka Council on August 19, 2014.

3. Problem Statement

The identification of problems and opportunities is Phase 1 of the Municipal Class EA process. The need for a new north arterial was identified in earlier studies and was updated during this Class EA study to reflect current information and data.

3.1 Data Collection

As part of the data collection program for this project, collision data and traffic data were assembled and used to assess existing and future traffic operations and safety as presented in this report.

Daily traffic counts are completed by the District Municipality of Muskoka (DMM) annually in the spring, summer and fall. Traffic data was provided for the road sections identified in Table 4 for the years between 1990 and 2011.

Table 4. Traffic Data Locations

High Falls Road (Muskoka Road 50)
• East of Muskoka Road 4
• East of Highway 11 (Holiday Park Drive)
Falkenburg Road (Muskoka Road 47)
• West of Muskoka Road 4
Monck Road (Muskoka Road 4)
• West of Manitoba Street

Manitoba Street (Muskoka Road 4)
• South of James Street
• North of Meadow Heights Drive
• North of Moore Road
Muskoka Road 118 West / Wellington Street South (Muskoka Road 118)
• South of Muskoka Road 118/Muskoka Road 4 intersection
• Ball's Flats just west of Wellington Street
• West of West Mall Road
Taylor Road (Muskoka Road 42)
• West end of Muskoka River bridge
• East of Pine Street
Manitoba Street (Muskoka Road 37)
• South of Ida Street

These daily counts were supplemented by turning movement counts taken by DMM and AECOM on March 4, 2012. These counts were taken at the following intersections in the AM and PM peak periods of 7:00-9:00 AM and 4:00-6:00 PM.

- Monck Street / Manitoba Street
- Monck Street / Wellington Street
- Manitoba Street / Taylor Road (Muskoka Road 42)

The values for Summer Average Weekday Traffic (SAWDT), Summer Average Daily Traffic (SADT) and Annual Average Weekday Traffic (AWDT) were tabulated from the data that was collected. The summer weekday traffic provides the highest traffic volumes within the study area and it was decided that the analysis would be completed using this data to be consistent with previous studies.

3.2 Collision History

Collision records along major roads in the study area were examined. Collision information for the District roads within the study area was provided by the DMM. The data reviewed was from January 2001 to November 2011. A total of 708 collisions were included in the collision database. Of these:

- 1 collision was a fatality;
- 109 collisions involved non-fatal injuries;
- 596 collisions were property damage only (PDO); and
- 2 collisions were recorded as “other”.

Collision records were analyzed to identify trends. Various collision characteristics for each of the intersections and mid-block road sections were examined in terms of the following characteristics:

- Collision severity including property damage only, non-fatal injury and fatal injury;
- Collision impact type;
- Light condition;
- Road surface condition; and
- Environmental condition.

Most collision occurrences were within the statistically expected ranges. However, there was a prevalence of collisions under dark conditions and wet pavement conditions along Manitoba Street - Muskoka Road 37 (MR 37) between Monck Road and Falkenburg Road. These results were carried forward for consideration during the development of alternatives.

3.3 Existing Traffic Operations

Traffic counts for the major roads in the study area were compared to the expected capacity of the road. The results are provided in Table 5. Locations where the volume to capacity ratio (v/c) is greater than 1.0 indicate that traffic problems may occur. Summer traffic volumes were used in the analysis to be consistent with previous work. (SAWDT is Summer Average Weekday Daily Traffic).

Table 5. Existing Traffic and Volume to Capacity Ratios

Roadway	Assumed Lane Capacity (vph)	PM Peak Hour Volume	PM/Daily Conversion Factor	Directional Split	Daily Road Capacity	Daily Volume (SAWDT)	Volume to Capacity
High Falls Rd. (MR 50)							
• East of MR 4	550	182	0.112	0.50	9812	1623	0.17
• East of Hwy 11 (Holiday Park Drive)	550	175	0.110	0.50	10040	1597	0.16
Falkenburg Rd. (MR 47)							
• West of MR 4	550	55	0.112	0.50	9808	490	0.05
Monck Road (MR 4)							
• West of Manitoba St.	700	1128	0.080	0.50	17413	14030	0.81
Manitoba St. (MR 4)							
• South of James St.	500-600	678	0.090	0.50	13295	7511	0.57
• North of Meadow Heights Dr.	550	538	0.094	0.50	11700	5722	0.49
• North of Moore Rd.	550	271	0.093	0.50	11787	2904	0.25
Wellington St. (MR 118)							
• South of MR 118/MR 4 Intersection	600	944	0.083	0.50	14468	11381	0.79
Muskoka Road 118							
• Ball's Drive just west of Wellington St.	800	980	0.080	0.50	20031	12269	0.61
• West of West Mall Rd.	700	1000	0.097	0.50	14452	10323	0.71
Taylor Rd. (MR 42)							
• West end of Muskoka River bridge	500	1095	0.082	0.50	12211	13371	**1.10**
• East of Pine St.	700	936	0.084	0.50	16708	11171	0.67
Manitoba St. (MR 37)							
• South of Ida St.	500	858	0.105	0.55	8699	9799	**1.13**

The section of Taylor Road at the west end of the Muskoka River Bridge has a daily volume to capacity ratio in the critical range as does Manitoba Street south of Ida Street. The road sections of Monck Road and Muskoka Road 118 in the vicinity of Manitoba Street and Wellington Street are nearing the critical range for volume to capacity ratio.

3.4 Future Traffic Conditions

A twenty year planning horizon is typically used for studies of this nature. The future traffic volumes in the Bracebridge area for the year 2032 were calculated with consideration for historical growth and anticipated development.

With the data provided by the District, historical growth rates were calculated. Traffic growth rates at various locations within the study area between 1996 and 2011 varied between -0.8% and 4.9% as indicated in Table 6. There has been an overall average annual growth in traffic in the study area of 2%.

Table 6. Growth Rates

Roadway	Historical Growth (%/yr)	Existing Summer Average Weekday (SAWDT)	
		PM Peak Hour	Daily
High Falls Rd. (MR 50)			
• East of MR 4	3.4%	182	1623
• East of Hwy 11 (Holiday Park Drive)	2.2%	175	1597
Falkenburg Rd. (MR 47)			
• West of MR 4	3.7%	55	490
Monck Road (MR 4)			
• West of Manitoba St.	700	0.080	14104
Manitoba St. (MR 4)			
• Monck Rd. east of MR 118 intersection	1.3%	1128	14030
• South of James St.	1.8%	678	7511
• North of Meadow Heights Dr.	3.4%	538	5722
• North of Moore Rd.	1.0%	271	2904
Muskoka Road 118 W. / Wellington St. S. (MR 118)			
• South of MR 118/MR 4 Intersection	-0.5%	944	11381
• Ball's Flats just west of Wellington St.	0.2%	980	12269
• West of West Mall Rd.	-0.4%	1000	10323
Taylor Rd. (MR 42)			
• West end of Muskoka River bridge	3.6%	1095	13371
• East of Pine St.	4.9%	936	11171
Manitoba St. (MR 37)			
• South of Ida St.	0.5%	858	9799

Given the uncertainty of growth rates for the future, the traffic volume projections were assessed for growth rates of 1%, 2% and 3% per year.

The existing traffic volume (Summer average weekday traffic –SAWDT) on Muskoka Road 42 east of Pine St. is 11,171 vehicles, which provides a volume to capacity ratio of 0.67. In this area, the growth rate between 2001 and 2011 has been 4.9%. With the more conservative projected growth rates of 1%, 2% or 3% the traffic volumes are expected to increase to 13,630, 15,599 or 20,176 in the future. These volumes result in v/c ratios of greater than 1.0 indicating that the capacity of the road will be exceeded by the expected volume of traffic.

At the Muskoka Road 42 interchange with Highway 11, the current traffic volumes indicate that over an 8 hour count 67% of the traffic or 2025 vehicles turn left to head north on Highway 11. If a factor is applied to the traffic to find a daily traffic volume, there are 3746 vehicles expected to head north on Highway 11 from the interchange. When the traffic volumes reach the capacity of the roadway, it is likely that people will search for an alternative route. This alternative route could be the north corridor. A volume to capacity ratio of 0.85 is typically the limit for a well-functioning roadway. In order for Muskoka Road 42 east of Pine Street to have a v/c ratio of 0.85 on the basis of daily traffic, 3000 vehicles per day would need to change their route and use another corridor to access Highway 11, such as the north corridor under study.

The Town of Bracebridge Transportation Planning Study from June 1994 predicted a SADT (Summer Average Daily Traffic) volume of 1850 vehicles on the new north corridor road. The census population data of 2011 indicates a slightly higher population of 15,409 than was predicted in the 1994 study (14,452) so the predicted volume on the new road should be higher. The previous Transportation Planning Study from 1994 expected an increase of 327 households in the area of Bracebridge where the Clearbrook development is located. The current plan is for 373 homes in that area. The difference in the number of households represents 184 daily trips on the new north corridor road.

When the predicted traffic from new development is added to the number of vehicles expected to transfer to the new road corridor to use a road with less congestion, the expected daily traffic on the new road is 5774 vehicles. Manitoba Street north of Monck Road has capacity to accommodate additional traffic that transfers from existing routes.

3.5 Summary of Problems and Opportunities

The results of the Project Need Analysis reveals the following problems:

- Limited downtown capacity. The route between the Taylor Road interchange on Highway 11 and MR 118 is nearing capacity;
- Limited existing connectivity across the Muskoka River barrier; and
- Need to maintain access to areas adjacent to Highway 11 when direct highway access is closed by MTO.

There are also several opportunities related to the development of improvement alternatives for transportation:

- Enhanced connection to Highway 11;
- Provision of an arterial road built to current arterial standards; and
- Provision of an alternative route for traffic from new developments and improved connections to new developments.

4. Existing Conditions

4.1 Natural Environment

AECOM undertook an assessment of the natural environment. The report, *Bracebridge North Transportation Corridor Class Environmental Assessment Study: Natural Environment Conditions*, is provided in **Appendix C** of this report. The following section provides the highlights of the report. References and citations are provided in the detailed report

4.1.1 Aquatic Environment

The study area is located within the North Branch Muskoka River Subwatershed which flows for 28 km from Mary Lake in Port Sydney to Lake Muskoka, downstream from Bracebridge. Muskoka River occurs along the southern and eastern portions of the study area and is the receiving water body for the watercourses within the study area. Minimal background data was available for watercourses within the study area.

4.1.1.1 Fish Species

The Muskoka River Watershed contains predominantly cool and cold-water fish species. The upper part of the watershed, including the North Branch Muskoka River Subwatershed, supports species such as Lake Trout and Brook Trout. Smallmouth Bass has been stocked within its lakes and Rainbow Trout and Brown Trout have been stocked in selected portions of the watershed. Through discussions and email correspondence with MNR, it was stated that most watercourses within the study area are coldwater and contain Brook Trout.

4.1.1.2 Aquatic Habitat Investigations

High level investigations were completed from July 9th to 13th, 2012 to identify watercourses, drainage features and potential fish habitat within the study area along the alternative routes. The location and presence/absence of water bodies were confirmed during these investigations. Water bodies originally interpreted from aerial photography and not found during field investigations were documented. General characteristics of the water bodies and fish habitat assessments were also documented along with details for both riverine and wetland/beaver pond habitat. Fish community surveys were not completed as part of this field program.

The fish habitat assessments documented the characteristics and major physical attributes of each water body found, including water quality parameters. A variety of details including both flow characteristics and land influences were also considered and include:

Figure 2 presents the aquatic conditions of the study area.

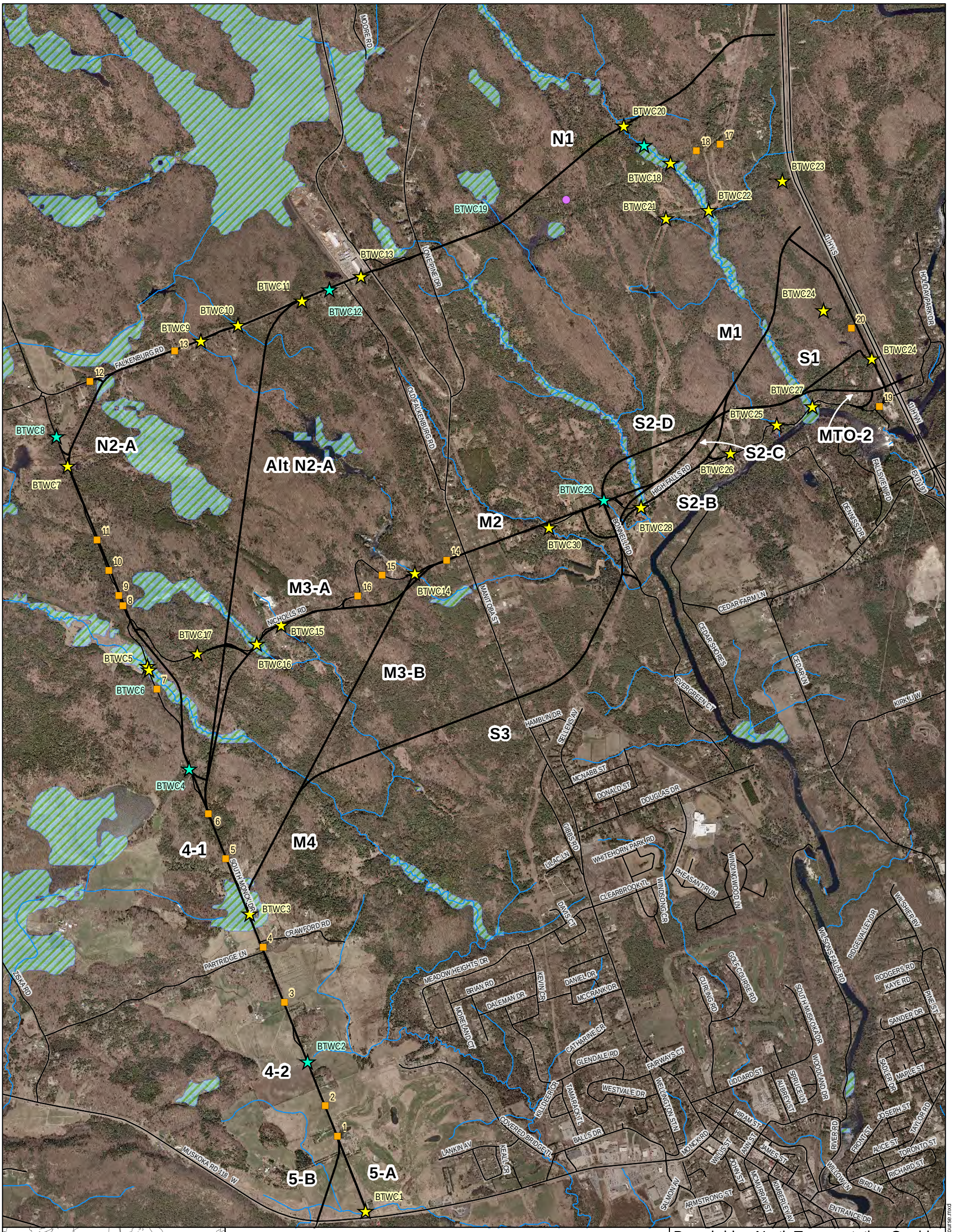
Appendix C presents a photographic record of the aquatic field surveys.

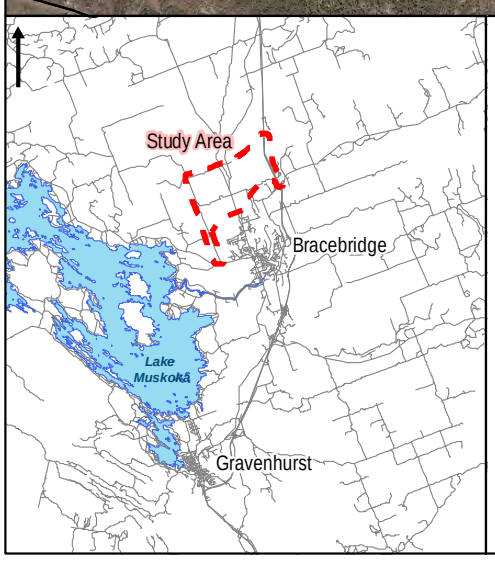
The results of the drainage and fish habitat assessment are provided in Table 7. Only watercourses that had potential fish habitat are shown in this table; the full table is available in the natural environment report in the appendix. As a note, watercourses and the location of aquatic habitat assessments were numbered in the field for identification. These reference numbers are presented in the table as well as in Figure 2.

4.1.1.3 Summary of Aquatic Habitat:

The Bracebridge North Transportation Corridor study area is located in the North Branch subwatershed of the Muskoka River Watershed, which contains predominately cool and cold water fish species.

There are a mix of wetlands, beaver ponds and both permanent and intermittent streams within the study area including four (4) permanent watercourses that likely provide fish habitat. There were two un-mapped watercourses located near Highway 11 and the OFSC Trails towards the eastern limit of the study area. Both were flowing at the time of field investigation. Several intermittent channels convey seasonal flow and provide connectivity between wetlands and beaver ponds. The Muskoka River is located adjacent to study area and is the receiving water body of all four watercourses in the study area.





Legend

- Culvert, Seasonal Drainage
- Vernal Pool, Seasonal Drainage
- Water Crossing, Fish Habitat
- Water Crossing, Seasonal Drainage
- Route Options
- Watercourses
- Roads
- Wetlands

N

Bracebridge North Transportation Corridor Class Environmental Assessment Study: Natural Environment Conditions

Wetlands and Watercourses

March 2013	1:24,000	Datum: NAD83 Zone17 Source: Bracebridge
P#: 60241537	V#: 001	

AECOM

Figure 2

0 412.5 825 1,650
Meters

Map location: P:\60241537\000-CADD\GIS data\Design\Report Maps\Wetland_Watercourse.mxd

Table 7. Data from Aquatic Habitat Assessment

Watercourse Identifier (Figure 2)	Description	Fish Habitat Potential
BTWC1	This watercourse flows in a south easterly direction under South Monck Road towards the Muskoka River. At the time of the investigation there was only pooled water in the channel and culvert; no flow was observed. The watercourse flows through a meadow marsh wetland (MAM 2-2 in Table 8 below) via a narrow (0.6 m wide) channel. On the east side of the road the water was pooling downstream of the culvert. It is not known what was causing the water to pool. The watercourse flows through a golf course. Both the east and west channel receive runoff from the adjacent roadside ditches. Substrates in the channel consist of gravel and sand. Erosion was observed around the culvert on the west side of South Monck Road. This watercourse is likely an intermittent system based on the pooling water and lack of flow.	High potential for fish habitat
BTWC2	Channel through farmers field on both sides via black plastic culvert. Channel is dry on east side with a small pocket of water on the west side. Seasonal Drainage	Provision of seasonal flows
BTWC3	This watercourse braids through a swamp thicket wetland community. No defined channel was observed. The water colour was a very dark brown. Substrates were fines with an abundance of organic material. Both submergent and emergent vegetation was present. The water was stagnant with no observed flow. Green frogs were heard calling.	High potential for fish habitat
BTWC4	Defined channel present with low gradual banks in deciduous forest. No flow, but some pools of water present. Culvert is perched on the west side.	Provision of seasonal flows
BTWC5/BTWC6	This is a medium sized tributary that flows in a south easterly direction to the Muskoka River. It flows through a large wetland community under two CSP culverts approximately 20 m apart. The west side meanders through the wetland and was very slow moving at the time of the investigation. The water was a brown colour and slightly turbid. Substrates consisted of fines with organics and there were pondweed species present. The east side of the watercourse runs parallel with South Monck Road before flowing east into a wetland community. Signs of erosion along the stream bank were observed at this location. Substrates were mixed with gravel, sand and silt with emergent grasses and pondweeds for aquatic vegetation. Unidentified cyprinids were observed on either side of South Monck Road at both culverts. This permanent watercourse provides direct fish habitat.	Fish habitat present
BTWC7	On the west side, low connectivity via a channel. A pool occurs at the culvert that is 5m x 2m with no flow. Water is a brown colour and the culvert is perched. There is also a pool approximate 5mx8m on the east side as well with no flow. A film is on the water.	Moderate potential for fish habitat
BTWC8	Small pool of water on west side. Some water (0.10 cm depth) on east side. No flow but choked with rushes and grasses.	Provision of seasonal flows
BTWC 9	Small, narrow channel flows through forest and under Falkenburg Road through plastic culvert. At the time of the investigation there was very low flow and poor connectivity between the north and south side of the channel. The channels are partially defined with riparian grasses overhanging. A pond was observed on the south side of the road however due to property access could not determine if connected to channel.	Potential for Fish Habitat
BTWC10	A small narrow watercourse flows under Falkenburg Road through a large black plastic culvert. The roadside ditch is steep and reinforced with armour stone. There was very little flow at the time of the investigation and water was pooled on the north side of the road. The watercourse receives runoff from roadside ditches on both the north and south side of the road. The south channel is choked with cattails. The water was a brown colour and had a humic film along the surface.	Moderate potential for fish habitat
BTWC11	A small narrow watercourse flows under Falkenburg Road through a large black plastic culvert. There was very little flow at the time of the investigation and water was pooled on the north side of the road with a lack of connectivity. The watercourse receives runoff from roadside ditches on both the north and south side of the road. The south channel is choked with horsetails and the northside with cattails.	Moderate potential for fish habitat
BTWC12	A wetland community occurs on the south side that is dry with no defined channel. Some pockets of water occur with no flow to the north amongst alders and cattails.	Provision of seasonal flows
BTWC13	This watercourse was flowing at the time of the investigation, through a defined channel approximately 1 m wide. Substrates were fines and the channel was covered with overhanging grasses and shrubs. Water depth was approximately 0.10 m deep and stream morphology was 100% flat. The watercourse receives water from roadside ditches.	High potential for fish habitat
Culvert 14	Culvert receives flows from road and overland.	No potential
BTWC14	At the time of the investigation this watercourse had very low flow and poor connectivity between the north and south side of the road. The channel is approximately 2.5 m wide and less than 0.10 m deep. During low flow connections the culvert on the south side may become perched creating a barrier to fish passage. The channel on the north side of the road was dominated with aquatic vegetation including milfoil and pondweed species.	High potential for fish habitat
BTWC 15	This watercourse flows under Nicholl's Road through a black plastic culvert. The channel on the north side of the road is approximately 2.0 m wide. The riparian cover consists of willow shrub, alders and grasses with emergent rushes in the channel and dense submergent vegetation. The channel on the south side of the road narrows to 1.0 m and is approximately 0.10 m deep. Substrates consist of red coloured fines with some gravel.	High potential for fish habitat
BTWC 16	This watercourse flows in a southerly direction under Nicholl's Road. On the south side the channel is well defined and is approximately 1.5 m wide and 0.15 m deep. There is a large pool on the north side of the road with an approximate depth of 0.50 m deep. The water is a very dark brown in colour and substrates consist of fines with high organic material. The roadside banks around the culverts are deteriorating and unstable.	High potential for fish habitat
BTWC 17	At the time of the investigation there was very little water flow in the channel. The north side of the culvert was blocked with woody debris and water was pooled. The south side of the road only contained pockets of water and was surrounded by alder and willow shrubs. Water colour was dark brown and substrates consisted of fines with organics.	Moderate potential for fish habitat
BTWC 18	This watercourse is a natural meandering channel that flows through an alder thicket swamp along the TransCanada Trail. The swamp is approximately 25 m wide that is bordered by coniferous forest on either side. The channel is approximately 4.30 m wide and the average depth is 0.40 m. Substrates consist of fines with areas of gravels and cobbles with organics. The banks are gradual, stable and well vegetated with lots of overhanging vegetation.	High potential for fish habitat
BTWC 19	Drainage is channelized within a meadow marsh with areas of standing water. A small opening under the trail provides connection. Areas of standing water are present with no flow. Algae mats observed and Green frog heard.	Provision of seasonal flows
BTWC 20	This watercourse meanders through a wetland community at the bottom of a ravine feature. The channel is approximately 2.5 m wide and 0.30 m deep. Substrates consist of fines with gravel areas with woody debris and aquatic vegetation. The stream was flowing at the time of the investigation and cyprinids were observed.	Fish habitat present

Watercourse Identifier (Figure 2)	Description	Fish Habitat Potential
BTWC 21	This watercourse is an open water marsh that narrows into a channel through the forest. The channel is approximately 0.5 m wide and 0.10 m deep. Substrates in the channel consist of cobble and silt. There is poor connectivity between the open water marsh and defined channel.	High potential for fish habitat
BTWC 22	This channel has been dammed by a beaver and in existence for a while. The beaver pond is very large and the dam structure is approximately 4-5 feet tall and 50 m long. The dam is well vegetated and stable with areas of water flowing out across the length of the dam. Cyprinids were observed in the pond. The watercourse flows south from the beaver dam and into a channel that is approximately 0.60 m wide and 0.20 m deep. Cyprinids were observed in the channel just downstream of the beaver dam. The stream morphology is a mix of riffle/run/pool sequence. The trail crosses through the watercourse and evidence of ATV activity in the channel was observed.	Fish habitat present
BTWC 23	This watercourse meanders through the forest and is a very narrow channel of approximately 0.40 m wide and 0.10 m deep. The substrates are a dark brown wilt with pockets of organic material and sand	High potential for fish habitat
BTWC 24	This watercourse meanders through the forest along the TransCanada Trail. The channel is narrow at 0.40 m wide and water depth was approximately 0.20 m deep. Substrates were fines with pockets of sand, gravel, organics and woody debris. Sever erosion of the stream bank was observed on the west side.	High potential for fish habitat
BTWC 25	This watercourse runs under High Falls Road through a black plastic culvert. The watercourse meanders through a cultural meadow. The channel is narrow at 0.40 m and water depth was approximately 0.10 m. Substrates consist of sand, gravel and cobble. The road embankments are very steep leading down to the watercourse and it receives runoff from adjacent roadside ditches.	High potential for fish habitat
BTWC 26	This is a small watercourse that flows towards the Muskoka River. The channel is approximately 0.20 m wide and water depth was less than 0.10 m deep. The channel was overgrown with cattails and other wetland vegetation.	Moderate potential for fish habitat
BTWC 27	This watercourse flows through a steep ravine and under High Falls Road in to the Muskoka River. The channel is approximately 5.0 m wide and water depth was approximately 0.35 m deep. Substrates consisted of silt, sand, gravel and cobble. Old bridge posts were observed in the channel. Water celery was abundant in the channel. The water was slow moving at the confluence with the Muskoka River.	Fish habitat present
BTWC 28	This channel is rock lines on north side and flows out of a forest into an alder thicket wetland. The channel is approximately 1.0 m wide and water depth is 0.20 m deep. The channel is choked with emergent grasses.	Moderate potential for fish habitat
BTWC 29	Channel observed with no water present	Provision of seasonal flow
BTWC 30	This is a small narrow, rock lined channel that flows into a meadow community. The channel was overgrown with vegetation. Water was present at the culvert.	High potential for fish habitat

4.1.2 Terrestrial Environment

4.1.2.1 Ecosystem Land Classification

A total of 15 terrestrial survey stations were visited by an AECOM Terrestrial Ecologist between July 4, 2012 and July 6, 2012. A transect was completed at each survey station to collect information on the representative conditions within that vegetation community including habitat that was representative of the conditions within that particular vegetation community.

Using information collected from the terrestrial survey stations, vegetation communities were classified and delineated using the ELC system Southern Ontario. Based on these systems the vegetation communities were separated into two separate groups, wetlands or uplands. Wetlands comprise a large part of the northern Ontario landscape and are defined as "land that is saturated with water long enough to promote wetland or aquatic process as indicated by poorly drained soils, hydrophytic vegetation and various kinds of biological activity which are adapted to a wet environment". They are ecologically, hydrologically and socially important, providing habitat for many species of plants and animals, and acting as both retention and playing an important role in the hydrological cycle and supporting commercially valuable forests.

The study area is located near the southern edge of the Georgian Bay Lake Ecoregion (Ecoregion 5E), which is part of the Humid High Moderate Temperature Ecoclimate Region. Land cover within this region is dominated by mixed forest (32.0%), deciduous forest (22.2%), coniferous forest (12.1%) sparse forest (11.3%), water (11.0%) and pasture (3.0%). Tree species in this ecoregion primarily consists of eastern white pine, red pine, eastern hemlock, yellow birch, sugar maple, beech, black cherry, basswood and white ash constituting the main forest species.

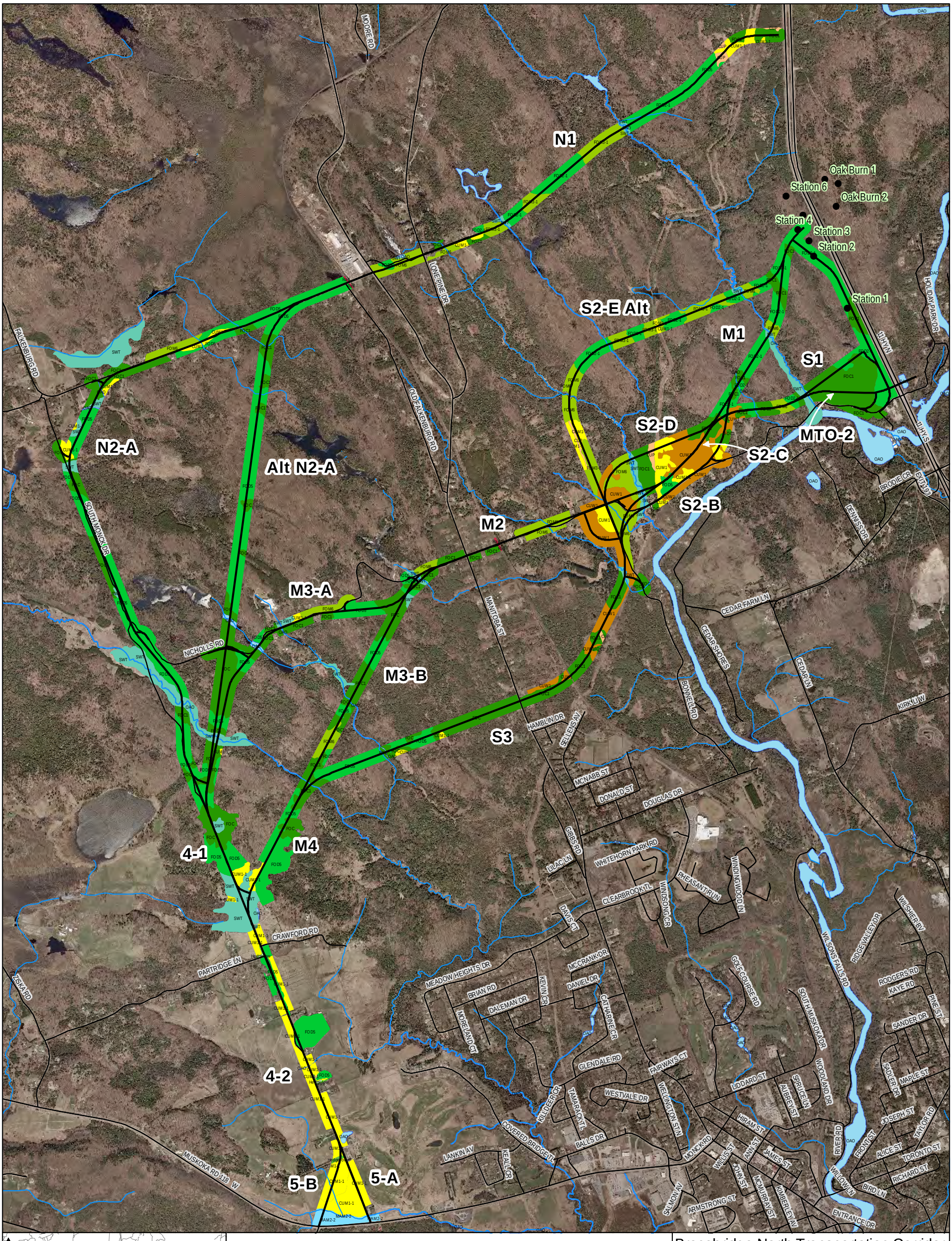
A total of 15 communities, presented in **Figure 3**, were identified through the aerial photography interpretation and field evaluation of the forest and wetland communities within the study area. More detailed descriptions of the ELC Codes can be found in **Appendix C**. The dominant community within the study area is a dry – fresh hardwood – hemlock mixed forest. Other upland communities that were identified within the study area include a coniferous forest, dry – fresh poplar mixed forest, dry – fresh oak – red maple deciduous forest, dry – fresh sugar maple deciduous forest, red pine coniferous plantation, white pine coniferous plantation, scotch pine coniferous plantation and a dry – moist old field meadow. All terrestrial communities identified within the study area are common within Central Ontario.

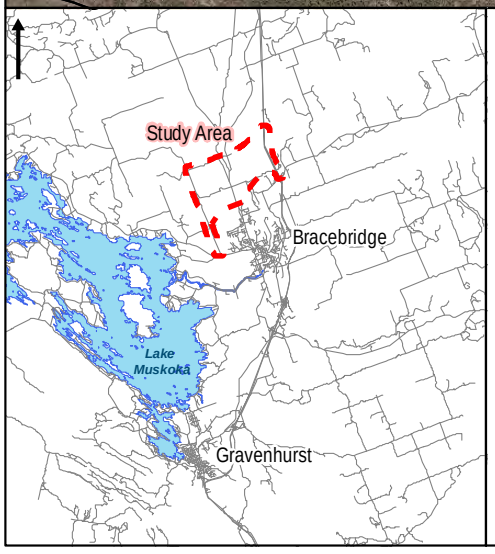
Wetland types within the study area include marsh and swamp habitat. A total of 3 wetland types were identified within the study area including a thicket swamp, a reed-canary grass meadow marsh and a bluejoint organic meadow marsh. All wetland types present within the study area appear to be common in the region.

A list of floral species observed, the field data collected and a representative photograph of each community observed can be found in the natural environment report in Appendix C.

4.1.2.2 Oak Monitoring Stands

Through discussions and email correspondence with MNR, long term oak monitoring stands were identified within the study area. To pinpoint their location, fieldwork was undertaken by one of AECOM's ecologists and MNR's forester on Thursday January 17th, 2013. A total of nine (9) oak monitoring stands were located in the field to aid in the refinement of the alignments and evaluation of alternative routes. Six (6) oak monitoring stands are located west of Highway 11 while three (3) are located east of the highway in the vicinity of the Bracebridge Resource Management Centre. The monitoring stands were geo-referenced with a hand-held geo-referencing device. The locations of these stands are found on Figure 3.





Legend

Route Options | Watercourses | Roads

CUM | CUP | CUW | FOC | FOD | FOM | MAM | SWT | OAO | Hedgerow

N

ELC Codes	Definitions	ELC Codes	Definitions
CUM1	Mineral Cultural Meadow Ecosite	FOD5	Dry-Fresh Sugar Maple Deciduous Forest Ecosite
CUM1-1	Dry-Moist Old Field Meadow Type	FOM3-1	Dry-Fresh Hardwood - Hemlock Mixed Forest Type
CUP	Cultural Plantation	FOM6	Fresh-Moist Hemlock Mixed Forest Ecosite
CUW1	Mineral Cultural Woodlot Ecosite	FOM5-2	Dry-Fresh Poplar Mixed Forest Type
FOC	Coniferous Forest	MAM2-2	Reed-canary Grass Mineral Meadow Marsh Type
FOC1	Dry-Fresh Pine Coniferous Forest Ecosite	OAO	Open Water
FOD2-1	Dry-Fresh Oak-Red Maple Deciduous Forest Type	SWT	Thicket Swamp

Bracebridge North Transportation Corridor Class Environmental Assessment Study: Natural Environment Conditions

Ecological Land Classification

March 2014	1:24,000	Datum: NAD83 Zone17 Source: Bracebridge
P#: 60241537	V#: 001	

AECOM

Figure 3

0 412.5 825 1,650
Meters

Map location: P:\60241537\000-CADD\GIS data\Design\Report Maps\ELC.mxd

4.1.3 Wildlife

4.1.3.1 Significant Wildlife Habitat

Potential significant wildlife habitat that may be present within the study area include winter deer yards, colonial bird nesting sites, reptile hibernacula, habitat for area-sensitive species, forests providing a high diversity of habitats, old-growth or mature forest stands, amphibian woodland breeding ponds, specialised raptor nesting habitat, and seeps and springs.

4.1.3.2 Winter Deer Yards

White-tailed Deer do not typically move well in deep snow in years where a large amount accumulates (i.e. depths of snow greater than 50cm). Under such conditions, deer begin to move to sheltered areas where they will remain in the general vicinity until early April. These areas, known as deer yards, are typically comprised of a core that contains a dense canopy (>60%) of pines, hemlock, cedar and spruce trees that provide shelter, ease of movement, food and protection from predators. In severe winters with deep snow, deer may be confined to the core part of these yards while in more mild winters they may be found in loose aggregations surrounding the core part of the yard. Deer yards are typically surrounded by mixed or deciduous forests. Deer tend to display high site fidelity to a deer yard typically visiting the same yard year after year. Consequently, deer typically do not react well to a loss of a deer yard.

Background information obtained from the MNR indicate that there is a large deer yard present in the large forested area in the northeastern half of the study area.

On February 26th and 27th, 2013 two AECOM ecologists conducted deer surveys specifically for the Bracebridge North Transportation Corridor EA Study. Surveys were conducted to determine whether the lands directly north of High Falls Road provided habitat for deer wintering yards.

No sign of substantial deer populations were evident within the survey limits. One deer trail was observed which was estimated to have been used by a total of three deer. The snow depth was recorded at approximately 70 cm. The species composition and conifer closure did not meet the requirements for deer wintering. Therefore, deer yard wintering habitat was not present within the survey limits conducted by AECOM. These results were confirmed with MNR during a conference call on March 20th, 2013.

4.1.3.3 Colonial Nesting Birds

Several species of herons, gulls, terns and swallows are known to nest in colonies. In some, one or two colonies can support the entire local population of these species. Also several of these species display high levels of site fidelity returning to the same locations year after year. This is why there is often a great deal of importance placed on the preservation of these features.

Background information obtained from the Muskoka Heritage Trust indicate that a Great Blue Heron colony is present to the north east of the Beaver pond located on the Upjohn Nature Preserve located at the intersection of Monck Drive and Nichols Road. The Muskoka Field Naturalists also indicated the presence of a Heron colony within this area through their correspondence dated November 12th, 2013. The exact location of this colony has not been confirmed as AECOM field staff were unable to locate these nests during their site visit in July 2012.

4.1.3.4 Reptile Hibernacula

Some species of snakes and turtles overwinter in sizable concentrations in sites known as hibernacula. A single unidentified snake was observed at the site during the 2012 site visit. Snakes generally hibernate underground in burrows, rock outcroppings or the foundations of old buildings. The presence of this snake could indicate that reptile hibernacula may be present in the study area.

4.1.3.5 Habitat for Area Sensitive Species

The minimum forest habitat for area-sensitive species is at least 100 m from any edge habitat. Large and un-fragmented forest habitat provide habitat for several species of mammals and birds that is important for their long-term survival. Bird species which are area sensitive typically require large tracks of undisturbed habitat to reduce competition from other species provide cover from predators and reduce the ability of nest parasites, such as Brown-headed Cowbird, from reducing the productivity of these birds. Large forests with closed canopy and large trees and a variety of vegetation layers typically support greater species diversity due to the range of habitat they provide. Several area sensitive bird species were observed within the study area indicating that area-sensitive habitat is present within the study area. It is important to note that area sensitive habitat is much more common in central and northern Ontario than it is in southern Ontario.

4.1.3.6 Forests Providing a High Diversity of Habitats

Forests that have a variety of vegetation communities, dominant tree cover, numerous vegetation layers, an abundance of fallen logs and complexes of upland and wetland habitats also may also have high diversity of flora and fauna. The presence of these features within a forest community can be beneficial to many species such as squirrels, cavity nesting birds like Woodpeckers, Barred Owls and Wood Ducks and resting habitat for mammals like Racoon and Porcupine. Older forests also typically have more cavity trees that support a higher diversity of species. Forests that have numerous vertical layers of vegetation can also increase site diversity due to the many microhabitats that they provide for wildlife.

Studies to verify the presence of this type of habitat were not completed as part of this study. However due to the complex topography, age and structure of the forest in the northern half of the study area it is possible that parts of this area could be considered to provide a high diversity of habitats.

4.1.3.7 Old-Growth or Mature Forest Stands

The definition of an old-growth forest varies depending on tree species, however, generally these sites will have a large proportion of trees that are in older age classes, many of which will be over 120 to 140 years old. Other features that are characteristic of an old-growth or mature forest include a broad spectrum of tree sizes and heights, an uneven canopy with scattered gaps due to fallen trees and an abundance of fallen logs in various stages of decomposition.

Studies to verify the presence of this type of habitat were not completed as part of this study. However it is possible that portions of the forest habitat in the north east part of the study area may be considered to be old-growth or mature.

4.1.3.8 Amphibian Woodland Breeding Ponds

Ideal breeding ponds are unpolluted, contain a variety of vegetation structures, are located adjacent to closed-canopy woodlands with a somewhat dense undergrowth and contain fallen logs. As surveys were completed later in the spring, only bodies of water and wetlands that contained water at that time (or are permanent in nature) were documented during the 2012 site investigation. Some of these sites are likely suitable habitat for amphibian and salamander breeding however other sites that only flood briefly in the spring and area smaller in nature and not visible from an air photo may not have been located. It is possible that other low lying wet areas or vernal pools that support amphibian and salamander breeding may be present within the study area.

4.1.3.9 Specialized Raptor Nesting Habitat

Habitat for raptors that nest in forests consists of closed canopies with large enough trees to support their nests and a minimum number of trees and shrubs in the understory to provide an open flight zone under the canopy. Shorelines of productive water bodies with large trees may also provide suitable habitat for Osprey.

Studies to verify the presence of this type of habitat were not completed as part of this study. However due to the large amount of forest habitat in the northern part of the study area and the presence of mature forest habitat near the river it is possible that specialized raptor nesting habitat may be present within the study area.

4.1.3.10 Specialized Habitat

Seeps and springs provide habitat for several species during different seasons due to their high diversity of plants and lack of snow on the ground in the winter and cool conditions during the summer. Although only a few seeps were documented during the site investigation it is highly likely that there are several throughout the study area.

The only Species of Conservation Concern that was documented in the study area or that may be present based on information obtained from background information was the Bald Eagle. Detailed information on the habitat preferences of this species and the suitability of the habitat present at the site is provided in **Appendix C**.

4.1.3.11 Wildlife Observations

Incidental wildlife observations were recorded during the 2012 site visit. These observations included documentation of wildlife sightings, tracks and animal scat. Recording these wildlife observations is an inexpensive and effective method of collecting information about wildlife that may be using the study area.

Wildlife that is representative of the Georgian Bay ecoregion includes little brown bat, American Black Bear, Moose, Fisher, North American River Otter, Beaver, Common Loon, Osprey, Broad-winged Hawk, Ruby-throated Hummingbird, Pileated Woodpecker, Yellow-bellied Sapsucker, Winter Wren, Veery, Blackburnian Warbler, Black-throated Blue Warbler, Yellow-rumped Warbler, Scarlet Tanager, Rose-breasted Grosbeak, Red-spotted Newt, Northern Two-lined Salamander, Four-toed Salamander, Grey Treefrog, Pickerel Frog, American Bullfrog, Snapping Turtle, Smooth Green Snake and Northern Ring-necked Snake.

The majority of the incidental wildlife observations recorded by AECOM were birds. Aside from birds there were very few incidental wildlife observations observed aside from an identified snake species, White-tailed Deer tracks and a beaver dam.

4.1.3.12 Breeding Birds

A background search was completed using the Ontario Breeding Bird Atlas to identify which species of birds have been recorded in the study area. Data obtained from the one Breeding Bird Atlas square (17PK39) that covers the study area identified a total of 94 species of birds, which displayed various levels of breeding evidence in the area surrounding the study area. Species that are included in the Ontario Endangered Species Act that were identified in the Breeding Bird Atlas includes Barn Swallow (Threatened), Canada Warbler (Special Concern) and Eastern Meadowlark (Threatened). The Canada Warbler is also listed as Threatened species under the Federal Species at Risk Act.

Barn Swallow can be found in a wide variety of habitats including agricultural areas, cities, and suburbs and along highways. Breeding habitat usually contains open areas, such as fields, meadows and marshes, for foraging with nesting sites that includes a vertical or horizontal substrate or structure underneath some form of roof or ceiling near a body of water that provides mud for nest-building. No barn swallows were observed during the 2012 site investigations.

Canada Warblers can be observed in a wide variety of forest communities during the breeding season, however, they are typically most abundant in cool, moist forests with a mix of coniferous and deciduous trees, a dense understory and complex ground cover, often with standing water and trees that emerge from the sub canopy. It is typically associated with areas that are covered with moss, nesting on or near the ground in the pockets of moss hummocks, upturned tree-roots or small depressions with deep litter and dense saplings. Compared to other warbler species the Canada Warbler spends relatively little time on its breeding grounds as it is one of the last warblers to arrive and one of the first to leave its nesting areas. Information collected from the forest and wetland evaluations indicate that a trembling aspen mixed wood forest that occupies a large portion of the study area would likely provide suitable breeding habitat for Canada Warbler. No Canada Warblers were observed during the 2012 site investigations. However, the Muskoka Field Naturalists group has indicated its presence during the breeding season for the last couple of years. They also indicated the presence of Golden-winged Warbler and Eastern Whip-poor-will.

Eastern Meadowlark is most commonly associated with native grasslands, pastures, tall-grass prairies and savannas but can also be found in hay and alfalfa fields, the weedy borders of agricultural fields, roadsides, orchards, golf courses, reclaimed strip mines, airports and shrubby overgrown fields. No Eastern Meadowlark were observed during the 2012 site investigations.

A total of 37 bird species were identified within the study area during the site investigation through incidental observations that occurred at various times of the day outside of the timing window identified in the Canadian Wildlife Service Forest Bird Monitoring Program protocol. The list of bird species can be found in **Appendix C**. The majority of the species observed are common central Ontario with the exception of the Bobolink, which is designated as a threatened species under the Ontario Endangered Species Act (ESA). All of the species observed within the study area are common to Central Ontario. Several of the species that were observed are known area sensitive species. Area sensitive species are those that respond negatively to decreasing habitat patch size.

4.1.3.13 Species at Risk

As the province has not been surveyed comprehensively for the presence of SAR; the absence of a species within the NHIC database for a particular area when completing a 1 km search does not necessarily indicate the absence of the species within the study area. Therefore, the 1 km search was supplemented by the records obtained from the Atlas of Breeding Birds of Ontario. The intention of the exercise is to use all available resources to create a comprehensive list of all potential SAR species located within the study area.

In order to better understand which species may be located within study area, a habitat assessment of each Endangered or Threatened species identified from the background search was completed to narrow down possible candidate species that are more likely to be present within the study area. This assessment is based upon a combination of available information: i) the presence/absence of suitable preferred habitat identified during site investigations, and ii) known populations, obtained through range maps COSEWIC reports, and MNR records.

The SAR known in the study area are listed below. This species list was obtained from MNR. The natural environment report in **Appendix C** outlines each of the species identified their Species at Risk Act (SARA) and Species at Risk in Ontario (SARO) designation, a description of their preferred habitat and the likelihood of the habitat found within the study area.

- Barn Swallow
- Blanding's Turtle
- Bobolink
- Chimney Swift
- Eastern Hog-nosed Snake
- Eastern Meadowlark
- Eastern Ribbonsnake
- Least Bittern
- Massassauga
- Milksnake
- Peregrine Falcon
- Snapping Turtle
- Whip-Poor-Will

In order to better understand the potential Species at Risk within the study area The *Species at Risk: Potentially Suitable Habitat Mapping* Final Draft Report completed by Glenside Ecological Services Limited in November of 2009 was also reviewed. Based on the suitable habitat mapping provided within the Species at Risk document the following 14 species have the potential to be located within the study area:

Table 8. Species obtained from *Species at Risk: Potentially Suitable Habitat Mapping* - Final Draft Report

Name	SARO Rank
American Ginseng (*Panax quinquefolius)*	END
Branched bartonia	THR
Broad beech fern	SC
Forked three-awned grass	END
West Virginia White (*Pieris virginiensis*)	SC
Cerulean Warbler	THR
Golden-winged Warbler (*Vermivora chrysoptera*)	SC
Bald Eagle (right along the edge of the Muskoka River)	SC
Kirkland's Warbler (*Dendroica kirtlandii*)	END
Blanding's Turtle	THR
Least Bittern	THR
Yellow Rail (*Coturnicops noveboracensis*)	SC
Eastern Hog-nose Snake (*Heterodon platirhinos*)	THR
Milksnake	SC

Only one SAR was observed during the site visit, a single Bobolink was observed in a field to the east of South Monck Drive in the southern half of the study area. Preferred habitat for Species at Risk that may be present near the study area were cross referenced with information collected from the 2012 site visits to determine if species may be present within the study area. Based on this analysis, habitat for Butternut, Henslow's Sparrow, Bobolink, Cerulean Warbler, Eastern Meadowlark, Eastern Musk Turtle, Bald Eagle, Broad Beech Fern, Canada Warbler,

Golden-winged Warbler, Eastern Whip-poor-will, Northern Long-eared Bat, Milksnake, and Northern Map Turtle may potentially be located within the study area. Of these, Canada Warbler, Golden-winged Warbler and Eastern Whip-poor-will were observed by members of the Muskoka Field Naturalists club during breeding season over the past couple of years.

4.1.3.14 Species of Conservation Concern

As defined in the *Significant Wildlife Habitat Technical Guide,* Species of Conservation Concern are species that have been designated as such according to the Species at Risk in Ontario (SARO) or have been given a provincial S-Rank of S1-S3. This designation does not include species classified as either Endangered or Threatened within Ontario. Species designated as Species of Conservation Concern are uncommon or rare species that do not exhibit high population densities, require fairly specialized habitat, have narrow tolerances for survival that are not thoroughly understood, and because their habitat is rare. Species of Conservation concern do not receive any protection from a provincial standpoint; however, they are identified to create awareness of their habitats.

The results of the NHIC search of the study area returned records of a Prairie Warbler, Caspian Tern, Black-crowned Night-heron, Amber-winged Spreadwing, Azure Bluet, Mottled Bluet, Green-striped Darner, Harlequin Darner, Cyrano Darner, Lilypad Clubtail, Uhler's Sundragon, Variegated Meadowhawk, Early Hairstreak, beautiful serviceberry, uttyroot, yellow bartonia, crowned beggarticks, triangle moonwort, rugulose grapefern, white-tinged sedge, silvery-flowered sedge, field sedge, northern long sedge, prickly hornwort, houghton's flatsedge, ram's-head lady's slipper, and returned one record of a Bald Eagle. Bald Eagles are designated as S2 and Special Concern under the ESA.

4.2 Socio-Economic Environment

Wayne Simpson & Associates undertook the assessment of land use. Their report, *Land Use Report for Bracebridge North Transportation Corridor Class Environmental Assessment*, is provided in **Appendix D** of this report. The following section provides the highlights of their report.

4.2.1 Official Plan

The study area falls under the jurisdiction of three different Official Plans (OPs):

- The Official Plan of the Muskoka District Planning Area, November 1988
- The Town of Bracebridge Official Plan, October 2013 (south of Nichols Rd./High Falls Rd.)
- The Corporation of the Township of Muskoka Lakes Official Plan, April 2013 (the majority of South Monck Dr.)

4.2.1.1 Muskoka Official Plan

The Official Plan (OP) of the Muskoka District Planning Area was first adopted in November 1988 and approved by the Ministry of Municipal Affairs and Housing in June 1991. The OP sets out a number of objectives and policies that are intended to guide land use planning decisions of a broad or regional nature. It also provides the framework upon which the official plans of the six local municipalities in Muskoka are built.

The division of responsibility between Muskoka and the area municipalities is established by various Acts and municipal policy. Of particular note in the instance of this Class EA is Muskoka's responsibility for:

- Broad scale planning for future population change and growth in accordance with the principles of sustainable development; and
- Planning for an integrated transportation system which stresses safe and efficient movement of vehicles, including inter-community and inter-regional traffic.

District Roads lying within the study area include: MR # 4 (i.e. the extension of Manitoba Street), MR #47 (Falkenburg Road) and MR #50 (High Falls Road).

The guiding vision of the Muskoka Official Plan is to always strike a balance between growth and development and the preservation of the natural Muskoka environment. This vision is implemented through policies that are based on the following principles:

- The forested landscape of Muskoka will be protected;
- Development will be based on the principle of a carrying capacity to ensure that the quality of the environment is maintained;
- Tourism and recreational opportunities will be enhanced;
- Improvement to services that support economic development will be promoted; and
- Urban-type development will occur in serviced urban areas.

4.2.1.2 Bracebridge Official Plan

The Town of Bracebridge Official Plan, dated October 2013, is primarily intended to guide development decisions in the urban area and on certain adjacent lands referred to as the 'Near Urban Area'. The Plan also includes general policies applicable everywhere in the Municipality. The environmental policies of the Muskoka Plan are to be applied throughout the Town of Bracebridge.

The lands within the Study Area are predominantly beyond the 'Urban' boundary and would thus be within the 'Rural' designation. The only part of the Study Area lying within the Bracebridge Urban Boundary is Lot 5, Conc. 3, Monck, which lands are for the most part occupied by the Muskoka Highlands Golf Club.

As might be expected, residential development has historically been centred about the urban core. The eastward expansion of residential development has been constrained by a combination of the unavailability of municipal services, the terrain, the presence of incompatible uses and Highway 11. Therefore, the direction of new residential development has been to the west and north. Appendix B to the Official Plan shows the expanse of lands slated for residential development as infilling the current 'Urban' boundary and generally extending to Douglas Drive in the north, South Monck Drive in the west and the area of the Highway 11/118 Interchange in the south. Based on growth projections by the municipalities, there is an approximate 40 year supply of residentially designated lands within the urban area.

Lying beyond this 40 year supply of residential lands is the Rural Area. Until the area within the Urban Boundary expands, the Rural Area is to remain predominantly rural in character with only small-scale development and infilling permitted. The focus of development within the Rural Area will be on "space extensive resource and recreational uses". The goal of the Official Plan is to limit residential development within the Rural Area to only 20% of the Town's development. Based on the estimated supply of residential lands, it would be reasonable to not expect the urban area boundary to be extended into the Rural Area for at least 20 years, and quite possibly closer to 40 years.

The Bracebridge Official Plan encourages the development and integration of a road network that ensures the safe, convenient and efficient movement of traffic while having regard for the natural and physical features of the Town. Included in the Official Plan as Schedule 'C1' – Transportation is a map showing the hierarchy of roads within the

environs of the urban area (**Figure 4**). Depicted are local, collector, arterial and inter-regional roads. All the roads shown on Schedule 'C1' and lying within the Study Area, except MR #4 (Manitoba Street), MR#50 (High Falls Road) and Highway 11, are categorized as local roads.

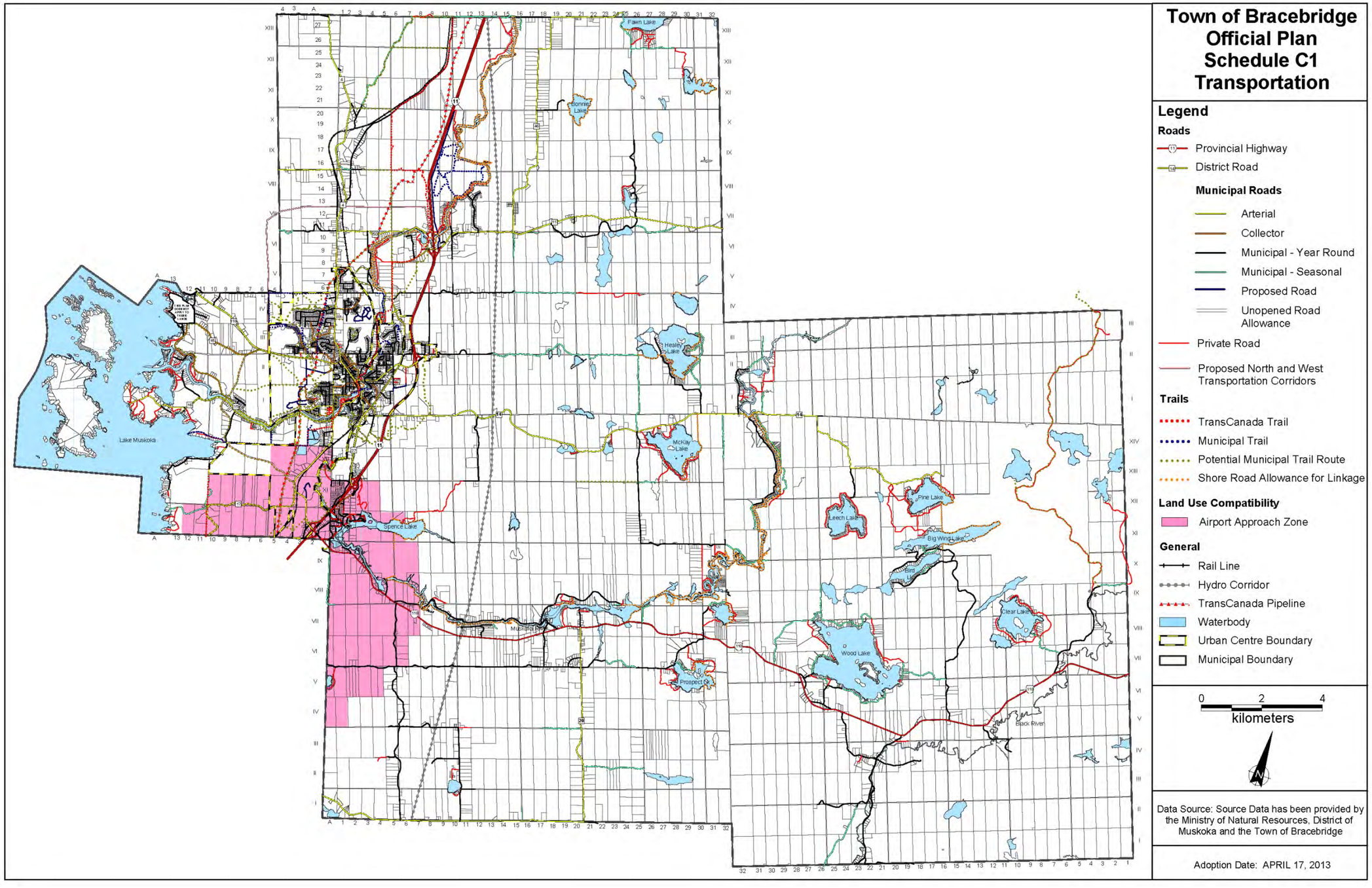
Schedule 'C1' also shows the 'proposed locations' of the Bracebridge West Transportation Corridor and the Bracebridge North Transportation Corridor. The conceptual routing is within the Study Area. The Plan states that the final alignments of both corridors are to be established through the approval of Class Environmental Assessments.

4.2.1.3 Township of Muskoka Lakes

The small part of the Study Area lying within the boundaries of the Township of Muskoka Lakes is designated Rural under the Township Official Plan and for the most part falls within the 'Country Residential' character area. The area lying to the west of South Monck Drive and just north of Partridge Lane is identified as being in the 'Rural Estate' character area.

Development in the 'Country Residential Areas' has historically manifested itself as intensive strip development along Township roads, owing in large part to the close proximity of the character area to an urban centre. While low density residential uses are permitted in the 'Country Residential' area, the Township Plan now encourages such development to be by registered plan of subdivision so the development can be comprehensively planned and integrated into the existing rural character. Otherwise individual lot creation is limited to one new lot per land holding, with both the severed and retained lots having a minimum of 180 metres frontage and 4 hectares in area.

Figure 4. Schedule C1, Transportation Plan, Bracebridge Official Plan



4.2.2 Land Use and Zoning

4.2.2.1 Municipal Zoning By-laws

The majority of the lands lying within the Study Land are zoned “RU-Rural” under Bracebridge Zoning By-law 2006-120 (see **Figure 5**). Permitted uses in the Zone include agriculture, bed & breakfast establishments, kennels, detached dwelling units, forestry, hobby farms, home industries and occupations, hunt camps, market gardens, tree nurseries and veterinary clinics.

Except for hunt camps, the minimum frontage is 120 metres and minimum lot area is 4 hectares. The second most prevalent zone category in the Study Area is “RR-Rural Residential”. This zoning is generally applied to those sections of roadway that have seen ribbon development take place over the years; most notably along MR #4 and the Old Falkenburg Road. The permitted uses in the RR Zone are restricted to bed & breakfast establishments, detached dwelling units, hobby farms and home industries & occupations. Because these uses are not land extensive the minimum lot frontage and lot area requirements are only 60 metres and 0.8 hectares respectively.

There are few commercial or industrial uses within the Study Area and fewer properties that are specifically zoned for commercial or industrial uses. These include: two properties near the junction of the Old Falkenburg Road and MR #4 that are zoned “RC – Rural Commercial” and the Muskoka Lumber property, which is predominantly outside the Study Area, and zoned “RUI – Rural Industrial”.

There is a single property on MR #4 that is zoned “Institutional”. It accommodates the congregational building of the Jehovah’s Witnesses. Under the Township of Muskoka Lakes Zoning By-law 87-87 most of the lands situated within Lot 6, Conc. 5 and Lots 4 and 5 in Conc. 8 are zoned “RU1 – Rural Area 3”. This zoning is very similar to the above described “RU-Rural” both in term of uses permitted and the development standards applied.

The lands on the east side of South Monck Drive and just north of Crawford Lane are, for the most part, zoned “RUER – Rural Estate Residential”. This zoning category under the Township By-law is similar to Bracebridge’s “RR-Rural Residential” zone, in that it allows dwellings on smaller lots with reduced lot frontages. The lands on either side of the seasonally maintained section of South Monck Drive, in Concessions 6 and 7, are zoned either “OS2 - Private Open Space” or “EP1- Environmental Protection One”. Such zoning effectively precludes all development, including single family dwellings.

4.2.2.2 Growth Projections

In recent years the permanent population of the Town of Bracebridge has increased at an annual rate of about 2.3% and the District is projecting continued growth at a rate of roughly 1.5%. At this rate the permanent population will be about 23,100 in the year 2041. Seasonal population growth is expected to continue at an annual rate of 0.31%. The seasonal population is therefore projected to reach 8,100 in 2041.

The Bracebridge economy is comprised predominantly of service sector employment and employment is projected to increase at an annual rate of 1.1%.

4.2.2.3 Residential Development

In accordance with Official Plan policies and the Provincial Policy Statement, most of the increase in the permanent population is expected to be accommodated by new housing in the urban area. Except for that small part of the

Muskoka Highlands Subdivision lying in Lot 5, Concession 3 and being adjacent to South Monck Drive, none of the currently proposed developments lie within the Study Area.

According to municipal estimates, the supply of lands designated as “Residential” within the urban area exceeds the currently projected demand to such an extent that the outward movement of the urban boundary cannot be expected for upwards of 30-40 years. Therefore intensive development in the “Rural Area” cannot be expected for many years and expansion of the urban boundary beyond the “Rural Area” is not expected.

A minority of new residents will continue to seek housing opportunities in the waterfront and rural designations, but the rate of growth in those areas is expected to decline as the policy and regulatory framework makes it increasingly more difficult to create new lots outside of settlement areas, even more so in the Study Area because of its close proximity to the urban area.

4.2.2.4 Employment Areas

The modest growth in employment opportunities will likely be accommodated by new or expanding development on the urban area lands currently designated as commercial, industrial or business area on Schedule ‘A’ to the Bracebridge Official Plan.

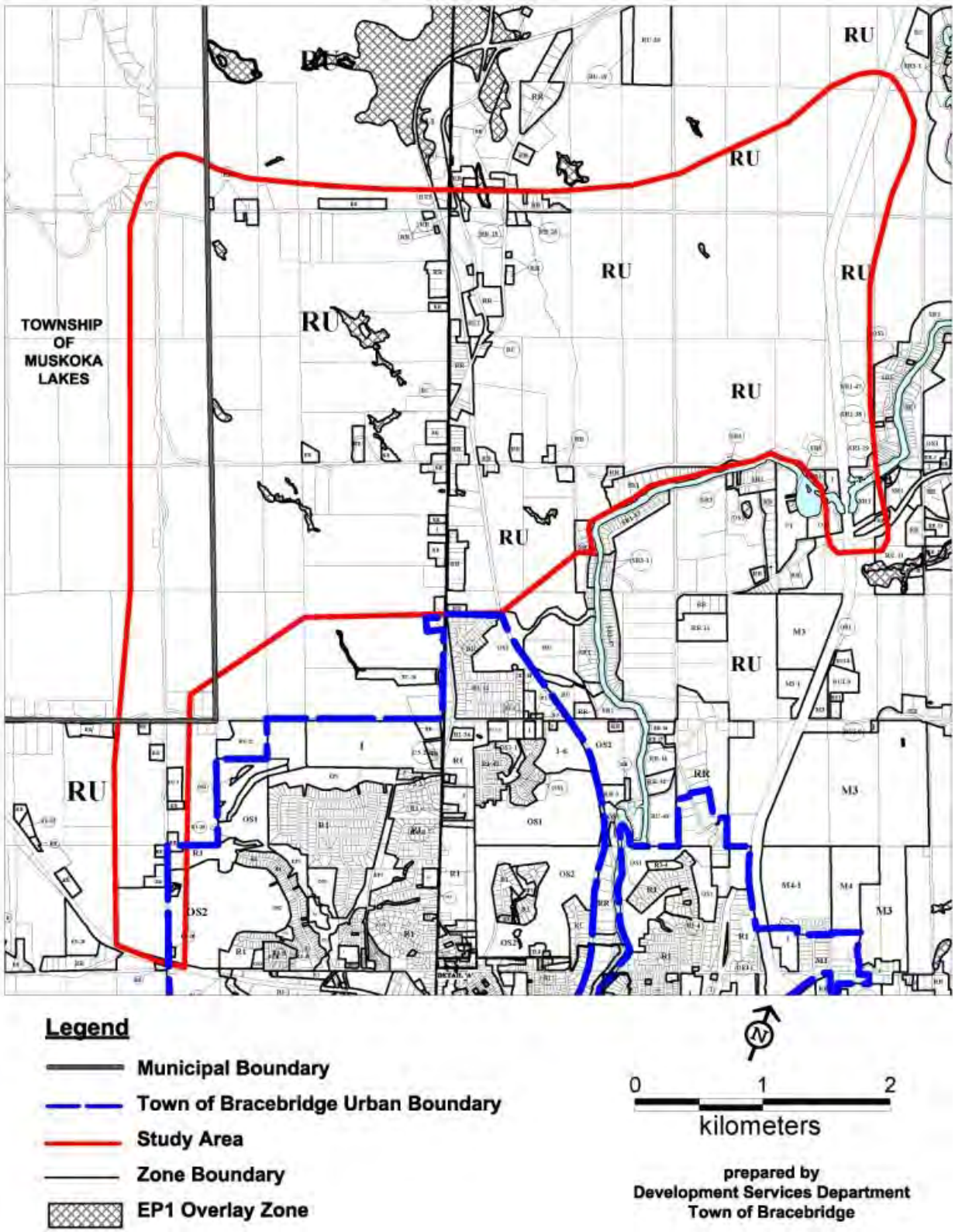
Construction and resource based employment will continue to be found outside the urban area, such as is the case with Muskoka Lumber the only major employer within the Study Area.

4.2.2.5 Snowmobile and Recreational Trails

The location of Bracebridge serves as a hub for snowmobile trails in Ontario. The Trans-Ontario Provincial Snowmobile (TOPS) Trail D passes through the west side of Bracebridge, and also through the study area. The TOPS D Trail utilizes the seasonal road South Monck Drive from south of Nichols Road to Falkenburg Road. The local connection trail 32 also utilizes South Monck Drive to Partridge Lane. Another local connector trail 36 roughly follows the alignment of Falkenburg Road and Naismith Road until it intersects with Highway 11, where is changes direction to parallel to Highway 11, extending to and crossing High Falls Road.

Within the study area, the Trans Canada Trail is located along the west side of Highway 11, roughly utilizing the same trail as the 36 snowmobile trail. The portion within the study area extends from High Falls Road northerly until it extends past the north boundary of the study area.

Figure 5. North Corridor Transportation Area, Town of Bracebridge Zoning



4.2.3 Noise

AECOM undertook the assessment of Noise within the study area. The report, *Bracebridge Transportation Corridor Options Assessment – Noise*, is provided in **Appendix E** of this report. The following section provides the highlights of their report.

Based on the population of the Town of Bracebridge (15,409 in the year 2011[1]), the study area was deemed a Class 2 (Sub-urban) area as per the terms and definitions described in the Ontario Ministry of the Environment (MOE) noise guidelines. Where no dominant noise sources exist, the Ontario Ministry of Transportation (MTO) *Environmental Guide for Noise* suggests an ambient noise level of 50 dB(A) for Class 2 areas. Therefore, the future ambient noise levels in the study area were taken as the greater of 50 dB(A) or the future "No Build" noise emissions due to the existing roadways.

For reference, the MTO Environmental Guide for Noise suggests an ambient noise level of 45 dB(A) for areas designated as Rural.

4.3 Cultural Environment

4.3.1 Archaeology

Archaeological Services Inc. undertook the archaeological assessments in the study area. Their report, *Stage 1 Archaeological Assessment Background Study, Bracebridge North Transportation Corridor Class Environmental Assessment Study*, is provided in **Appendix F** of this report. The following section provides the highlights of their report.

The Stage 1 background study determined that four archaeological sites have been registered within 1 km of the study area. A review of the geography of the study area suggested that the study area has potential for the identification of Aboriginal and Euro-Canadian archaeological resources.

The High Falls 1 (BgGt-1), High Falls 2 (BgGt-2) and High Falls 3 (BgGt-3) sites are all located within the study area boundaries. All three sites were researched by ASI in 1993 and were identified during the study conducted for the Master Plan of Archaeological Resources for the District Municipality of Muskoka (ASI 1993). All three sites are prehistoric with High Falls 1 being a camp and High Falls 2 and 3 being of undetermined site type. The report also determined that local residents identified the High Falls site location as a traditional meeting place for Aboriginal people in the area. The High Falls location is also a known portage route.

Archaeological Research Associated Ltd (ARA) conducted a Stage 1 and 2 Archaeological Assessment along Highway 11 from Muskoka Road 117/Cedar Lane in 2010. The Stage 1 component found that archaeological potential existed in the study area and recommended that Stage 2 work be performed. A Stage 2 assessment was conducted where permission to enter the property was granted. No archaeological materials were recovered during the Stage 2 property survey. The report recommended that the assessed lands be cleared of archaeological concern but the remaining properties should be subject to Stage 2 archaeological assessment (ARA 2010).

[1] *Population estimate obtained from http://www.city-data.com/canada/Bracebridge-Town.html.*

4.4 Physical Environment

4.4.1 Geotechnical

Terraprobe Inc. undertook the assessment of the geotechnical inventory. The report, *Geotechnical Inventory Report, Bracebridge North Transportation Corridor*, is provided in **Appendix G** of this report. The following section provides the highlights of the report.

4.4.1.1 Physiography

Based on the Physiography of Southern Ontario by Chapman and Putnam (1984) the origin of the study area is as a deposit of sediment just below the shoreline of glacial Lake Algonquin. The predominant glaciofluvial outwash and glaciolacustrine deposits of sand to gravelly sand are interrupted by frequent outcrops of igneous and metamorphic Precambrian bedrock. Localized recent peat and/or muck deposits are also anticipated in the study area.

4.4.1.2 Topography

The study area generally has rolling/undulating terrain. Elevations of the ground surface vary from about 240m to 335m throughout the area. Bedrock outcrops define steeper sections while sediment deposits and/or recent organics fill in low-lying bowls. Drainage is anticipated to vary throughout most of the study area with run-off directed largely by the bedrock surface. Poorer drainage in the vicinity of a number of swampy areas in the northern portion of the study area is noted.

4.4.1.3 Subsurface Information

The soils in the Bracebridge area were generally deposited in the following stratigraphic sequence: bedrock is overlain by glaciofluvial outwash deposits overlain by glaciolacustrine deposits; overlain by the more recent post-glacial alluvium and organic deposits.

Shallow or exposed bedrock was noted at numerous locations across the study area. Additional information on the bedrock is provided in Section 4.4.1.5 below.

Glaciofluvial deposits, generally consisting of gravelly sand or sand material, cover much of the study area. According to Chapman and Putnam (1984), the glaciofluvial deposits are generally not considered to be suitable as aggregate sources for commercial uses.

Glaciolacustrine sediments are noted in bands/pockets across the study area. This deposit consists of sand to gravelly sand and silt and is likely of limited depth as well as area.

Organic deposits are noted at several locations within the study area. They are usually associated with poorly drained areas and are likely indicative of bedrock near surface. The materials include peat and muck.

4.4.1.4 Overburden Thickness

Water well records obtained from the Ministry of the Environment of Ontario were used to estimate the depth to bedrock within the study area. It is noted that the water well records can be inaccurate and the information provided from them must be treated with caution. Experience in this area would suggest overburden/drift thickness of about 0 to 10m over the undulating bedrock surface.

4.4.1.5 Bedrock Geology

Based on Geology Map No. 2254 published by the Ontario Division of Mines, the bedrock in the study area consists of Precambrian metamorphic and igneous rocks.

4.4.1.6 Groundwater

From the review of online well data and the site reconnaissance visit, the depth to groundwater is frequently less than 5m where bedrock outcrop is not present. Groundwater was noted at shallower depths at other locations.

4.4.2 Potential Site Contamination

AECOM undertook a Contaminated Site Screening for the study area. The report, *Contaminated Sites Screen Report, Bracebridge North Transportation Corridor*, is provided in **Appendix H** of this report.

One area of potential environmental concern was identified during the contaminated site screening. The property occupied by the Ministry of Natural Resources at 1350 High Falls Rd. was classified as an O.Reg. 347 Waste Generator. The Generator #ON5764225 was approved in 2011 and is no longer active on the Hazardous Waste Information website. Waste classes were not mentioned in the records.

5. Generation, Assessment and Evaluation of Alternatives

5.1 EA Process

The EA process, described in Section 1, requires consideration of a reasonable range of alternatives and their effects on the environment. The evaluation of alternatives during the EA process must be systematic, leading progressively to the identification of the preferred. To achieve this, evaluation criteria are developed to compare the alternatives. These criteria need to reflect an understanding of the existing conditions, the nature of the proposed project and the issues related to the project.

The first alternatives considered in the process are the “alternatives to the undertaking” (also called alternative solutions). These are functionally different ways of addressing the project need. In the evaluation of the alternative solutions, the first consideration is whether or not they address the identified problems and opportunities. The second consideration is the impacts that have been identified. The identified impacts are described with reference to the criteria groups and relevant criteria.

The second alternatives considered are “alternative routes”. The evaluation of alternative routes also considered whether or not they address the identified problems and opportunities and considered the identified impacts.

5.2 Evaluation Criteria

Evaluation criteria were selected with input from agencies and the public as well as study team specialists. Table 9 lists criteria and provides the rationale for their selection. The list of criteria and measures were refined for each independent set of alternatives to reflect the ability of each criterion to help distinguish between the alternatives.

Table 9. Evaluation Criteria

Criteria Group	Criteria	Rationale
Transportation	Accommodation of future vehicular travel demand	The ability of an alternative to provide an acceptable level of service/delay during peak travel periods is required.
	Accommodation of pedestrian and cyclist movements	Providing for the safety and comfort of pedestrians and cyclists is important to the encouragement of active transportation, healthy lifestyles and an active community.
	Travel safety	Designs that meet driver expectations, provide guidance to users and create a forgiving roadside will result in reduced risk of collisions. Designs that remove traffic from collision locations and create fewer conflict points are preferred.
	Emergency service	An alternative that improves access and travel for emergency responders is preferred.
	Transportation network connectivity and compatibility	Alternatives that complement the existing transportation network and planned infrastructure are preferred.
	Commercial goods movement	Alternatives that assist commercial vehicles in reaching their destinations in and beyond Bracebridge are preferred.
	Recreational trails	Conflicts with existing and planned trails (including snowmobile trails) should be minimized.
Socio-Cultural Environment	Noise	Outdoor living spaces may experience increased noise levels. The effect of increased traffic on noise and the feasibility of mitigation needs to be determined.
	Visual aesthetics	The view to and from the road will be considered with respect to existing views and how those might change.
	Residential property required	The area of residential property required and the number of properties affected will be considered
	Recreational property required	The area of recreational property required and the number of properties affected will be considered
	Other property required	The area of other property types required and the number of properties affected will be considered
	Compatibility with existing/future land uses/plans	Alternatives that are compatible with municipal planning are preferred (such as future land uses and Official Plan policies)
	Archaeological resources	Alternatives that minimize the impact on areas of high archaeological potential are preferred.
	Heritage resources	Impacts on heritage properties, infrastructure with historical significance or cultural landscapes will be considered.
Natural Environment	Watercourses/fisheries/aquatic habitat	Alternatives crossing fewer watercourses (especially cold water) and with fewer impacts on specialized habitat (spawning, rearing) are preferred
	Vegetation and woodlots	Impacts on natural vegetation and woodlots should be minimized
	Wildlife/terrestrial habitat	Impacts on terrestrial habitat and specialised habitat types should be minimized
	Wetlands	Impacts on wetlands (especially provincially significant wetlands and wetlands with unique characteristics) should be minimized
	Species at Risk	Alternatives affecting potential habitat for SAR are not preferred

Criteria Group	Criteria	Rationale
Economic Environment	Future development potential	Alternatives that support future development areas in Bracebridge are preferred
	Accessibility to existing commercial areas	Alternatives improving access to existing businesses in Bracebridge are preferred
Engineering	Construction impacts	Alternatives with flexible staging and fewer impacts to traffic during construction are preferred
	Utility/service conflicts	Alternatives with fewer conflicts with existing above ground and below ground utilities are preferred. Alternatives that do not require a new crossing of the pipeline are preferred
Construction Cost	Estimated capital construction cost	Lower costs overall are preferred
	Estimated utility relocation cost	Lower costs overall are preferred

6. Alternative Solutions

6.1 Generation of Alternative Solutions

The investigation of Alternative Solutions is Phase 2 of the Municipal Class EA process. Based on the results of the needs assessment, functionally different ways of addressing the transportation needs for the study area were identified. Reasonable alternative solutions, described in Table 10, are:

- Do nothing;
- Improve existing routes through realignment, intersection improvements, removing parking, and/or widening; and
- Build a new corridor.

Table 10. Description of Alternative Solutions

Alternative Solution	Description
Do Nothing	This alternative assumes no changes are made to the road system to address the needs identified. Development will continue and local roads will be built to serve the property development.
Improve Existing Roads	This alternative assumes the transportation needs will be addressed through the realignment or widening of existing roads, intersection improvements, and/or removal of parking.
New Corridor	This alternative assumes that transportation needs will be addressed through the construction of a new road on the north and west side of Bracebridge.

6.2 Assessment and Evaluation of Alternatives to the Undertaking

The analysis and evaluation of the Alternative Solutions was based on readily available information and field reviews and used a qualitative trade-off comparison approach. This level of detail was deemed sufficient for the evaluation of alternative solutions and was traceable and objective.

With consideration for the criteria that are expected to help differentiate between the alternatives, the following questions were posed:

- Is it technically feasible?
- Will it improve traffic operations?
- Will it improve the Town's connections to Highway 11?
- Are the impacts to the natural, social and other environmental features largely mitigatable?

Alternative Solutions must solve the problems identified during the project need in order to be considered further. Solutions that do not address problems are screened out.

Considering the questions above, the alternatives were analysed and then evaluated according to whether their impacts or benefits (when compared to other alternatives) were better, worse or the same. A reasoned argument method was used. Table 11 provides an assessment and evaluation of the alternative solutions described above in Table 10.

Table 11. Evaluation of Alternative Solutions

Evaluation Considerations	Do Nothing	Improve Existing Routes	Build a New Corridor
• Is it technically feasible?			
	• Yes • The current situation is functioning.	• No • There is little right-of-way space available through the downtown area to widen existing roads. (Manitoba St., Taylor Road). • Existing roads such as Cedar Lane, and High Falls Road have challenging geometric features that cannot easily be improved.	• Yes • A new corridor is technically challenging from the perspective of topography and natural features. • A new crossing of the pipeline is required. • There is an opportunity to introduce a grade separation of the rail line.
Will it improve traffic operations?			
	• No • Traffic operations will deteriorate as Bracebridge continues to grow.	• Potentially • Traffic operations could potentially be improved marginally if the technical challenges were able to be overcome.	• Yes • Traffic operations through Bracebridge and in the vicinity of the north corridor will be improved with the new corridor construction.
Will it improve the Town's connections to Highway 11?			
	• Connection to Highway 11 as per MTO's Recommended Plan with flyover from High Falls Road to Holiday Park Drive and a new connection over the Muskoka River to Cedar Lane interchange.	• Connection to Highway 11 as per MTO's Recommended Plan with flyover from High Falls Road to Holiday Park Drive and a new connection over the Muskoka River to Cedar Lane interchange.	• A new interchange with Highway 11 north of Cedar Lane interchange is feasible with the new corridor.

Evaluation Considerations	Do Nothing	Improve Existing Routes	Build a New Corridor
Are the impacts to the natural, social and other environmental features largely mitigatable?			
	• No • There are no impacts to the natural environment • Impacts to the social environment include increased noise levels along existing roads. • Economic impacts would include congestion along downtown streets, which would lead people to avoid the area.	• No • There would be significant impacts to properties, homes and businesses adjacent to the road corridors to be widened. The character of Bracebridge would be impacted. • Removing on-street parking would impact adjacent businesses. • Natural features adjacent to or crossing the road corridors would be impacted (watercourse crossings, edge vegetation).	• Potentially. A detailed mitigation plan will be required. • Improved traffic will encourage people to visit downtown, a positive effect. • The construction of a new corridor will have impacts on the natural environment (new watercrossings, loss of wetlands, vegetation and habitats). • Some impacts to rural properties and hunt camps are possible.
Summary	Does not address the problem or the opportunities. Does not support future growth in Bracebridge.	Technical challenges and significant environmental impacts make this alternative undesirable.	This alternative addresses the problem and the opportunities. The adverse impacts will need to be examined in detail and eliminated or reduced to the extent feasible.
RECOMMENDATION	Carry Forward for comparison purposes	Do not carry forward	**CARRY FORWARD AS THE PREFERRED SOLUTION**

6.3 Selection of the Preferred Solution

A new corridor was selected as the only alternative solution that will solve the transportation needs identified for the north side of Bracebridge. It was carried forward for the consideration of Alternative Routes.

7. Alternative Routes

7.1 Identification of Alternative Routes

The defined study area for the investigation of route alternatives was generally from Highway 11 in the east to South Monck Drive in the west; from Falkenburg Road in the north to MR 118/Bracebridge urban area in the south. Portions of existing roads were considered in the development of route alternatives where feasible. Figure 6 illustrates the alternative routes considered.

The North Transportation Corridor route alignments were designed for a speed of 80 km/h with 3.75m lanes (one in each direction) and 2m shoulders. A design speed of 80 km/h suggests a posted speed of 60 to 70 km/h.

7.1.1 Interchange Alternatives

The identification of potential routes began at Highway 11. Interchange spacing requirements were provided by MTO, based on safety research. The minimum distance was established as 1711 m from bullnose to bullnose where one lane change is required (corresponding to a distance of about 850 m from the end of the entrance taper to the start of the exit taper). For a standard interchange configuration, this translates to about 3 km centreline to centreline.

A standard interchange configuration was also required (partial cloverleaf or diamond interchange was identified as acceptable). Loops on exit ramps such as present at MR 117/Cedar Lane are not acceptable unless they have a minimum radius of 90m.

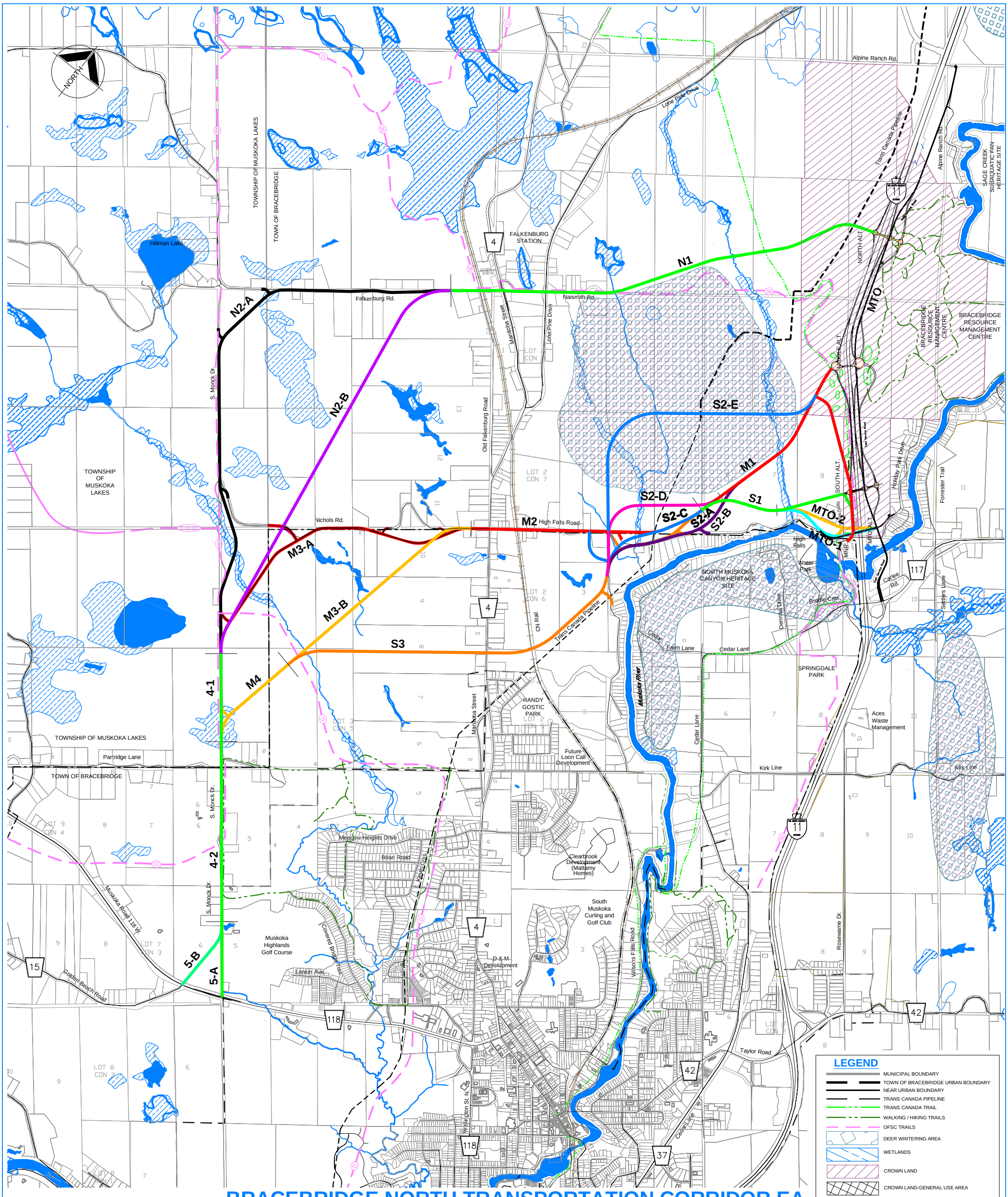
The interchange locations and alignments also considered the deer yard located west of Highway 11, the Bracebridge Resource Management Centre and the red oak regeneration research plots on either side of Highway 11.

At each interchange location, the use of roundabouts was considered for the ramp terminals. In general, roundabouts provide a better level of service than stop controlled intersections and because of the lower speeds needed to traverse a roundabout, there is increased safety. Due to the required sight distance, roundabouts and traffic lights allow a more compact interchange than stop controls would. Roundabouts are preferred over traffic lights, especially given the lower anticipated traffic volumes

Using these parameters, the "**middle**" interchange was established, ensuring that the distance between the bullnose of the southbound entrance ramp was at least 1711m from the bullnose of the southbound exit ramp to Cedar Lane interchange. The northbound distance was also checked. The ramp locations had to consider the location of MNR research stands for regeneration of red oak trees. These stands were surveyed in the field by AECOM.

A second interchange, the "**north**" interchange was established in the vicinity of the existing access to the Bracebridge Resource Management Centre so as to facilitate a route over the north side of the deer yard.

The "**south**" interchange was established closer to High Falls Road. At this location, only the ramps to and from the north could be included as part of the interchange to satisfy the MTO interchange spacing criteria. The distance between the successive exits and entrances was established to conform to the recognized safety research.



BRACEBRIDGE NORTH TRANSPORTATION CORRIDOR EA

District Municipality of Muskoka

ALTERNATIVE ROUTES

March. 2014

Scale: 1:10.000

AECOM

THE DISTRICT MUNICIPALITY OF MUSKOKA

7.1.2 North Alternatives

The north interchange was connected to the East Service Road from Alpine Ranch Road to Holiday Park Drive established by MTO as part of their Highway 11 Class EA Study. No connection across the Muskoka River to the Cedar Lane/MR 117 interchange is needed or provided.

On the west side of Highway 11, the north route (**section N1**) generally follows the north side of the deer yard, and then proceeds along Naismith Road and Falkenburg Road to the west of the railway.

West of the railway, two route alternatives were identified in **section N2**, N2-A and N2-B. Alternative N2-A was located primarily along existing Falkenburg Road and South Monck Drive with the connection between the two existing roads upgraded to the 80 km/h design speed while minimizing impacts to existing homes. Alternative N2-B was located diagonally through the undeveloped area between Manitoba Street and South Monck Drive.

7.1.3 Middle Alternatives

The middle interchange was connected to the East Service Road from Alpine Ranch Road to Holiday Park Drive established by MTO. The East Service Road is re-aligned to be east of the interchange and connects to the bridge over Highway 11 and the ramps at the roundabout (avoiding the red oak regeneration research plots as noted in the discussion of interchange alternatives).

Given the location and shape of the deer yard, the middle road (**section M1**) generally follows the south east edge of the deer yard to High Falls Road and proceeds along High Falls Road (**section M2**) to west of Manitoba Street. An optional West Service Road was designed from the middle interchange to High Falls Road to provide a link to the east end of High Falls Road and minimize out of way travel for users of High Falls Road. Discussions with the Town of Bracebridge representatives indicated that it wasn't needed unless required by MTO as part of their work.

West of Manitoba Street, two route alternatives were identified in **section M3**, M3-A and M3-B. Alternative M3-A was located partially along Nichols Road before turning southwest towards South Monck Drive. Alternative M3-B was located diagonally through the undeveloped area south of Nichols Road and west of Manitoba Street.

Section M4 was established to define the length where Alternative M3-B combines with the south route.

7.1.4 South Alternatives

The south interchange was connected to the East Service Road from Alpine Ranch Road to Holiday Park Drive. The East Service Road is re-aligned to be east of the interchange and connects to the bridge over Highway 11 at a roundabout. The new bridge connection across the Muskoka River to the Cedar Lane/MR 117 interchange is needed for the south interchange alternative. A West Service Road was designed from the south interchange to the east end of High Falls Road.

The south road alternative, **section S1**, is located north of High Falls Road and meets the middle alignment (section M1). To proceed south, **section S2** alternatives (S2-A, S2-B, S2-C and S2-D) connect from north of High Falls Road to south of High Falls Road. Alternatives S2-A and S2-B climb in and out of the valley and use a portion of High Falls Road as part of their alignments. Alternatives S2-C and S2-D remain at a higher elevation and cross High Falls Road to meet Bonnell Road. Alternative S2-C includes a grade-separation with High Falls Road and a short connecting roadway. Alternative S2-D includes an at-grade intersection with High Falls Road at Bonnell Road. Alternative S2-E, which was added later, connects to section M1 of the middle alternatives just west of the

interchange with Highway 11, follows the rear property lines of High Falls Road properties and then swings south to Bonnell Road at High Falls Road similar to S2-D.

Section S3 connects from Bonnell Road and remains north of the pipeline. As it approaches existing and planned development on the north side of Bracebridge, it curves to head west across the railway and Manitoba Street. Along this alignment there is sufficient distance between the railway and Manitoba Street to allow the development of a grade separation of the railway should that be desirable in the future. East of South Monck Drive, section S3 meets the end of Alternative M4.

7.1.5 MTO Alternatives

The Recommended Plan from the MTO Class EA study for Highway 11 included a flyover at High Falls Road connecting to Holiday Park Drive and an East Service Road from Cedar Lane/MR 117 northerly to Alpine Ranch Road. The MTO Recommended Plan was included as an alternative in the Bracebridge North Transportation Corridor Study.

In addition to the "as drawn" MTO Plan, an alternative was created, with a skew on the High Falls Road flyover such that the new road would connect to section S1, described above.

7.1.6 South Monck Drive

All routes connect to South Monck Drive at various locations north of Partridge Lane. **Section 4-1** includes the portion of South Monck Drive from the point where the north alternatives and Alternative M3-A meet to the point where Alternative M4 meets South Monck Drive. **Section 4-2** includes the portion of South Monck Drive from the south end of Section 4-1 to the north end of section 5 (described in the following section).

7.1.7 South Monck Drive at MR 118

At the connection to MR 118 (**section 5**), two route alternatives were identified. Alternative 5A intersects MR 118 at the existing intersection of South Monck Drive and MR 118. Alternative 5B swings away from South Monck Drive near a golf driving range and intersects MR 118 at Golden Beach Road.

7.2 Assessment and Evaluation of Design Alternatives

The alternative routes identified were assessed and evaluated using the evaluation criteria described in Section 5. The assessment and evaluation must consider mutually exclusive portions of alignment (i.e. portions that are alternatives to each other). The sections to be evaluated independently were:

- North alternative route is comprised of:
  - Section N1 from Highway 11 to Falkenburg Road west of the railway (1 alternative)
  - Section N2 from west of the railway to south of Nichols Road on South Monck Drive (2 alternatives)
  - Section 4 from south of Nichols Road to north of Highway 118 along South Monck Drive (1 alternative)
  - Section 5 from north of Highway 118 to Highway 118 (2 alternatives)

- Middle alternative route is comprised of:
  - Section M1 from Highway 11 to point north of High Falls Road (1 alternative)
  - Section M2 from north of High Falls Road along High Falls Road (1 alternative)
  - Section M3 from point on Nichols Road west of Manitoba Street to South Monck Drive (2 alternatives)

- Section 4 from south of Nichols Road to Highway 118 along South Monck Drive (1 alternative as per portion of section 4 from north alignment)
- Section 5 from north of Highway 118 to Highway 118 (2 alternatives as per north alignment)

- South alternative route is comprised of:
  - Section S1 from Highway 11 to common point north of High Falls Road (1 alternative)
  - Section S2 from north of High Falls Road to south of High Falls Road (5 alternatives)
  - Section S3 from south of High Falls Road to south Monck Drive (1 alternative)
  - Section 4 from south of Nichols Road to Highway 118 along South Monck Drive (1 alternative as per portion of section 4 from north alignment)
  - Section 5 from north of Highway 118 to Highway 118 (2 alternatives as per north alignment)

- MTO alternative route is comprised of:
  - Section MTO from Highway 11 flyover at High Falls Road joining Section S1 from South alignment (2 alternatives including a modification of the TESR Recommended Plan to improve connectivity)
  - Continues as per preferred south or middle alignment

To complete this evaluation in a systematic and traceable manner, the steps described in Table 12 were completed in order:

Table 12. Evaluation Methodology Steps

Step:	Action:
1	Evaluate Alternatives N2-A and N2-B from common point on Falkenburg Road to common point on South Monck Drive.
2	Evaluate Alternatives 5-A and 5-B from common point on South Monck Drive approximately 700 m north of Highway 118 to their separate intersections with Highway 118
Result	Preferred northerly alignment from Highway 11 to Highway 118
3	Evaluate Alternatives S2-A, S2-B, S2-C and S2-D from common point north of High Falls Road to common point south of High Falls Road
Result	Preferred southerly alignment from Highway 11 to Highway 118
4	Evaluate Alternatives M3-A and M3-B from common point on Nichols Road to common point on South Monck Drive
Result	Preferred middle alignment from Highway 11 to Highway 118
5	Evaluate preferred middle and southerly portions between common points (M2/S2 and M3/S3)
Result	Preferred middle/south alignment (excluding interchange location)
6	Evaluate MTO-1 and MTO 2 alignments between High Falls Road Flyover and S1
Result	Preferred MTO alternative
7	Evaluate preferred northerly, middle and southerly alternatives together with the MTO alternative
Result	Technically preferred route
8	Evaluate Alternative M1 plus S2-D (preferred middle and southerly alternatives) and M1 plus S2-E (new proposed alternative) from common point west of Highway 11 to common point south of High Falls Road
Result	Recommended Plan

Detailed assessment and evaluation tables for each of the above eight steps are provided in **Appendix I** along with the associated plans and profiles and detailed calculations of the scoring.

As part of the evaluation process, a sensitivity analysis was undertaken to assess the robustness of the results. This was done by calculating the score using the same weight for each criterion and then by adjusting the weights to place more emphasis on criteria with more significant environmental effects, based on the judgement of environmental specialists. This work is also documented in **Appendix I**.

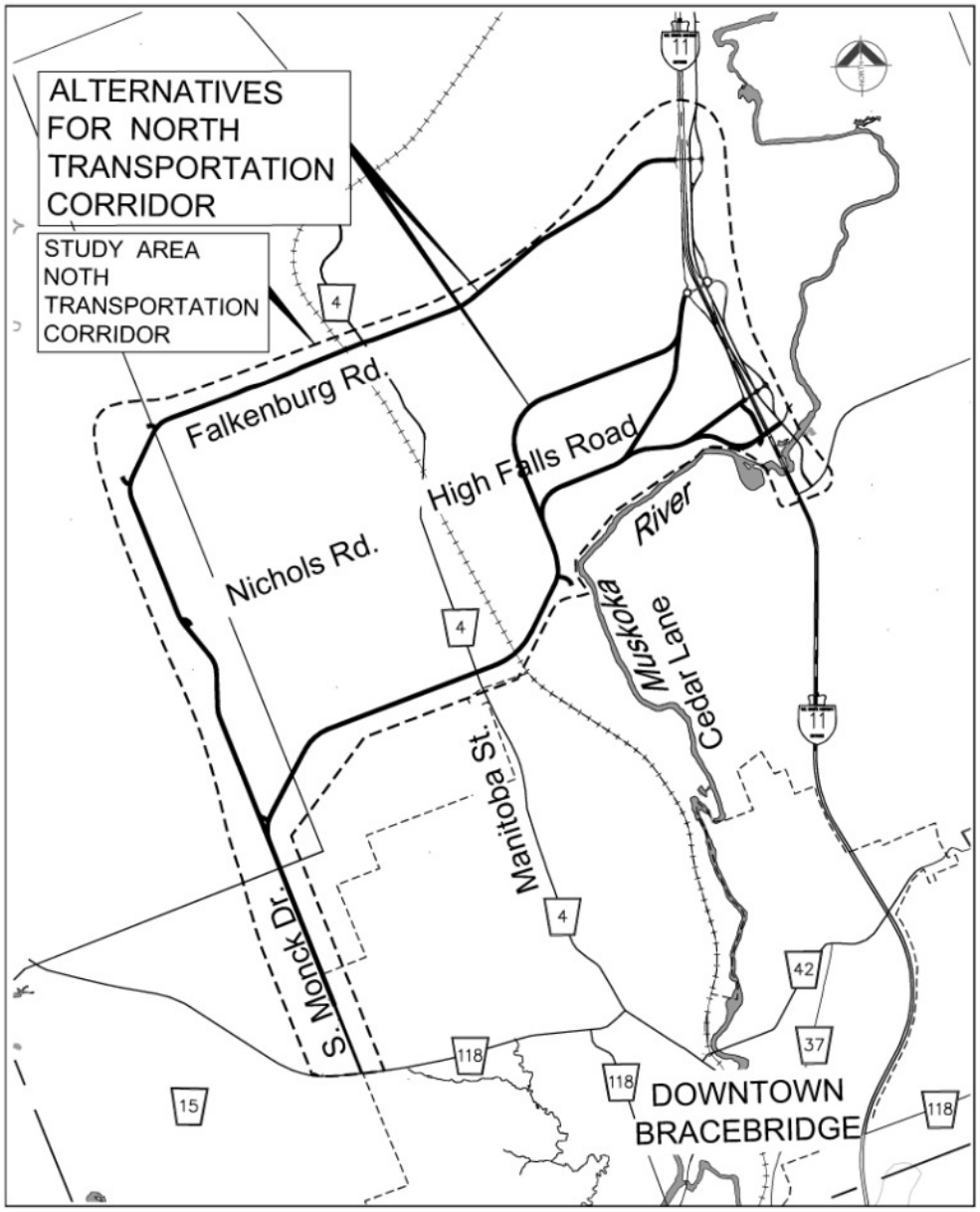
Table 13 summarizes the results of the evaluation and overall scores for the alternatives. Lower scores are preferred.

Table 13. Evaluation Results

Step:	Action:				Result:
1	Evaluate Alternatives N2-A and N2-B from common point on Falkenburg Road to common point on South Monck Drive.				N2-A preferred
	Scores	***N2-A*** *91.0*	***N2-B*** *96.0*		
2	Evaluate Alternatives 5-A and 5-B from common point on South Monck Drive approximately 700 m north of Highway 118 to their separate intersections with Highway 118				5-A preferred
	Score	***5-A*** *91.0*	***5-B*** *96.0*		
Result	Preferred northerly alignment from Highway 11 to Highway 118				N1, N2A, 4-1, 4-2, 5A
3	Evaluate Alternatives S2-A, S2-B, S2-C and S2-D from common point north of High Falls Road to common point south of High Falls Road				S2-D preferred
	Score	***S2-A*** *NA*	***S2-B*** *87.0*	***S2-C*** *82.7*	***S2-D*** *78.7*
Result	Preferred southerly alignment from Highway 11 to Highway 118				S1, S2-D, S3, M4, 4-2, 5A
4	Evaluate Alternatives M3-A plus 4-1 and M3-B plus M4 from common point on Nichols Road to common point on South Monck Drive				M3-B plus M4 preferred
	Score	***M3-A & 4-1*** *93.3*	***M3-B & M4*** *69.3*		
Result	Preferred middle alignment from Highway 11 to Highway 118				M1, M2, M3-B, M4, 4-2, 5A
5	Evaluate preferred middle and preferred southerly portions between common points (starting with M2/S2 and ending with M3/S3)				S2-D, S3 preferred
	Score	***M2 & M3-B*** *102.3*	***S2-D & S3*** *81.0*		
Result	Preferred middle/south alignment (excluding interchange location)				S2-D, S3, M4, 4-2, 5A
6	Evaluate MTO-1 and MTO 2 alignments between High Falls Road Flyover and their connection to S1 (MTO is a modification of the original MTO Recommended Plan for High Falls Road but with the same elements)				MTO-1 preferred
	Score	***MTO-1*** *81.0*	***MTO-2*** *82.0*		
Result	Preferred MTO alternative				MTO-1, portion of S1
7	Evaluate preferred northerly, middle and southerly alternatives together with the MTO alternative (as illustrated in Figure 7)				Middle alternative preferred
	Score	***Do Nothing*** *86.7*	***North Route*** *120.0*	***Middle Route*** *80.3*	
		South Route *93.5*	***MTO Route*** *95.7*		
Result	Technically preferred route				M1, S2-D, S3, M4, 4-2, 5A
8	Evaluate M1 plus S2-D and M1 plus S2-E (new alternative route segment added) from common point west of Highway 11 to common point south of High Falls Road				M1 plus S2-E preferred
	Score	**M1 & S2-D** *71.3*	**M1 & S2-E** *67.7*		
Result	Recommended plan (with changes made as a result of consultation)				M1, S2-E, S3, M4, 4-2, 5A

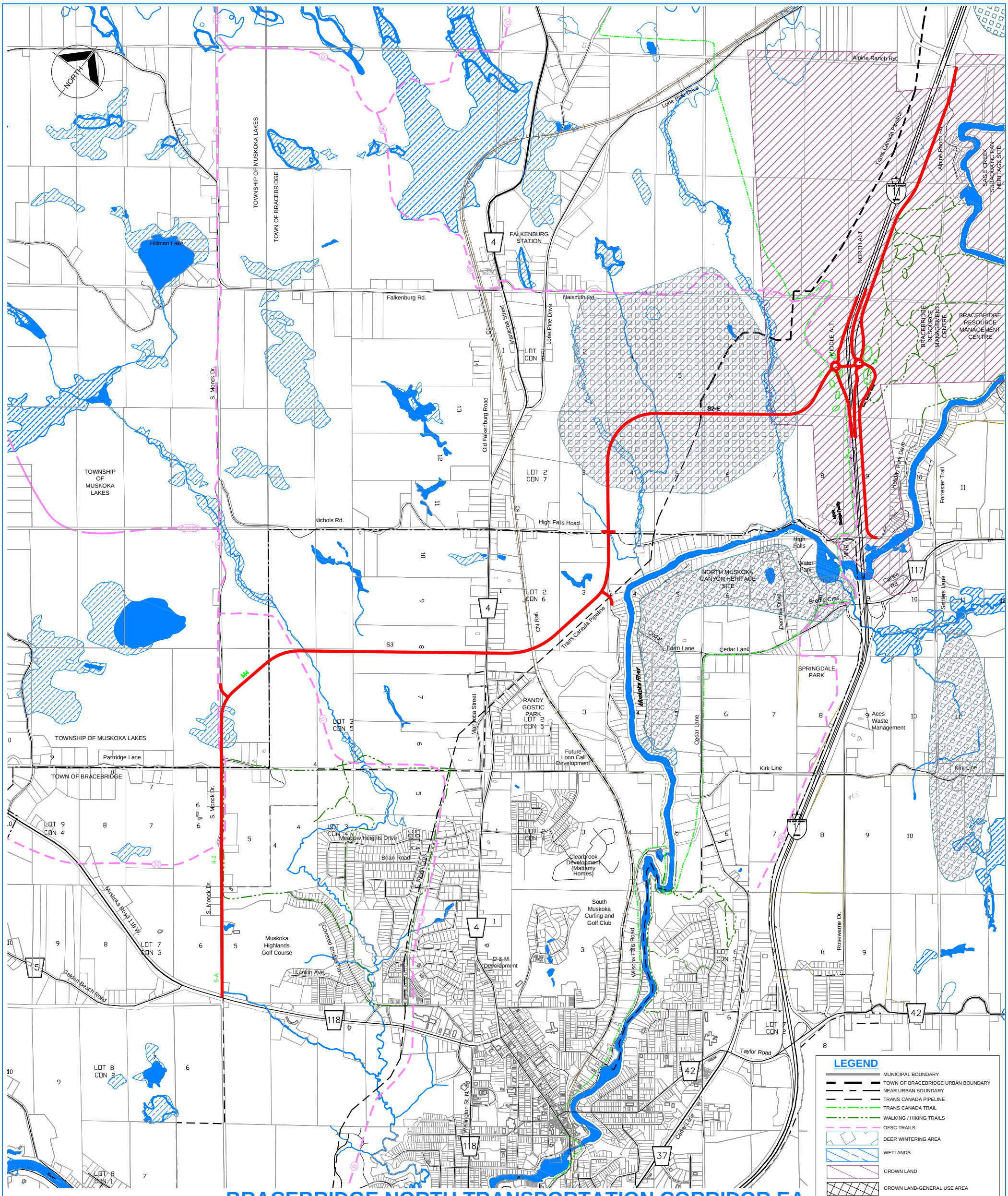
**Lower scores are preferred*

Figure 7. Preferred Northerly, Middle, Southerly and MTO Alternatives



7.3 Selection of the Preferred Alternative(s)

The middle interchange, providing full movements in all directions at Highway 11 combined with the south route alternative was selected as the technically preferred alternative. Following consultation, an additional route segment (S2-E) was considered and evaluated. The Recommended Plan was identified and included this new route segment. The corridor of the Recommended Plan is illustrated in Figure 8.



BRACEBRIDGE NORTH TRANSPORTATION CORRIDOR EA

District Municipality of Muskoka

PREFERRED ROUTE

October. 2013

Scale: 1:10.000

AECOM

THE DISTRICT OF MUSKOKA

8. Project Description

8.1 Description of Recommended Design

The Recommended Plan and typical cross- section is illustrated on the drawings in **Appendix A**. An index sheet and typical section drawing are included in **Appendix A** for reference. The overall length of the corridor from Highway 11 to MR 118 is about 6.5 km.

Road design will generally be in accordance with the MTO's *Geometric Design Standards for Ontario Highways*. The geometric design criteria for a new 2-lane arterial in the District of Muskoka are:

Table 14. Design Criteria for Arterial Road

	Criteria
Classification (Rural Arterial Undivided)	RAU 80
Design speed [1]	80 km/h
Posted Speed (typically 10-20 km/h below design)	60-70 km/h
SADT (Horizon Year 2032)	5500
% Trucks (Horizon Year 2032)	3%
Lane Width	3.75m
Shoulder Width [2]	2.0 m (paved)
Rounding Width	0.5-1.0 m
Ditch Slopes	3:1
R.O.W. Width (minimum)	30 m
No. of Through Lanes [3]	2 (1 in each direction)
Minimum Stopping Sight Distance	135 m
Minimum Horizontal Radius	250 m
Minimum Gradient	N/A
Cross fall	2 %
Maximum Gradient	8%
Minimum Crest K-Value	35
Minimum Sag K-Value (headlights)	30
Maximum Superelevation	6%

Notes:
1. Design speed is reduced on the approaches to roundabouts to provide a transition from the operating speed on the road section to the operating speed in the roundabout.
2. Paved shoulder accommodates cyclists and pedestrians along the road.
3. Auxiliary lanes may be provided at intersections where warranted.

Interchange with Highway 11:
At Highway 11, a new interchange is provided that satisfies the MTO interchange separation requirements. The minimum bullnose to bullnose distance between the ramps at Cedar Lane and the ramps of the new interchange is 1711m. The interchange has a diamond configuration with roundabouts providing traffic control at the ramp terminal intersections to provide speed management and to safely assign right-of-way between all directions of travel. The alignments of the ramps and the locations of the roundabouts were selected to avoid impacts to the red oak

research stands in the area and the Bracebridge Resource Management Centre. Provision for a level at-grade crossing and relocation of the Trans Canada Trail and collector snowmobile trail will be required in the vicinity of the interchange on the west side of Highway 11. Relocation of one trail in the Bracebridge Resource Management Centre will be required on the east side of Highway 11.

East Service Road:
On the east side of Highway 11, the East Service Road that forms part of the MTO Recommended Plan for Highway 11 is connected to the roundabout. The East Service Road extends from Holiday Park Drive in the south to Alpine Ranch Road in the north. The portion of the MTO Recommended Plan for Highway 11 that includes a new crossing of the Muskoka River with a connection to the Cedar Lane interchange is not required as the new interchange will provide the access between Highway 11 and the properties on its east side.

Highway 11 to High Falls Road:
West of Highway 11, the route alignment heads south and west to the property line between Concession 7 and 8 and then curves south to intersect High Falls Road at Bonnell Road. There is a new crossing of the TransCanada Pipeline in this segment. The route crosses four permanent watercourses with valley lands and is within the deer yard identified by the MNR. A grade of 7% is found on the route approximately 1 km west of Highway 11 and a grade of 8% is found approximately 1 km north of the Intersection with High Falls Road.

High Falls Road to Manitoba Street:
The route continues south along the Bonnell Road right-of-way, then curves to the southwest north of the intersection of Bonnell Road and the pipeline. The route continues southwest roughly parallel to the pipeline. In the vicinity of the CN railway, the route curves west to intersect with Manitoba Street north of the Bracebridge urban boundary and existing subdivision development. There are also existing homes and other buildings along Manitoba Street north and south of the corridor. A future grade separation of the railway and the arterial road would be feasible. The topography is gentler in this segment and the route crosses one watercourse. A relatively short section of 5% grade is found on the route 200-300 m south of High Falls Road.

Manitoba Street to South Monck Drive:
The route alignment continues west of Manitoba Street before curving southwest in the vicinity of the Bracebridge-Township of Muskoka Lakes boundary. The route then curves south to intersect with South Monck Drive. Two watercourses and associated valley lands are crossed by the corridor. Two locations with 6% grades are found on the routes, just west of Manitoba Street and approximately 700m west of Manitoba Street. A 7% grade is located in the valley down to South Monck Drive.

South Monck Drive to MR 118:
The route alignment follows South Monck Drive to MR 118. The plan and profile of existing South Monck Drive would be reconstructed to provide the appropriate design standards for the new arterial. A new connection to South Monck Drive north of the corridor (seasonal road segment) is included in the plan. The kink in the road within the area of Concession 4, Lot 6 would be straightened. The route crosses a watercourse just north of MR 118. A 6% grade is located immediately south of the Partridge Lane intersection and a 5% grade is located about 1 km from MR 118.

8.2 Project Cost Estimate

Table 15. Project Cost Estimate Breakdown

Item	Description	Units	Estimated Quantity	Unit Rates	Total Cost
1	Clearing and Grubbing	ha	29	$16,000	$464,000
2	HL4	t	39,400	$105	$4,137,000
3	Earth excavation - grading	m3	70,000	$12	$840,000
4	Rock excavation	m3	247,100	$60	$14,826,000
5	Earth borrow (m³)	m3	105,500	$20	$2,110,000
6	Granular 'A'	t	80,000	$20	$1,600,000
7	Granular 'B' Type II	t	204,000	$18	$3,672,000
8	S.B. Guide Rail	m	7,420	$100	$742,000
9	Extruder End Treatment	ea.	82	$3,500	$287,000
10	Highway Fence	m	14,040	$60	$842,400
11	"Deer Barrier" Fence	m	3,180	$70	$222,600
12	Medium span culverts	m	246	$5,000	$1,227,500
13	Large span structural culvert	m	227	$20,000	$4,540,000
16	Rail grade separation	LS	1	$5,000,000	$5,000,000

Subtotal	$40,600,000
Drainage (15%)	$6,100,000
Subtotal	$46,700,000
Miscellaneous (25%)	$11,700,000
Total	**$58,400,000**

Note: 1) The interchange with Highway 11 and East Service Road is not included.

8.3 Geotechnical Requirements

Much of the corridor is expected to be underlain with competent subsurface material including rock, sand and gravel. There are also areas of soft organic soils and loose sands/gravels that will require special attention. The characteristics of the variable subsurface material along the corridor will be defined and mapped during geotechnical investigation in detail design.

Where materials are looser and high fills are present, densification may be required to increase stability. Depending on the depth of soft materials, they may be excavated from under the proposed roadbed and replaced with compacted granular materials. Geosynthetics may also be incorporated into the pavement design to provide adequate support. In areas of rock excavation, the thickness of Granular B may be reduced and rock shatter used to complement the granular materials.

Excavations below groundwater level are expected to experience inflows and require excavation support and dewatering.

Bridge/culvert foundations will likely be founded on spread footings on rock or steel piles in sand/gravel.

8.4 Drainage and Stormwater Management

A rural cross-section will be used for the transportation corridor with runoff directed via ditches to receiving watercourses. During detail design the need for Best Management Practices for quantity and quality controls will be identified for each segment of the route in consultation with regulatory agencies.

Where required, roadside ditches will be developed as enhanced swales for water quality impact mitigation and flow attenuation using either rock check dams or swales with a controlled outlet. Where the corridor is adjacent to wetlands, direct discharge from the roadway to the wetland is recommended, using intervening buffer strips to mitigate any water quality impacts.

The potential impact of increased winter maintenance salt loading to environmentally sensitive areas, due to new pavement, cannot be directly mitigated: salt is typically "in solution" when runoff occurs and cannot be cost-effectively removed. The federal government, in partnership with Canadian municipalities and the Transportation Association of Canada, have developed a *Code of Practice for the Environmental Management of Road Salts* for identifying salt-vulnerable areas and the *Salt Management Guide (TAC 1999)* for appropriate winter maintenance operations that can minimise the impact of salt application on these areas. These additional salt management measures could include:

- Using technologies that further optimize the use of road salts, e.g., electronic spreader controls, Road Weather Information System (RWIS) sites, pre-wetting, direct liquid application, Automatic Vehicle Location/ Global Positioning System (AVL/GPS)
- Using alternatives to road salts, e.g., calcium magnesium acetate (CMA) in sensitive areas
- Increasing the monitoring and measuring of chlorides and their impacts on sensitive wetlands

It is recommended that the District of Muskoka identify these salt-vulnerable areas in relation to the corridor and review its winter maintenance activities in these areas.

8.5 Utilities and Pipeline

A new crossing of the Trans Canada Pipeline is located at approximately Station 1+600. Once a survey has confirmed the elevation of the ground over the pipeline, the road profile will be adjusted to suit the requirements. The District of Muskoka will work with the pipeline owner to design the crossing, including appropriate protection for the pipeline.

Power and communication poles will require relocation where the Recommended Plan conflicts with existing installations. This is expected to be primarily along South Monck Drive, Bonnell Road and where the route crosses existing roads.

8.6 Property Acquisition

Property must be acquired throughout the corridor, involving a wide range of land uses. Additional property may be identified in detail design to provide screening/shielding for existing homes using vegetation, grading or fencing. Property requirements will also be refined in detail design when more accurate topographic mapping and locations of rock are available for the determination of grading limits.

9. Impacts and Proposed Mitigation Measures

9.1 Natural Environment

9.1.1 Aquatic Species and Habitat

Loss of aquatic habitat and function at five (5) new watercourse crossings containing coldwater habitat may result from the construction of the preferred alignment. Negative effects would be mitigated and compensated for (as required) by undertaking construction outside of the relevant fish spawning timing window; limiting removal of riparian vegetation; stabilizing banks and implementing a restoration plan based on consultation with review agencies.

9.1.1.1 Riparian Zone Protection

Where no in-water work is required, general recommendations still apply to protect riparian zones surrounding watercourses. Best Management Practices, including the use of standard erosion and sediment control devices, shall be reviewed at the detailed design stage. These plans shall adhere to the principles of reducing the risk of erosion control measures and trapping mobilized sediment as close to the source as possible. Sediment and erosion control measures shall be inspected daily with particular scrutiny after rain events, and repaired as necessary. All sediment and erosion control measures shall remain intact until vegetation cover is established on all exposed soil.

A construction plan shall identify a contingency plan for accidental sediment release. An emergency spill kit shall be kept on-site in case of any fuel or chemical leaks.

Disruption to riparian vegetation shall be minimized by defining the necessary work area using construction fencing. Post construction restoration efforts shall include fast-growing tree and/or shrubs where riparian vegetation has been removed. Restoration works shall only incorporate locally sourced native plants appropriate for site conditions.

9.1.1.2 Authorization and Mitigation for In-Water Work

In-water work is not anticipated or planned at the watercourse crossings, however, it may be required as a result of culvert extensions and/or new stream crossings, etc. In the event of harmful alteration, disruption or destruction of fish habitat (HADD), Department of Fisheries and Oceans (DFO) approvals may be required. In order to obtain Authorization for Works or Undertakings Affecting Fish Habitat, a detailed Letter of Intent to Implement Construction Measures will need to be submitted to DFO via a designated delegate agency. Additionally, construction mitigation measures (to minimize intrusion) and a Fisheries Habitat Compensation Plan (to replace habitat lost) will need to be developed, in accordance with DFO's No Net Loss Policy.

Screening of potential HADDs requires General Arrangements of each crossing for accuracy and efficiency. As such, authorizations will be explored during detail design.

In order to reduce and/or eliminate potential impacts to fisheries habitat and aquatic resources, design modifications and avoidance/mitigation techniques will be considered. Detailed design will consult a qualified engineer to identify appropriate timing for any in-stream works. The timing window is intended to protect fish communities present. To protect downstream fisheries resources, standard erosion and sediment control devices shall be used in areas requiring excavation or in-channel works in order to slow runoff velocities and reduce erosive forces, including:

a. Rock checks or silt fence flow checks are to be placed in all ditches immediately upstream of their discharge into a watercourse;
b. Straw bale dams are to be placed in advance of sewer inlets;
c. Finished slopes shall be graded to an acceptable slope minimum and completed with plantings. Large cuts shall be terraced to minimize surface erosion;
d. All excavated materials requiring stockpiling shall be in accordance with OPSS 180.07.06 and placed in pre-determined locations. The perimeters of stockpiles shall be encircled with silt fencing, according to OPSD 219.110;
e. Any in-water work that is necessary must be conducted in dry conditions within the appropriate fisheries timing window.
f. Cleaning and refuelling of machinery shall be prohibited within 50 m of a watercourse to prevent the discharge of petroleum products;
g. Excess silt fence, straw bales and rip-rap shall be maintained on-site, prior to the commencement of grading operations and throughout the duration of the construction, in case of an emergency; and
h. The integrity of all sediment trapping devices shall be monitored regularly (at least weekly, and immediately following rain events) and properly maintained. Such structures shall be removed only after the soils of the construction areas have been stabilized and then only after the trapped sediments have been removed.

It is acknowledged that the proposed crossings may involve spanning fish habitat for some locations while requiring the extension of culverts or culvert replacements in others. Recognizing the environmental constraints and sensitivities of the crossings, standard/common Pathways of Effects Mitigation measures (DFO Risk Management Framework) will be utilized. Further to this however, additional construction mitigation measures may also include:

a. Adherence to cold water construction timing window (July 1 - September 15);
b. Permit(s) to Take Water during construction will be obtained if required;
c. Ensure bridge/culvert span maximizes light penetration if feasible to encourage riparian vegetation growth underneath the structure; and,
d. Replace riparian vegetation lost during construction of bridge abutments and re-naturalize as soon as possible after construction to minimize erosion of bare riparian sections.

9.1.2 Terrestrial Species and Habitat

Potential impacts to the terrestrial environment include the loss of portions of unevaluated wetland, coniferous forest, dry-fresh poplar mixed forest, dry-fresh oak-red maple deciduous forest, dry-fresh sugar maple deciduous forest, red pine coniferous plantation, white pine coniferous plantation, scotch pine coniferous plantation and old field meadow. The following provides appropriate mitigation measures to ensure net losses are minimized and to minimize construction and post-construction impacts.

9.1.2.1 Vegetation

The preferred corridor will result in the permanent loss of trees and shrubs. Trees or large shrubs identified for preservation within and immediately adjacent to construction zones shall be protected with appropriate hoarding (fence or similar structure using OPSD 220.01) at an appropriate distance from the tree stem, as determined by a qualified professional. In sensitive areas, higher quality tree protection fencing will be used. Tree wells may be necessary where significant grading affects soil levels surrounding large trees. In the event that roots or branches of trees to be protected are inadvertently damaged during construction, they shall be pruned clean as soon as possible. Exposed roots shall then be covered with topsoil.

Trees identified for removal shall be properly inventoried at the Detailed Design stage in order to quantify and plan for compensation with an appropriate landscape planting plan (with locally native, non-invasive species and species that blend into the surrounding environment). At the time of construction, trees shall be marked and felled into the work area to avoid damage to adjacent vegetation. A restoration/landscaping plan will be prepared during Detailed Design. Vegetation removal will be scheduled to occur outside the breeding bird period (May 1st to July 31st). Should avoidance of the breeding bird period not be possible, and removal is scheduled within this period, active nest surveys prior to construction shall be undertaken.

Riparian trees (trees located within 30 m of any watercourse) identified for removal shall be inventoried at the Detailed Design stage. All restoration plantings shall be an appropriate species for the growing conditions at the site.

Where construction is to occur within 30m of a naturally vegetated feature, install and maintain protective fencing to clearly define the construction area and prevent accidental damage to vegetation or intrusion into the natural feature.

All exposed surfaces susceptible to erosion shall be revegetated through the placement of seeding, mulching or sodding immediately upon completion of construction activities or within 45 days of exposure and with sufficient time to allow for successful establishment prior to winter. Native plants and seeds shall be favoured in all restoration.

Vegetation restoration plans can be developed to replace lost vegetation with new vegetation and opportunities to replace trees at a higher rate than the removal can be explored as part of the Detail Design. The planting of new vegetation in areas that would not be affected by the future transportation corridor in advance of the construction activities would grow prior to the new corridor being required. Areas for potential vegetative restoration would be defined in consultation with review agencies and municipal departments during the preliminary design phase for the preferred corridor.

With respect to erosion control, the following shall be implemented:

- Develop and implement an erosion and sediment control plan before commencement of construction.
- Utilize erosion blankets, erosion control fencing, straw bales, siltation bags, etc. for construction activities within 30 m of a wetland, woodland or water body, to mitigate potential excessive erosion and sedimentation. Extra erosion and sediment control materials shall be kept on hand, (*i.e.*, heavy-duty silt fencing, straw bales).
- Check that sediment and erosion controls are in good repair and properly functioning prior to conducting daily work and re-install or repair as required prior to commencing daily construction activities. Check sediment and erosion controls before and after significant rainfall events to ensure they are effective.
- Keep sediment and erosion control measures in place until disturbed areas have been stabilized (*i.e.*, re-vegetated).
- To avoid sedimentation in wetlands and watercourses, schedule grading within 30 m of a watercourse or wetland to avoid times of high runoff volumes, wherever possible. Temporarily suspend work if high runoff volume is noted or excessive flows of sediment discharges occur until contingency measures are in place.
- Re-vegetate temporary disturbance areas (i.e. roads, laydown areas, etc.) to pre-construction conditions as soon as possible after construction activities are complete using species native to the area in naturally vegetated areas.

9.1.3 Wildlife

Potential impacts to wildlife include loss of deer wintering habitat, fragmentation and obstruction of wildlife movement and loss of potentially significant wildlife habitat and Species at Risk habitat. The following provides appropriate mitigation measures to ensure net losses are minimized and to minimize construction and post-construction impacts.

9.1.3.1 Deer Yard and Wildlife Movement

The preferred corridor will cross through woodlands and a deer wintering area and will create a new barrier to wildlife movement in the area which may result in increased wildlife road mortality. In order to mitigate this, wildlife fencing and crossings will be established in key areas to allow the safe passage of wildlife across the highway. The provision of suitable culverts and structures to allow for wildlife passage shall be considered on a site specific basis. As well, considerations to prevent wildlife and vehicular interactions shall be considered. This should minimize anticipated negative effects to deer yard and wildlife movement as telemetry data obtained from a study completed in Quebec entitled, "Construction of a Highway Section Within a White-Tailed Deep Winter Yard Near Quebec City, Canada; Mitigation Measures, Monitoring, and Preliminary Results" (Leblanc *et al.* 2007) indicate that deer with split winter home ranges continued to use both sides of a new section of a highway when wildlife passage corridors and deer-proof fencing was used. Specific details of these crossings will be determined during Detail Design in consultation with the Ministry of Natural Resources and the District Municipality of Muskoka, however, to aid in agency discussion during later stages of the project, the following measures as described in literature include but are not limited to:

- Selecting sizeable roadway and linkage alignments to avoid unsafe intersections (e.g. at curves);
- Use of plantings and wing-walls to direct wildlife using the linkage to culvert/structure crossings;
- Install wildlife fencing along primary linkages and deer wintering areas to direct wildlife to the culvert/structure crossing; and
- Design culverts/structures to accommodate wildlife movement.

The design of these crossings would include recommendations for focusing wildlife movements to appropriate crossing locations and/or structures. These measures would depend on site specific features and reported collision hazards. Culverts 1.8 m in height, or greater, with larger spans have been used successfully for wildlife crossings.

During construction, the following is recommended:

- Clearly post construction speed limits (30km/h). Install and maintain wildlife crossing and speed limit signs on access roads.
- Locate project components outside of natural features, to the extent possible, to avoid direct impacts to wildlife habitat.
- Schedule vegetation removal to occur outside the breeding bird period (May 1 to July 31). Undertake active nest surveys prior to construction if clearing of vegetation must take place during this period.

9.1.3.2 Significant Wildlife Habitat

Potential significant wildlife habitat that may be present within the study area include winter deer yards, colonial bird nesting sites, reptile hibernacula, habitat for area-sensitive species, forests providing a high diversity of habitats, old-growth or mature forest stands, amphibian woodland breeding ponds, specialised raptor nesting habitat, and seeps and springs. Further surveys shall be conducted at the Detailed Design phase to confirm presence or absence of Significant Wildlife Habitat. If any species are found during these surveys, appropriate mitigation or compensation plans will be developed in consultation with the Ministry of Natural Resources.

9.1.3.3 Species at Risk

Species at Risk (SAR) may be present along the corridor of the preferred alternative route. While suitable habitat for Butternut, Henslow's Sparrow, Bobolink, Cerulean Warbler, Eastern Meadowlark, Eastern Musk Turtle, Bald Eagle, Broad Beech Fern, Canada Warbler, Golden-winged Warbler, Eastern Whip-poor-will, Northern Long-eared Bat,

Milksnake, Chimney Swift, American Ginseng, Hognose Snake, Five-lined Skink and Northern Map Turtle was observed, only one SAR was identified, a single Bobolink in a field east of South Monck Drive, in the preferred corridor at the time of the field studies carried out in support of the EA study. Further surveys shall be conducted at the Detailed Design phase to confirm presence or absence of SAR. If any species are found during these surveys, appropriate mitigation or compensation plans will be developed in consultation with the Ministry of Natural Resources.

9.2 Socio-Economic Environment

9.2.1 Land Use

The preferred alternative route is not expected to have any major impact on lands uses and no shift in the land use designations on Schedule 'A' to the Bracebridge Official Plan should be expected. Intensive development should continue to be expected in the urban area in accordance with the currently ascribed land use designations. It is highly unlikely that the possibility of a new inter-regional arterial road would be such a factor as to influence the location of any new land use or business.

Owners of properties lying within the preferred alignment can expect any applications they may submit under the Planning Act to be reviewed in the context of the then proposed development and its future impact by, or on, the proposed arterial road. Whether or not there will be any practical repercussions to property owners is difficult to predict, but given the current restrictive policy framework it is unlikely that the identification of the alignment will have that effect.

While it is impossible to know the future policy and regulatory framework that will guide land use decisions in the somewhat distant future, the only land use impact that might be anticipated as a result of the construction of the Bracebridge North Transportation Corridor will be the pressure to allow the creation of new lots, whether residential or rural commercial, along the roadway; in effect, the replication of the historic pattern of ribbon development. It is reasonable to expect that the pressures to create new land uses along the roadway will be compounded if the arterial is constructed on lands that move from the present 'Rural Area' designation to the fully serviced 'Urban Area' designation.

The North Transportation Corridor is expected to have very little effect on land uses due to it being sufficiently removed from the existing urban community and the development that may be expected in, or near the urban area, within the next 40 years. That being said, properties along the final alignment will be impacted to varying degrees through the property acquisition, road construction and future zoning stages.

9.2.2 Noise

Where the increase in noise for any sensitive receptor is greater than 5 dBA, or sound levels are greater than 65 dBA, mitigation will be investigated. Although predicted noise impacts are anticipated to be greater than or equal to 5 dB(A) in some areas, potential changes in sound level exposures are not anticipated to result in a future build sound level of greater than 65 dBA at any of the sensitive receptors. Mitigation measures for those receptors where noise impacts are anticipated to occur will be investigated in detail design and may include such measures as noise walls or berms where the natural environment does not provide adequate noise mitigation.

9.2.3 Snowmobile and Recreational Trails

Provision for a level at-grade crossing and relocation of the Trans Canada Trail and collector snowmobile trail will be required in the vicinity of the Highway 11 interchange on the west side of Highway 11. Relocation of one trail in the Bracebridge Resource Management Centre will be required on the east side of Highway 11.

Between Manitoba Street and South Monck Drive, a provision shall be included for a level crossing of the main snowmobile trail (TOP D). Between South Monck Drive and MR 118, the collector snowmobile trail shall be relocated to the ditch adjacent to the road.

9.3 Cultural Environment

9.3.1 Archaeology

Stage 2 archaeological assessments shall be required in all areas where archaeological potential exists. The Stage 2 assessment will include a combination of pedestrian survey and test pit survey, where appropriate.

Should the proposed work extend beyond the current study area, then further Stage 1 archaeological assessments must be conducted to determine the archaeological potential of such additional areas.

In the event that archaeological remains are found during subsequent construction activities, the consultant archaeological, approval authority, and the Cultural Programs Unit of the MTCS shall be notified immediately.

9.4 Physical Environment

9.4.1 Geotechnical

9.4.1.1 Foundation Types

As shallow bedrock is present throughout the study area, foundations for bridge abutments and piers in areas with shallow bedrock are likely to consist of spread footings on bedrock. Some rock excavation is likely to be required to remove loose and weathered rock from beneath foundations and to provide a level bearing surface.

The surficial soil conditions where bedrock outcrop is not encountered consist of glaciofluvial sand and gravel and post glacial alluvial sand and gravel. These deposits provide poor to moderate foundation conditions, depending on the density of the deposits. Driven steel piles may be the preferred foundation option for structures located in areas underlain by sand and gravel deposits.

The soil and bedrock conditions at the proposed foundation locations will be assessed in detail design, including assessment of the bedrock profile.

9.4.1.2 Soft Ground

The presence of swampy areas with organic soils and/or soft cohesive soils is likely to be encountered in localized areas along the alignment. Where the route crosses poor soils, the soft organic soils shall be removed from beneath road embankments and structures and replaced with compactable granular material. The use of geosynthetic support materials will be investigated in detail design.

9.4.1.3 Pavement Design

Increased granular thicknesses and/or geosynthetic materials may be required in order to create a stable pavement structure where there are poor subgrade materials. Additional geotechnical investigation will be required along the selected route during the detail design.

9.4.1.4 Embankment Settlements/Stability

Shallow bedrock and sand and gravel deposits are generally quite competent and settlement due to embankment loading typically occurs rapidly (i.e. during the construction period). As a result, these deposits do not present any restrictions on design grades. In addition, the stability of embankments over these materials is typically not a concern under static conditions.

There is the potential for liquefaction of loose to compact sand and gravel deposits located below the groundwater level under seismic design loads. This is generally not a concern for at-grade roads but may be a concern where high fills are required. The potential for liquefaction must be verified as part of the design stage. The risk of liquefaction can be managed by densification of the sand and gravel prior to embankment construction. New fills will experience excessive and long-term settlement if they are placed over existing organic materials.

9.4.1.5 Excavation Support and Dewatering

The sand and gravel deposits are typically characterized by moderate to high hydraulic conductivity. As a result, significant groundwater inflow shall be expected for any excavations that extend below the groundwater level. Water seepage from excavation walls also has a detrimental impact on the stability of excavation side slopes. Excavations within the sand and gravel deposits can likely be made with excavation side slopes of 1H:1V where they are carried out above the groundwater level. Excavations that extend below the groundwater level will likely require excavation support (e.g. sheet piles) and dewatering.

9.4.2 Potential Site Contamination

An assessment of the soil and groundwater quality (where excavation depths are anticipated to extend below the groundwater table) within the project footprint shall be completed to confirm the presence/absence of environmental impacts from the area of potential environmental concern identified at 1350 High Falls Rd.

9.5 Construction Mitigation

During construction, the following Best Construction Practices shall be implemented:

Equipment Use

- Ensure machinery is maintained free of fluid leaks.
- Where feasible, light vehicles with wide tires having a large surface area (rather than tracked vehicles) and lighter machinery (e.g. hand-held equipment) shall be used in and around natural areas.
- Any vehicles used within natural areas shall use wide-based tires. Tracked vehicles shall be avoided.
- Locate site maintenance, vehicle washing and refuelling stations where contaminants are handled at least 30 m away from natural features or water bodies. Use spill collection pads for vehicle refuelling and maintenance.

Grading and Excavation

- Minimize changes in land contours and natural drainage; maintain timing and quantity of flows. Any grading of lands adjacent to natural heritage features shall match existing grades at the identified set-back, or buffer from the features.

Material Stockpiling and Handling

- Control soil / water contamination through best management practices, including:
  - Store any stockpiled materials at least 30 m away from a wetland, woodland or water body to prevent deleterious substances from inadvertently discharging to the environment;
  - Develop a spill response plan and train staff on associated procedures;
  - Maintain emergency spill kits on site; and,
  - Dispose of any waste material from construction activities by authorized and approved off-site vendors.

As noted above, the recommendations outlined in this section will be further detailed during the detailed design stage of the project.

9.6 Monitoring

A comprehensive monitoring and maintenance program will be established both during and following construction to ensure that:

- Individual mitigating measures are providing the expected control and/or protection continuously throughout the construction period;
- The mitigating measures are adequate to minimize or eliminate adverse effects;
- Additional mitigating measures are provided if required to address any unanticipated environmental effects which arise during construction, and;
- Adequate information is available for the assessment of the mitigative measures.

Environmental monitoring will include periodic site visits and inspections throughout the course of the work by the District Municipality of Muskoka Engineering and Public Works Department representative to administer the environmental control aspects of the Contract and to ensure their application and effectiveness. In the event that the Contract Administrator determines that the controls are unacceptable, the Contractor will be requested to cease those operations which are of concern.

A log book for both construction and environmental moritonig activities will be kept on site.

Should unforeseen environmental concerns and/or issues arrive during the construction period, the appropriate Ministries and Agencies will be contacted and appropriate measures taken to mitigate the environmental concerns/issues.

9.7 Commitments to Further Work

As part of the detail design for the construction of a new North Transportation Corridor, the following work will be completed:

- Develop detail design plans illustrating the proposed mitigating measures to protect the aquatic habitats;
- Develop detail design plans illustrating proposed stormwater management measures for review and approval of the Ministry of Environment (MOE), the Ministry of Natural Resources (MNR) and the Department of Fisheries and Oceans (DFO);

- Develop detail design plans including potential revisions to the alignment of the preferred route;
- Coordinate required relation of existing utilities with utility companies;
- Complete a detailed noise analysis;
- Complete a Stage II Archaeological Assessment;
- Complete updated Species at Risk studies;
- Coordinate with the Ministry of Transportation regarding their new interchange;
- Prepare accurate surveys, designs and cost estimates; and
- Identify any areas vulnerable to salt.