iTRANS®
transportation planning
and traffic consultants

St. Marys Cement

Preliminary Draft Haul Route Evaluation Report

Hamilton, ON

May 2009

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Project # 4313

Client Project Team

Project Manager	*Melanie Horton – St. Marys Cement*
Project Team	Jennifer Tuck – St. Marys Cement Glen Schnarr – Glen Schnarr & Associates

iTRANS Project Team

Principal	Tyrone Gan, P. Eng
Project Manager	Chris Philp, P. Eng
Technical Team	Tammy Dow, P.Eng Tara Erwin, P. Eng David Schleihauf, EIT Matthew McCumber, EIT

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1. INTRODUCTION

1.1 Background

In 2006, St. Marys Cement retained BA Group to undertake a haul route study for a proposed quarry in the former Township of Flamborough (now part of the City of Hamilton). Due to insufficient resources BA Group was replaced by iTRANS Consulting Inc. in the fall of 2007 to continue with the haul route study and see it though to completion.

The proposed St. Marys Flamborough Quarry is situated on a 158-hectare (380 acre) site at 11th Concession Road East and Milburough Line. The property was purchased by St. Marys on June 15, 2006. St. Marys plans to extract Amabel Dolostone, a high quality stone, for use in construction, road-building and manufacturing. The proximity of this location to the Greater Toronto Area (GTA) and the Greater Golden Horseshoe (GGH) is clearly a major asset when establishing an operation involving the transportation of heavy materials.

A haul route study was initiated as part of the City of Hamilton’s development review process. Given the number of review agencies involved, a separate committee was formed to coordinate the review of submitted deliverables. This committee is called the Combined Aggregate Review Team (CART). CART consists of municipal and provincial representatives, and other organizations.

1.1.1 Description of Proposed Quarry

The proposed St. Marys Flamborough Quarry is located on the north-west corner of the intersection of Concession 11 E and Milburough Line in the City of Hamilton. The planned extraction will occur on approximately 67-hectares of the 158-hectare (380 acres) site, or less than half of the area of the property. The remaining land holdings would be outside of the proposed development area. The location of the proposed St. Marys Flamborough Quarry and the approximate area of extraction are shown in **Exhibit 1-1.** The proposed annual maximum tonnage limit for the quarry is three-million tonnes. The proposed quarry footprint is designed to ensure that there is no displacement of important wetlands, watercourses, forests or significant species.

The site features a very thick deposit of high quality Amabel Dolostone. Amabel Dolostone is the most durable aggregate material in Southern Ontario and is used in:

- Granular base in asphalt mixes and structural concrete for sidewalks, bridges, roads and streets
- Structural concrete for buildings, bridges, sidewalks, and airport runways

The planned excavation will be an average of 34 metres (100 feet) deep. The site will be developed and rehabilitated in stages. The volume of reserves is estimated at 60 million tonnes with a projected life of 25 to 30 years. St. Marys also owns adjacent property to the west of the proposed quarry and there is potential for future expansion of the quarry; however, there is a long term lease on the adjacent lands and it is anticipated that expansion would not be contemplated before 2020.

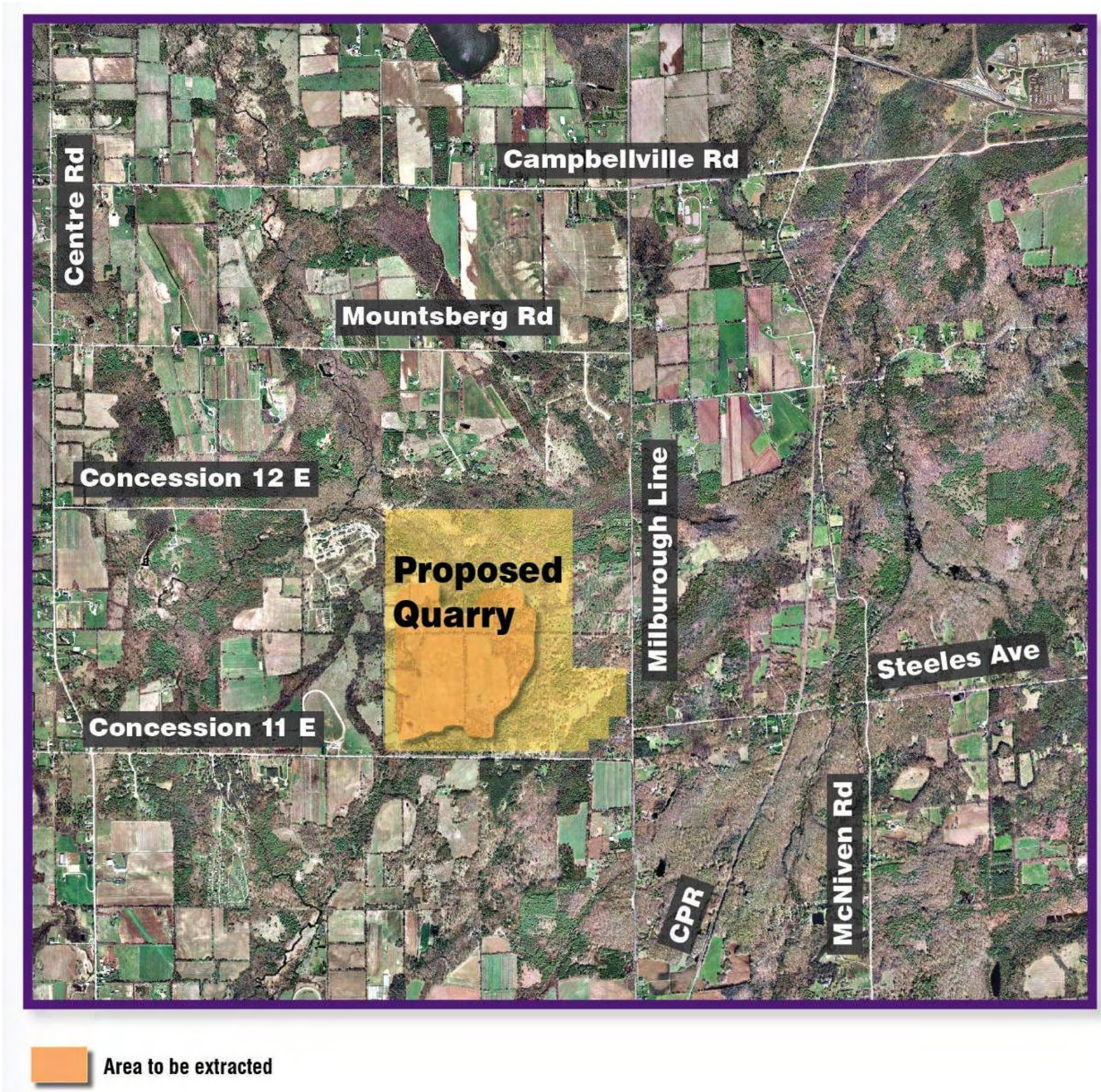


Exhibit 1-1: Location of the Proposed St. Marys Flamborough Quarry

1.1.2 Proposal History

In 2004, when Lowndes Holdings Corporation owned the site, applications for planning approvals for a Proposed Dolostone Quarry and an amendment to the City of Hamilton Official Plan/Zoning By-Law were submitted to the City of Hamilton. Stantec Consulting was retained by Lowndes Holding Corporation to undertake a traffic impact study (TIS). The report was entitled "Lowndes Property – Traffic Impact Study," dated August 2004.

IBI Group was retained by the City of Hamilton to undertake a peer review of Stantec's TIS Report. In IBI's report entitled "Lowndes Holding Corporation Proposed Quarry, Lowndes Property – Traffic Impact Study, Stantec, Peer Review Report," dated August 2005, IBI identified a number of potential deficiencies with the TIS submitted in support of the Lowndes Property proposal.

The City of Hamilton then requested an evaluation of the preferred mode/routes to transport the aggregate material from the proposed quarry site. This request stemmed from the concern associated with the potentially large volume of truck traffic that would be generated by the Flamborough Quarry, and the impact of this traffic on the safety, and social and environmental features along the haul route(s).

The City of Hamilton developed the "Terms of Reference, Mountsberg Quarry Haul Route Evaluation Study" in April 2006, The Terms of Reference were adopted by CART representatives and issued to Lowndes and subsequently to St. Marys upon their purchase of the property. As mentioned previously, the Terms of Reference specify that the haul route study evaluation process be consistent with the requirements of the Ontario Environmental Assessment (EA) Act.

The study area identified by the Terms of Reference for the Haul Route Evaluation Study is shown in **.** The study area is bounded by Highway 401 to the north, Guelph Line on the east, Highway 403 to the south, and Highway 6 to the west.

A number of major jurisdictions are represented in the study area: the City of Hamilton (mainly on the eastern side), Halton Region (on the west), the City of Burlington (south and south-east), and the Ministry of Transportation of Ontario (MTO) (for freeways). There are also some smaller jurisdictions: Town of Milton (north-east), Wellington County (north), and Township of Puslinch (north-west).

The large number of jurisdictions involved in the study area and the history of administrative change and amalgamations in the area complicated some of the data collection and consultation required for the study. Former jurisdictions include the former Region of Hamilton-Wentworth, and six former municipalities (the Towns of Ancaster, Dundas and Flamborough, the Township of Glanbrook, and the Cities of Hamilton and Stoney Creek).

1.2 CART Terms of Reference

The Terms of Reference ("Terms of Reference, Mountsberg Quarry Haul Route Evaluation Study") for the haul route study were developed and adopted by CART representatives, and issued to the original proponent Lowndes Holdings Inc. A copy is provided in **Appendix A.** The Terms of Reference specify that the evaluation process be consistent with the requirements of the Ontario Environmental Assessment (EA) Act. The standard EA guidelines include a comprehensive public consultation process.

The Terms of Reference provides the minimum expectation for the haul route study including definition of study parameters, review of alternative solutions, identification of alternative routes within the defined study area, description of baseline conditions, development of a comparative evaluation approach, assessment of the impacts of alternative haul routes, comparative evaluation and recommendation for the preferred alternative(s), describe effects and mitigation for the preferred route(s).

One of the other requirements of the Terms of Reference included a minimum of four public consultation events and the involvement of CART throughout the entire process. It is also expected that consultation would take place with the Ministry of Transportation, County of Wellington, Township of Puslinch, and CP Rail.

The Terms of Reference also provided an example of evaluation criteria and indicators that were used as a foundation for the analysis and comparative evaluation.

The Haul Route Evaluation study will present the detailed results and analysis of the overall haul route study. As required by the EA Act, a wide range of disciplines are involved in evaluating the proposed quarry.

1.3 Description of the Consultation Team

iTRANS specializes in Environmental Assessments / Functional Planning for municipal transportation infrastructure. We manage multi-disciplinary teams to assess the needs, environmental implications, preferred alternative solutions, and designs for road and transit facilities.

iTRANS has a "solutions for all" approach to the environmental assessment / functional planning process. Our inclusive, transparent, traceable approach has been highly successful in addressing environmental constraints, public concerns, and competing objectives. In conducting our work we ensure that it is highly detailed sufficient to anticipate and address all issues, clearly communicated to allow each stakeholder to have a full understanding of implications for all affected and innovative to ensure that all feasible solutions are considered.

For this haul route study iTRANS coordinated with eight other sub consultants that specialized in natural environment, agriculture, land use, social and business environment, cultural heritage and archaeology, air quality and noise, pavement and road engineering, and structural and stormwater.

1.3.1 Natural Environment

Tom Hilditch, President, Savanta Inc, is an environmental professional, communicator and businessperson. After 25 years, in senior roles with three leading North American consulting firms, he launched Savanta Inc., with an eye towards advancing the implementation of practical and productive sustainable development projects and programs. For 26 years, Tom has led a variety of environmental approvals, compliance, restoration, communications and sustainability projects and initiatives. Through his work and research in Canada, the U.S.A., China, Hong Kong, Japan, Equatorial Guinea, Venezuela, Thailand, Malaysia, Singapore, Turkey, Qatar and the United Arab Emirates (U.A.E)., he has developed a broad appreciation for a full range of environmental business challenges and solutions. He has investigated hundreds of natural areas ranging across wetlands, forests, grasslands, coastal and marine systems, many covering thousands of square kilometres. Tom has worked collaboratively amongst all manner of stakeholders in an effort to optimize sustainable outcomes on specific projects and on more broad regulatory initiatives.

Heather Davis, Ecologist, has experience conducting and writing environmental impact statements, tree preservation plans and baseline studies. Heather has completed professional botanist training and has performed plant community classification, taxonomic identification of terrestrial vascular plants and species at risk surveys as a part of various projects. Heather has conducted a variety of assignments related to species at risk including rare flora and fauna surveys and statistical analyses. She has completed field investigations and population estimates for Lake Erie Water Snake and Eastern Fox Snake in the Lake Erie Archipelago. She has also participated in surveys for Green Dragon, Pitcher’s Thistle, Queensnake and species at risk turtles in southern Ontario. She has completed assignments regarding riparian habitat restoration, invasive vegetation management, erosion control and related public education initiatives. She is proficient in technical report writing and primary literature research and compilation.

Heather Whitehouse, Ecologist, directs and manages ecological reporting projects (Environmental Impact Studies/Assessments) for small (i.e. lot) and large-scale (i.e. Block Plan) projects across the Greater Toronto Area. Heather is involved in all aspects of the project from conducting ecological investigative studies to working with agencies to meet regulatory requirements to report writing. Heather has worked in both terrestrial and aquatic environments, with expertise in wetland plant ecology. Heather has developed long-term ecological monitoring and annual field study programs, and also conducts numerous programs as she is certified by the Ministry of Natural Resources to conduct Ecological Land Classification and wetland evaluations. Clients cross a broad spectrum of industry sectors including urban development, sand and gravel quarries, mining, and municipal governments.

Project work has taken her to central and northern Alberta, throughout Ontario, inland New Brunswick and rural Idaho.

Stantec Consulting Ltd. conducted baseline aquatic and terrestrial field studies and characterized the natural environment along the haul route alternatives. This baseline information was incorporated into the Natural Environment Report completed by Savanta Inc. The Stantec Consulting Ltd. consulting team is described below.

Valerie Wyatt, M.Sc., Senior Project Manager is a knowledgeable field ecologist and project manager with twelve years of professional experience. Valerie has successfully managed or directed dozens of projects including impact assessments, community plans and biological inventories. These projects involved the implementation of natural heritage policy of the Ontario Provincial Policy Statement, Greenbelt Plan, Oak Ridges Moraine Act and municipal policy documents for numerous municipal draft plan applications throughout southern Ontario. Valerie's expertise includes field inventories of vegetation communities, breeding birds and other wildlife; analysis of community significance, terrestrial linkages, habitat assessment and ecological land classification; integration of engineering, hydrogeological, planning and geomorphological studies; and review agency liaison. Valerie has served on the Technical Committee for Guelph's Natural Heritage Strategy, the Steering Committee for Environment Canada's and the Canadian Wind Association's Bird Monitoring Database Project and has appeared as an expert witness before the Ontario Municipal Board.

Andrew Taylor, B.Sc., Terrestrial Ecologist has successfully managed both small and large projects, including environmental impact statements, constraint analyses and environmental implementation reports. In addition, he has coordinated natural heritage components of Environmental Assessments. These projects involve the implementation of natural heritage policies of the Ontario Provincial Policy Statement, Greenbelt Plan and municipal policy documents. Andrew also has experience with policies pertaining to Threatened and Endangered Species including Butternut. Andrew has strong field skills including identification of vascular plants, breeding amphibians (calling frogs and toads), breeding salamanders (adult and egg studies), reptiles and bats, with a particular emphasis on birds, butterflies and dragonflies. He is skilled at assessing wildlife habitat, applying Ecological Land Classification (ELC) and delineating wetland boundaries. Andrew is experienced at analyzing natural heritage features for the presence of Significant Woodlands or Significant Wildlife Habitat using guidance documents such as the ‘Natural Heritage Reference Manual, How Much Habitat is Enough?' and the ‘Significant Wildlife Habitat Technical Guide'.

Ryan Park, B.Sc., Aquatic Ecologist has experience in industry and development sector projects. He has conducted field investigations, liaised with government agencies and regulators, synthesized data and produced reports. His specific areas of expertise include Environmental Impact Studies and Environmental Effects Monitoring. Ryan has assessed potential impacts to aquatic and terrestrial habitats at a number of development-related sites such as subdivisions, sewage treatment plants and aggregate expansions. Ryan is also responsible for managing and maintaining the field equipment for the Guelph office. Ryan's technical experience includes both terrestrial and aquatic habitats. He has conducted fisheries habitat assessments based on provincial protocols, benthic macroinvertebrate surveys and fisheries inventories.

1.3.2 Agricultural

Conna Consulting specializes in the inventory and assessment of agricultural resources and land use; agricultural impact assessment; and related interpretation of planning policy. Mr. Jerry Hagarty, P.Ag. is a senior Agrologist with the firm and conducted this agricultural impact assessment.

Jerry Hagarty is a Professional Agrologist with 35 years of consulting experience in agricultural and environmental impact assessment. He has had extensive involvement in agricultural research and rural land use planning. His experience includes the interpretation of agricultural impacts and farm damage assessments relating to a wide variety of site and linear facility development. This work has involved soil and agricultural land use surveys and interpretation of soil and climatic capability for common field crop and specialty crop production and analysis of farm operational impacts associated with transportation and other power and pipeline corridor developments.

1.3.3 Land Use

Glen Schnarr & Associates Inc. is an urban and regional land development consulting firm providing professional planning services to developers and landowners in the Southern Ontario region since 1986.

Glen Schnarr & Associates Inc. (GSAI) have the expertise and staff resources to complete a variety of projects. GSAI are comprised of a team of professional land use planning consultants and planning technicians who bring expertise in planning residential, commercial, industrial, institutional and recreational development projects to their clients. GSAI are the land use planning consultants representing St. Marys Cement (Canada) Inc. in connection with the proposed St. Marys Flamborough Quarry.

Glen Schnarr is the company President with over 30 years of professional planning experience in a wide variety of urban planning and development projects in Southern Ontario. Glen is a member of the Canadian Institute of Planners (MCIP), and is a registered professional planner (RPP).

Karen Bennett is a Senior Planner with GSAI and has over ten years of experience as a Planner. Karen is a member of the Canadian Institute of Professional Planners (MCIP), and is a registered professional planner (RPP).

1.3.4 Social and Business Environment

The Socio-Economic Environment study team consists of Gartner Lee Limited staff. Since it's founding in 1973, Gartner Lee Limited has become a global company providing strategic environmental planning services to clients of all types and sizes in both government and industry. Gartner Lee's focus on environmental and strategic planning is backed by a team of over 80 professionals from across the spectrum of environmental and social science disciplines. The individuals involved and their specific roles are provided as follows:

Mr. Tomasz Wlodarczyk M.E.S. is a Senior Consultant and Principal with Gartner Lee Limited. He has over 19 years experience, providing expertise in a number of areas including: strategic planning, environmental and socio-economic impact assessment, public consultation, impact management and agreement negotiation, policy development and research. He has completed projects across Canada, Malaysia and Brunei. Thomas has conducted environmental and socio-economic assessments for a variety of energy developments (e.g., hydroelectric, nuclear and fossil), mines, airports and port facilities, waste management facilities and transportation routes; gas pipelines, highway and access road developments.

Mr. Edward Terry B.U.R.Pl., is an Environmental Planner with Gartner Lee Limited with over ten years of experience in Land Use and Environmental Planning. Edward has worked on numerous development planning applications and environmental assessments (EA) for both public and private sector clients. He has also carried out socio-economic and land use impact assessments.

Edward is experienced in provincial planning policy working for the Ministry of Municipal Affairs and Housing and The Regional Municipality of Peel. He has assisted in the development of The Planning and Conservation Land Statue Law Amendment Act (Planning Act & OMB Reform), The Five-year review of The Provincial Policy Statement, review of The Environmental Assessment Act, review of the Clean Water Act, development of Brownfields legislation, created guidance materials on Energy Conservation, Efficiency & Supply and provided training across the province on The Greenbelt Act/Plan. Through his planning experience in the private sector, he has also assisted conducting Transportation Studies for the BA Transportation Consulting Group, developed the Terms of Reference for the Municipality of Grey Highlands regarding Wind energy generation while working for The Jones Consulting Group, facilitated public/stakeholder meetings and is currently involved in assisting in the development of Natural Environment Official Plan policies for the City of Vaughan.

1.3.5 Cultural Heritage and Archaeology

Archaeologix Inc. is a team of dedicated professionals with extensive experience in conducting archaeological and built heritage assessments for both public and private sector clients across the Province of Ontario, offering a range of services including field assessments, background research, archaeological potential modeling studies, and built heritage assessments. As a company, they are committed to providing the highest quality heritage consulting services, with the express goal of facilitating the diverse development requirements of their clients. All of their services meet or exceed the highest standards of the Ontario Ministry of Culture. The consultant team involved with producing this report is:

Project Coordinator	Jim Wilson, M.A.
Field Investigation	Jeffrey Muir, B.A.
	Nancy Tausky, M.Phil.
Report Production	Jeffrey Muir, B.A.
	Nancy Tausky, M.Phil.
	Hilary Bates Neary, M.L.S., M.A.
	Jim Wilson, M.A.
Office Assistant	Cassandra Duckworth-Robb

The completion of this report was facilitated by the assistance of the following:

- Tara Erwin, iTRANS Consulting Limited, Richmond Hill.
- Anne Fisher, Planning Division, Town of Milton.
- Joanne Lopata, Our Lady of Mount Carmel Roman Catholic Church.
- Robert von Bitter, Archaeological Data Coordinator, Ontario Ministry of Culture, Toronto.

1.3.6 Air Quality and Health Risk Assessment

RWDI is a leading consultant for assessing air quality and noise impacts on highway improvements and other major roadway enhancement projects across the province. They are known for providing superior technical expertise and professionalism. For this assignment, an experienced team of air quality and health risk specialists undertook the air quality and health impact assessment and evaluation of route alternatives, as summarized below:

Scott Penton, Project Director, joined RWDI in 1996 and became a Project Director of the firm in 2005. Scott has an undergraduate degree in Systems Design Engineering from the University of Waterloo, and has published several papers on environmental noise impact assessments. He is the head of the Environmental Noise and Vibration group at RWDI, overseeing a team of 10 people located in Guelph, Calgary and Vancouver. During his time at RWDI, Scott has worked on hundreds of environmental noise impact assessments, covering everything from new subdivisions to major power plants, for projects in Canada and around the world, and provided expert witness testimony. As a Project Director, Scott is responsible for providing overall direction and leadership on noise and vibration projects, ensuring that a high level of service is provided. Scott supervised all technical aspects of the study and was responsible for ensuring that all work conformed to RWDI's standards for quality assurance.

Nigel Taylor, Project Manager joined RWDI in 2004, as a Project Manager and Specialist. He came to RWDI with ten years of experience in the energy sector, and has been responsible for providing managerial and technical support for over 100 assessment projects providing air quality, acoustic, and environmental risk services. Nigel provided technical direction and was responsible for the day-to-day communication with the Flamborough Quarry Haul Route Study Project Team.

Ron Haley, Senior Risk Specialist brings over 18 years of consulting experience in human toxicology, risk assessment, risk-based decision-making and risk communication. Ron provides senior technical support and direction on air quality issues requiring toxicology, risk assessment, and regulatory criteria assessment support and has participated in a number of air quality projects for transportation studies. Ron conducted the health assessment work under the direction of the Project Manager and Project Director.

Terri-Lyn Pearson, Project Coordinator joined RWDI in 2004. She has experience in data collection and analysis, emission inventories, and numerical modelling. Terri-Lyn conducted the air quality technical work under the direction of the Project Manager and Project Director.

1.3.7 Noise

A study team consisting of RWDI staff undertook the noise and vibration assessment and evaluation of route alternatives. The actual individuals and their specific roles are provided as follows:

Scott Penton, P.Eng., Project Director: Supervised all technical aspects of the study and was responsible for ensuring that all work conformed to RWDI's standards for quality assurance. Scott is listed as a qualified Noise and Vibration consultant with the Ministry of Transportation and has conducted numerous transportation noise and vibration studies, including studies for quarry and landfill haul routes.

Nigel Taylor, M.Sc., CCEP., Project Manager: Provided technical direction and was responsible for the day-to-day communication with the Flamborough Quarry Haul Route Study Project Team.

Kevin Carr, Hon.B.Sc., Project Scientist: Conducted the technical work under the direction of the Project Manager and Project Director.

1.3.8 Pavement and Road Engineering

Golder Associates Ltd. (Golder) is a multi-national, employee-owned group of consulting companies specializing in providing geotechnical engineering and environmental science services for the transportation, land development/construction, waste management, water resources, mining and manufacturing industries. Golder has built a reputation for excellence that has seen the company grow to more than 5000 employees worldwide. Golder has been involved in geotechnical engineering in the Greater Toronto Area for more than 45 years, during which time they have provided geotechnical and pavement engineering services during the Environmental Assessment, preliminary design and detailed design stages for hundreds of roadway and highway improvement projects, including the rehabilitation of major bridges and highways, throughout Ontario.

Andrew Balasundaram, P.Eng. (Golder's Project Director for the study), a Principal with Golder, has over 20 years experience in pavement and materials engineering as applied to the construction and rehabilitation of provincial and municipal roads, airports, ports and parking lots. He has been responsible for the management of over 20 projects for the Ministry of Transportation of Ontario (MTO) and has been fulfilling MTO pavement design assignments since 1997. Andrew has been the Geotechnical/Pavement Design Engineer for the rehabilitation of more than 300 km of MTO highways and municipal roads in the Greater Toronto Area.

Robert A. Douglas, Ph.D., P.Eng. (Golder's Project Manager for the study) is a Senior Geotechnical Engineer. He has managed projects involving geotechnical and pavement investigation and analysis including rehabilitation design, and preliminary and detailed design for various roads within the Regions of Halton and Peel, on Manitoulin Island, and in Northern Ontario.

1.3.9 Structural and Storm Water

R.J. Burnside & Associates Limited (Burnside) has been engaged to prepare a report to document the existing condition of various bridge and culvert structures located on the various alternative haul routes for the proposed Flamborough Quarry.

The Burnside consultant team for this assignment consisted of Mr. Stephen Riley, P.Eng., and Mr. Mark Hartley, P.Eng.

Stephen Riley is the Manager of Bridge Design for Burnside and has over 20 years experience related to the inspection, planning, design, approval and implementation of bridge and culvert projects. Stephen heads a team of professionals who routinely undertake the inspection of bridge and culvert structures for a larger number of municipal clients, as part of the legislated requirement that all municipal bridge structures are inspected biannually. Developing repair and rehabilitation programs and / or planning for and preparing

engineering design and documentation packages for structure replacement projects are day to day activities for the Burnside Bridge Group.
Mark Hartley is with the Hydrotechnical Group and has been working around the rivers and streams of Ontario in a variety of capacities for almost 20 years. He has undergraduate degrees in Fisheries Science and Water Resources Engineering as well as a Masters degree in river hydraulics. Mark has extensive expertise in the areas of valley & stream corridor hydrology/hydraulics, natural channel design, fish habitat assessment and rehabilitation, low-flow hydraulics, fluvial geomorphology, sediment transport and water quality. He has analyzed the condition and capacity of a large number of culverts (CSP and concrete) as well as designed and construction several channel design and bank stabilization projects.

1.3.10 Transportation and Safety

iTRANS has extensive experience with developers and municipalities in evaluating the transportation implications of development, and in securing development approvals. Based on our knowledge of the planning and approval process, we are able to advise our clients throughout the life of any project, from inception to implementation. The iTRANS team for this assignment consisted of Mr. Christopher Philp, P.Eng., Mr. Tyrone Gan, P. Eng., Ms. Tara Erwin, P.Eng., David Schleihauf, E.I.T., and Mr. Matthew McCumber, E.I.T.

Mr. Christopher Philp, P.Eng.

Chris Philp is a Vice President of iTRANS Consulting. He has almost 20 years of experience in both private and public sectors specializing in roadway and traffic operations, ITS technologies and safety.

Chris' expertise also includes the management of multi-disciplinary teams to analyze and evaluate traffic problems and roadway capacity issues as well as successfully implement traffic control systems and ITS technologies. His experience includes management of the following representative projects:

- Traffic Impact Analysis for the Duntroon Quarry Expansion
- Truck Safety Stakeholders Consultation – Town of Caledon
- Stayner Asphalt Plant – Walker Industries
- Congestion Mitigation Strategies for Highway 7 at Keele Street – York Region
- Traffic signal coordination for York Region, City of London, Town of Cobourg, Town of Aurora, Town of Oakville, Town of Markham and others
- Safety Prioritization of intersections for MTO, Town of Markham, York Region and Halton Region

He has also been involved in the development of industry standards. Chris was the Project Manager for the update of the Ontario Traffic Manual – Book 12 – Traffic Signals for the Ministry of Transportation. The Ontario Traffic Manuals are used by many practitioners throughout Ontario as the standards for the industry. The Traffic Signals manual was updated to reflect recent legislation, new and emerging technologies for traffic signals and corrections for consistency. The overall project involved a steering committee of traffic professionals from 12 municipalities and organizations.

Mr. Tyrone Gan, P.Eng.

Tyrone Gan is the President of iTRANS Consulting. He has over 30 years of experience in all aspects of transportation planning and engineering. His areas of expertise include traffic studies, transportation corridor studies, transportation master plans, and environmental assessments for major transportation facilities, multi-modal transportation planning, travel demand management, travel forecasting, traffic operations, public consultation, and expert testimony. His experience includes landfill projects, quarries, and hazardous waste transportation. Tyrone has managed over 30 EAs, including individual EAs. He has conducted Environmental Assessments for the Ministry of Transportation, and is qualified by MTO in Individual Environmental Assessments, Class Environmental Assessments, Route Selection Studies, and Functional Planning and Design Studies. He has published and presented on the relationship between the masterplan process and the environmental assessment process. Tyrone has also provided expert testimony at the Environmental Assessment Board, Joint Consolidated Hearings Board, and OMB, approximately 50 hearings.

Ms. Tara Erwin, P.Eng.

Education – Bachelor of Applied Science, University of Waterloo, 2003
Master of Applied Science, University of Waterloo, 2007
Practicing Professional Engineer with Professional Engineers of Ontario (Since 2008)

Tara has been a Transportation Engineer with iTRANS Consulting for over 5 years. She has experience in the analysis and evaluation of data for traffic impact studies, safety, and freight flow studies, haul route study, business case and policy development, practical and scientific research, report writing, and project management.

She has had exposure to a variety of prominent projects for the Transportation Association of Canada (TAC), Transport Canada, the Transportation Research Board (TRB) and the National Cooperative Highway Research Program (NCHRP) on a wide range of topics including freight flows, sustainable transportation, safety, road treatments, and transportation planning. Through her work Tara has gained experience in coordinating multi-disciplinary teams, literature reviews, conducting in-depth surveys and interviews, and collecting and analyzing large volumes of data.

Mr. David Schleihauf, E.I.T.

Education – Bachelor of Applied Science, University of Waterloo, 2004

David Schleihauf has been a Transportation Planner at iTRANS Consulting for over 4 years. His experience involves projects of varying scope, which include traffic impact studies, traffic data collection, pedestrian safety analyses, parking studies, and functional design reviews.
He has completed many studies for both public and private clients throughout Ontario, providing technical analysis and data collection. He has good working experience with the following traffic software packages: Synchro, HCS, and CCG Calc v2.

Mr. Matthew McCumber, E.I.T.

Education – Bachelor of Applied Science, Queen's University, 2006
Master of Engineering, University of Toronto, 2008

Matthew McCumber is a Transportation Planner at iTRANS Consulting. His experience includes traffic impact studies, environmental assessments, transportation master plans, report writing and project coordination. He also has 16 months of experience in the Ministry of Transportation Engineering Development Program where his work focused on conducting regional freight and passenger traffic surveys, goods movement policy, asset management, and pavement design.

1.4 Overview of Report Contents

The following report is a detailed documentation of the haul route evaluation study for the proposed Flamborough Quarry. This first section of the report includes background information including a description of the quarry and proposal history, highlights from the Terms of Reference, and a description of the consultant team.

Section two provides a description of the project and study area.

Section three includes a description of the existing environment within the study area in the context of the natural environment (aquatic and terrestrial), agriculture, land use, social and business environment, cultural heritage and archaeology, air quality and health risk assessment, noise, geotechnical, structural and storm water, and transportation and safety.

Section four documents the anticipated supply and demand of aggregate over the 20 year horizon period and forecasts the aggregate distribution to the surrounding markets.

In section five of the report, analysis of the alternative modes of transportation is described including rail options, trucking options and a combination of both.

Section six provides truck traffic estimates through the description of proposed quarry operations and estimates of quarry truck trip generation and distribution for both 10 and 20 year horizon periods.

Section seven contrasts two alternative haul route strategies and describes in detail potential tools to control quarry truck traffic including the St. Marys truck policy. A case study of the Limehouse Pit illustrates how St. Marys has achieved success at their other locations.

Section eight of the report describes the screening and selection process that was used to arrive at a preferred haul route, from the initial long list, to the short list, to the five alternatives that were carried forward for evaluation.

The five alternative haul routes are described in detail in section nine including a description of recommended road alterations associated with each alternative.

Section 10 documents the analysis of the five alternative haul routes in the context of aquatic / surface water environment , terrestrial environment, land use, social environment and community impacts, economic environment and business impact, cultural and heritage resources, transportation and safety, and costs.

Section 11 summarizes the qualitative and quantitative evaluation of the five alternative haul routes including detailed descriptions of the methodology and the weightings applied.

Section 12 outlines the recommendations including alterations to existing roads, site access and pedestrians and cyclist infrastructure associated with each haul route alternative.

Section 13 describes the consultation process and summarizes the key issues and how they have been addressed during the study through the documentation of each of the five public meetings, agency consultation and CART correspondence.

Finally the major conclusions and recommendations are summarized in **Section 14**.

2. PROJECT DESCRIPTION

2.1 Study Area

The study area identified by the Terms of Reference for the Haul Route Evaluation Study is shown in **Exhibit 2-1**. The study area is bounded by Highway 401 to the north, Guelph Line on the east, Highway 403 to the south, and Highway 6 to the west.

A number of major jurisdictions are represented in the study area: the City of Hamilton (mainly on the eastern side), Halton Region (on the west), the City of Burlington (south and south-east), and the Ministry of Transportation of Ontario (MTO) (for freeways). There are also some smaller jurisdictions: Town of Milton (north-east), Wellington County (north), and Township of Puslinch (north-west).

The large number of jurisdictions involved in the study area and the history of administrative change and amalgamations in the area complicated some of the data collection and consultation required for the study. Former jurisdictions include the former Region of Hamilton-Wentworth, and six former municipalities (the Towns of Ancaster, Dundas and Flamborough, the Township of Glanbrook, and the Cities of Hamilton and Stoney Creek).

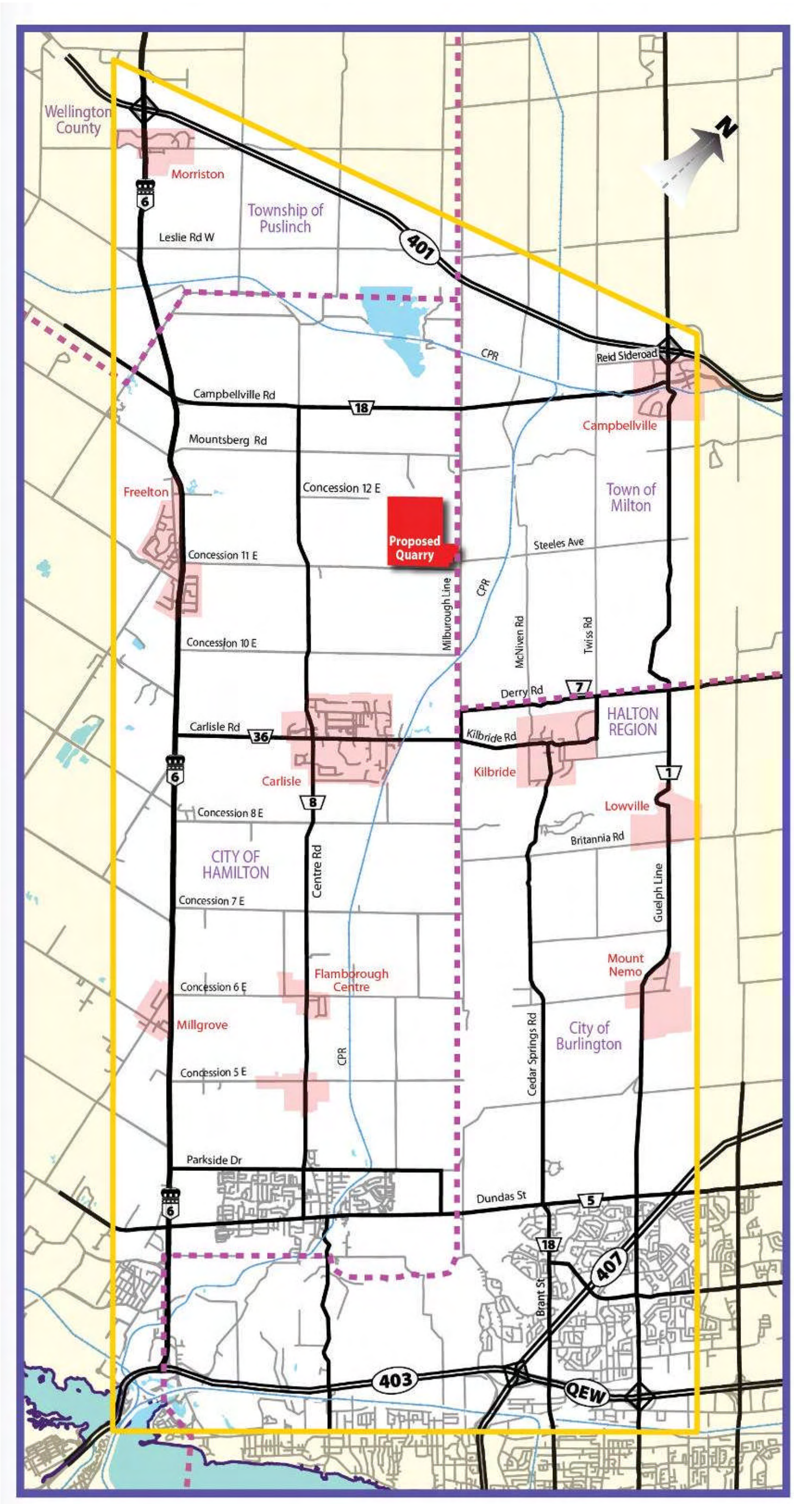


Exhibit 2-1: Study Area

2.2 Project Description

The Haul Route Evaluation Study follows the terms of reference found in Appendix A which were provided by the Combined Aggregate Review team (CART).

As part of the Terms of Reference five Public Information Centres were identified to give community members the opportunity to provide input and help shape the study.

A summary of the meetings purpose and date is found below in **Table 2-1.**

Table 2-1: Public Consultation

	Purpose	Timeline
Public Information Centre #1	To introduce the project, to identify how the public would like to be involved and to identify initial public concerns and issues.	Held June 21, 2007
Public Information Centre #2	To present the draft alternative routes and the evaluation approach.	Held November 29, 2007
Public Information Centre #3	A public workshop that allows the opportunity to provide input on the alternative haul routes, evaluation criteria, the relative importance of the criteria and the evaluation approach.	Held January 9, 2008
Public Information Centre #4	To share the interim analysis of the haul routes and the interim evaluation results. Obtain public feedback.	Held June 23, 2008
Public Information Centre #5	To present the: preliminary results of the evaluation of the alternative routes; preliminary recommendation on the preferred haul routes; and, recommended road alterations and mitigation measures. Obtain public input.	Anticipated Spring 2009

3. DESCRIPTION OF THE ENVIRONMENT

The following section provides a summary of the baseline conditions from the supporting technical documents for the study area and more specifically for the links that comprise the alternative haul routes. These technical documents have examined the existing environment in following study areas: Natural Environment, Agricultural, Land Use, Social and Business Impacts, Cultural Heritage and Archaeology, Air Quality and Health Risk Assessment, Noise and Vibration, Pavement and Road Engineering, Structural and Storm Water, and Transportation and Safety.

3.1 Natural Environment

The following is a summary of the existing natural environment conditions noted in the Natural Environment Report (Report C) completed by Savanta Inc. (September, 2008). The natural environment examination was divided into two parts: aquatic environment and terrestrial environment.

3.1.1 Aquatic Environment

There are four subwatersheds of Bronte Creek found within the study area including: Bronte Creek tributaries; Mountsberg Creek; Flamboro Creek; and, Kilbride Creek. Within the study area, there are a total of 19 potential watercourse crossings with the following flow regimes: permanent (6); intermittent (9); and, ephemeral (4). The approximate location of these water crossings are shown in **Exhibit 3-1: Aquatic Natural Heritage Features**. Most of the intermittent and ephemeral watercourses are dominated by herbaceous vegetation within the channels, thereby limiting their potential as direct habitat for fish. Found in close proximity to a number of the potential crossing locations associated with Bronte Creek is the Redside Dace which is designated as threatened under Ontario's Endangered Species Act and is of special concern under Schedule 3 of the federal Species at Risk Act (SARA).

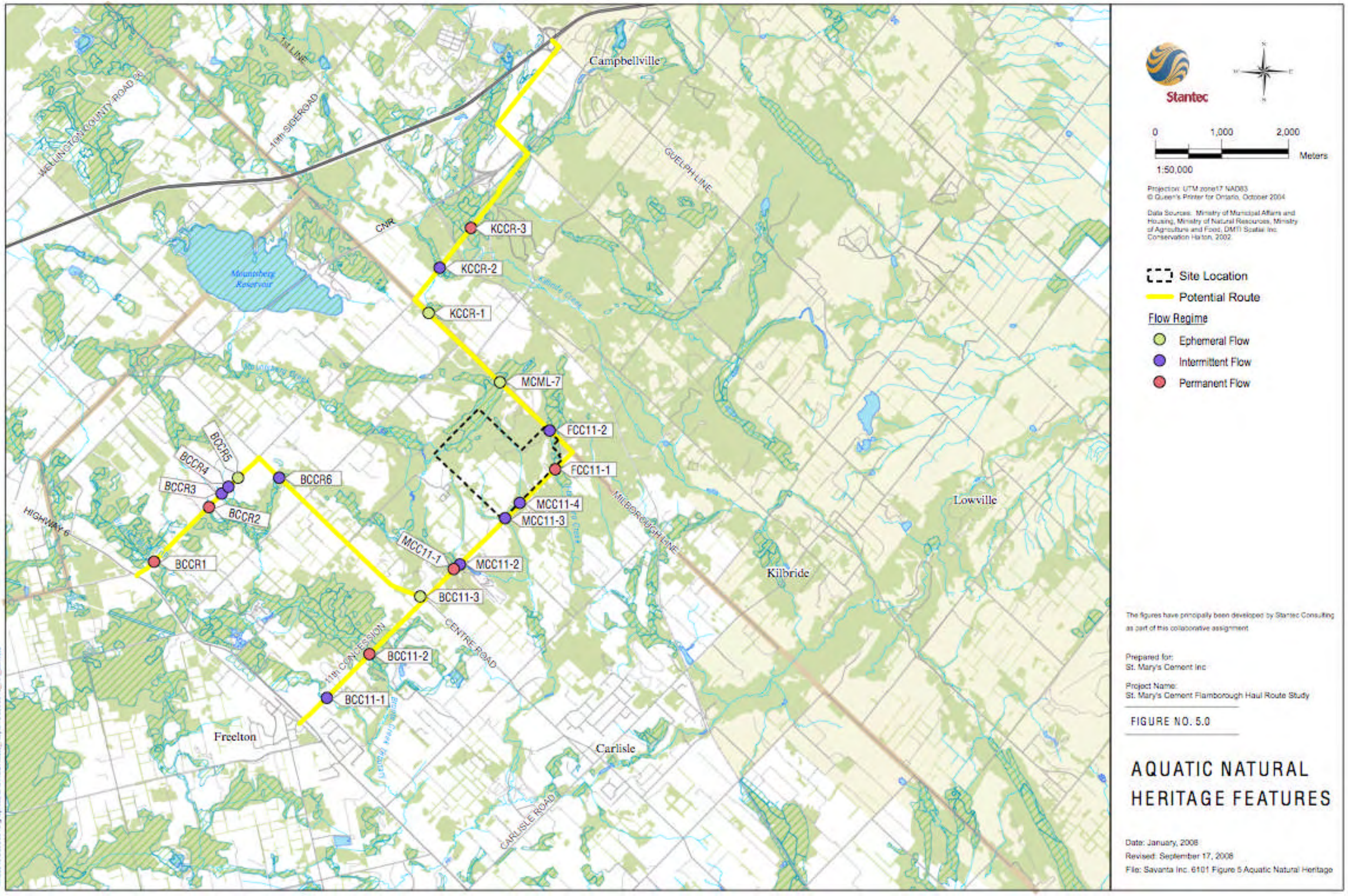


Exhibit 3-1: Aquatic Natural Heritage Features

3.1.2 Terrestrial Environment

Several Environmentally Significant Areas (ESAs), Areas of Natural and Scientific Interest (ANSIs), and provincially significant wetlands (PSWs) lay within 100-metres of one or more of the alternate haul routes. There are 7 identified core deer wintering areas found on the Subject Lands and along the alternative haul routes identified. Many of these natural areas are known to contain rare or sensitive vegetation communities. As well, many contribute to a generally well-linked landscape in terms of wildlife movement functions.

The Natural Environment Report provides a detailed analysis of the features and functions of the individual habitats, including vegetation communities based on the Ecological Land Classification (ELC) system, found within the study area. **Exhibit 3-2: Designated Terrestrial Natural Heritage Features** summarizes the distribution of these features.

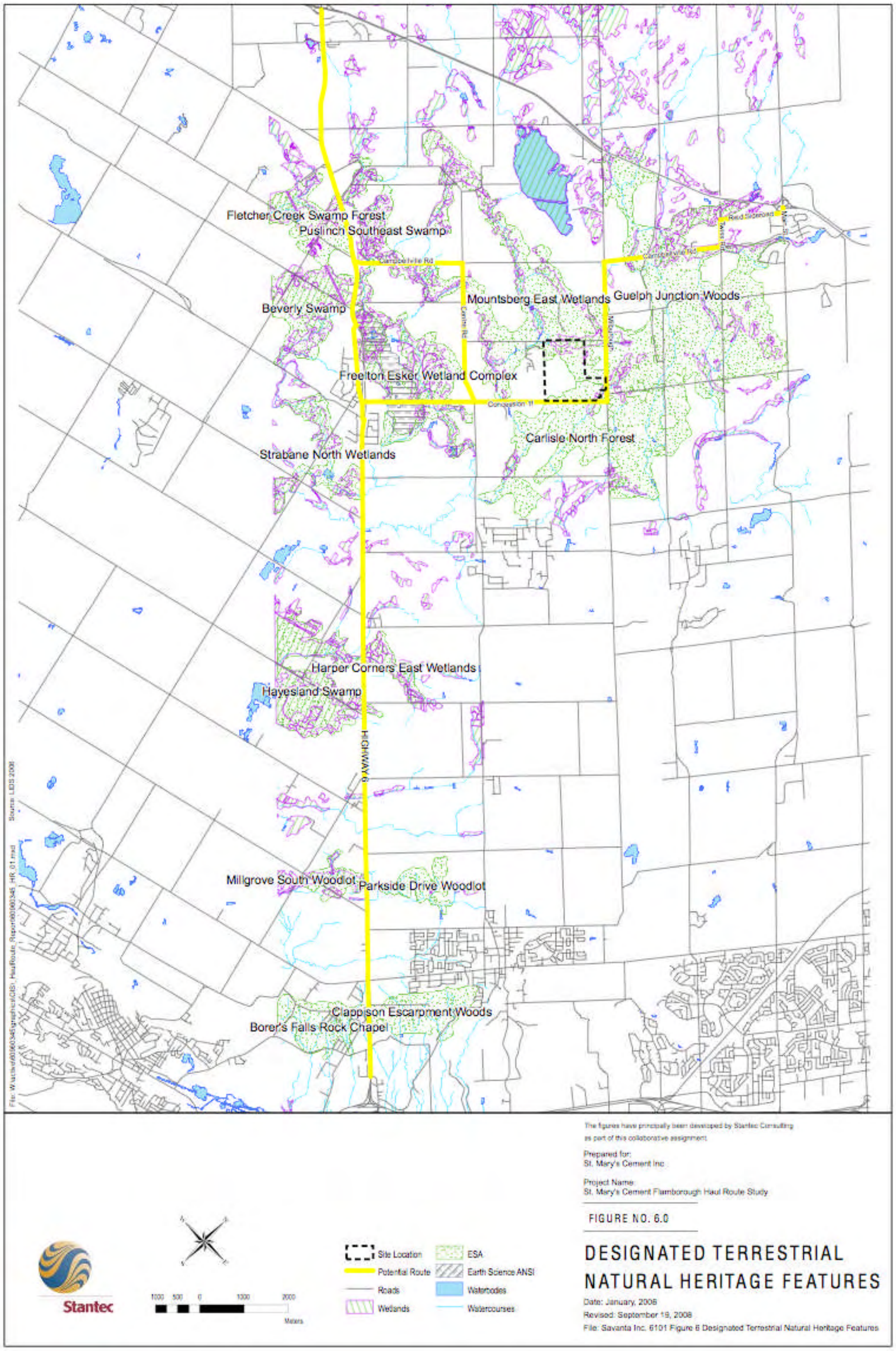


Exhibit 3-2: Designated Terrestrial Natural Heritage Features

3.2 Agricultural

The following is a summary of the agricultural baseline conditions information from the Agricultural Report (Report F) completed by Conna Consulting (August, 2008).

Most of the Study Area east of Freelton, along Campbellville Road, Concession Road 11E, Centre Road, Milburough Line, Twiss Road and Reid Sideroad is characterized by rough, hilly and swampy till moraine deposits with stony, bouldery and shallow soils occurring over limestone bedrock. Peat and muck organic soils and associated wetlands are common to this area. These conditions are typical of the Horseshoe Moraine and Flamborough Plain physiographic areas which dominate the Study Area.

Gravelly Burford, stony Dumfries, shallow Farmington and poorly drained organic soils are common, with low agricultural capability Class 5 and 6 soils predominant in this area. The Campbellville Road haul route segments, for example, exhibit an average of less than 16% Prime Agricultural Land; Concession Road 11E averages around 15%; and Milburough Line, 18% . The relatively low level of agricultural productivity within the Study Area is reflected by the general absence of Agricultural designations within the Milton, Hamilton and Wellington County Official Plan portions of the Study Area. For the most part, the Study Area is designated Rural, rather than Agriculture.

The soil capability constraints result in low cropping percentages along Campbellville Road, 11E and Milburough Road. However this allows the occurrence of pasture and grazing lands suited for livestock such as horses. Highway 6 does have high soil capabilities for agricultural but cropped land is less common because of transfer of farmland to non-agricultural uses.

There are a limited number of commercial farming facilities in the study area including cattle, poultry and sheep production facilities mainly along Highway 6, Campellville Road and Centre Road. There are also four agricultural market facilities along Highway 6.

A limited number of other commercial farming facilities including cattle (dairy and beef) and cash crop facilities occur mainly along Highway 6, north of Campbellville Road. A large poultry facility is located on the east side of Highway 6 between Carlisle and Safari Roads and some sheep and cattle production facilities are found on the north side of Campbellville Road and along Centre Road.

Agricultural market facilities include the Woodland Farm Market, Imperial Mushroom Co., Terra Nursery and Elliott Tree Farm located along Highway 6 south of Freelton and a large tree nursery production area situated along the east side of Centre Road. The reconnaissance survey did not observe any pick-your-own or fresh produce market signage that would indicate established fresh market outlets along the various haul route alternatives.

3.3 Land Uses

The following is a summary of the land use environment along the alternative haul routes which are described in detail in the Land Uses Report (Report D) completed by Glen Schnarr and Associates Inc. (October, 2008).

The **Highway 6** corridor has a full range of land uses bordering it on both sides, including agricultural areas, natural areas, residential areas, commercial areas, industrial areas and institutional areas. The settlement areas of Morriston, Freelton and Millgrove, and Urban lands in Waterdown are located along Highway 6.

Campbellville Road (between Highway 6 and Centre Road) generally consists of agricultural lands and residential/vacant lands, as well as the Mountsberg Baptist Church (at NW corner of Centre Road and Campbellville Road), and an equestrian training centre.

Campbellville Road (between Millburough Line and Twiss Road) generally consists of agricultural lands, woodlots and conservation lands, and residential/vacant lands.

Concession 11 includes agricultural lands, residential/vacant lands (including Stonebury Place), community/recreational lands (including Lawson Park Family Camping Resort), and an equestrian training centre.

Centre Road generally consists of agricultural lands, residential/vacant lands, the Mountsberg Community Centre at SW corner of Centre Road and Campbellville Road, and an equestrian centre.

Milburough Line generally consists of agricultural uses, residential/vacant lands (including the rear yards contained within Timberrun Court), woodlots and conservation lands, and business uses (including Forrestdale Dog Kennels).

Twiss Road includes business uses, agricultural uses, and residential/vacant lands.

Reid Side Road consists of residential/vacant lands, agricultural uses, a cemetery, a business (Ridley Windows and Doors), and an Emergency Response Centre; and

Guelph Line includes the Highway 401 interchange at Guelph Line.

3.4 Social-Economic and Business Impacts

The following is a summary of the existing social and business conditions along the Alternative Haul Routes from the Socio-Economic and Business Impacts Report (Report E), completed by Gartner Lee Limited (September, 2008). For the purpose of reporting, the project team divided the Alternative Haul Routes into 15 individual route segments.

Concession 11 between Highway 6 and Milburough Line is characterized by its rural homes, with approximately 54 residences and 4 farms with driveways along Concession 11. Horse-related businesses such as training stables and ranches are present alongside other farms, including a livestock farm. Two other businesses exist but their setback is largely away from the street.

Milburough Line between Concession 11 and Campbellville Road includes the primary access to the proposed quarry. This access is located in a primarily rural residential area containing estate homes and horse stables. There are approximately 18 rural residence and two farm residences along the route. Businesses include a kennel and horse stables/ranches.

Centre Road between Concession 11 and Campbellville Road falls within the community of Mountsberg, with a cluster of community features such as a community centre (a historic schoolhouse), memorial park, residential cluster and linear development, and rural/agricultural residences. A tree nursery along this segment, the community centre/historic schoolhouse and park were considered sensitive uses. There are approximately 43 rural residences and one farm with driveways along the route, and 1 residence backing onto the route.

Campbellville Road between Highway 6 and Centre Road is characterized by large individual residences and horse farms, along with the new subdivision development of Chesswood located within the segment.

Campbellville Road between Milburough Line and Twiss Road, is dominated by residential and rural uses such as horse stables and related business. These horse farms were considered to be sensitive land uses. The Mountsberg Wildlife Centre is also located to the northwest of the route segment and two woodlots flank the route to the west of the railway crossing.

Twiss Road between Campbellville Road and Reid Sideroad, includes a large “storage solutions” storage business which also has a driveway from Twiss Road. A rail crossing at grade may require alterations, however, residential/farm uses were limited with 2 rural residences and 1 farm residence with driveways onto the route.

Reid Sideroad between Twiss Road and Guelph Line, contains few residences with driveways directly onto the route; however, one commercial business, two farms, recreation land uses and the Campbellville Emergency Response Centre (Fire Station #2) are located here and the Village of Campbellville is also located directly behind the land uses fronting on the route.

Guelph Line between Reid Sideroad and Highway 401, is one of the main entrances or gateways to the village of Campbellville. Campbellville is a local and regional tourist destination. Historic residences, many converted to shops; and a church is located to the south of this route segment along Campbellville Road and Guelph Line (Main Street). Guelph Line north of Reid Sideroad, does not contain any socio-economic features.

Highway 6 between Highway 403 and Parkside Drive, consists mainly of linear highway and rural commercial development with several rural homes with driveways along the highway. This area is zoned as the Flamborough Business Park and contains mainly vacant lands but also includes commercial, industrial/business, non-developable and some residential designations. The community of Northcliffe is located on the west side of Highway 6 along Highway 5 (Dundas Street). On the east side of Highway 6 stands an established subdivision with residential uses bordering some industrial uses near the Highway 6, but accessed from side roads. Businesses along this segment of Highway 6 include highway commercial uses: gas stations, auto sale shops; and rural commercial uses such as driving ranges, trailer storage and a fairway.

Highway 6 between Parkside Drive and Concession Road 6E, contains substantially more residences with driveways along Highway 6 than the segment of Highway 6 above. This route contained the highest number of rural and farm residences with driveways along the route compared to all other segments. The community remains primarily rural/ex-urban residences and remaining farms. The Millgrove community is located on west side of the Highway 6 near Concession 6E. Highway/rural commercial uses are present along this route segment.

Highway 6 between Concession 6E and Concession 8E, also contains a high proportion of highway commercial and cluster residential development consisting of homes similar in character to segment 2. Harper’s Corner subdivision is present in this segment with approximately 22 homes that back onto the road. This development appears to be more recent, having homes that are newer and larger in appearance as compared to the more typical roadside residences. Some homes are up for sale and there was no new construction observed. The Millgrove community is located on west side of the Highway 6 near Concession 6E. There are more abundant commercial land uses along this segment than previous segments. Some businesses are located in business parks or plazas with their main access onto Highway 6.

Highway 6 between Concession 8E and Concession10E, has fewer total rural and farm residences along this route segment than the others but there are a greater number of farms and residences that have direct access onto Highway 6 than previous segments. There are residential clusters off Safari Road and Edgewood Road to the west, and the Harper’s Corner community to the east, along segment 4. Businesses along this route segment such as horse stables; farms, farm/markets and restaurants were considered sensitive to the nuisance effects associated with trucking.

Highway 6 between Concession 10E and Mountsberg Road, divides or bisects the Freelton community, with the majority of the community set back to the west of Highway 6. In particular, there is a senior citizen's residence located within Freelton and was considered to be a sensitive use. However, segments along Highway 6 are already impacted by the major arterial and impacts would be more of an analysis of the cumulative effect on adjacent uses. On the east side of the route, there is a newer subdivision named "Wildan Estates" with approximately 11 homes backing onto Highway 6. In addition, there is a small residential cluster near Mountsberg Road (part of the Mountsberg community) that is not located directly along the route but is in close proximity.

Highway 6 between Mountsberg Road and Leslie Road West, contains predominantly linear and cluster residential development, with fewer highway commercial/rural uses than previous sections. Approximately 37 rural residences and 10 farm residences have driveways that provide access to Highway 6.

Highway 6 between Leslie Road West and Highway 401, acts as the main street in the town centre of Morriston, a small community that is experiencing new residential growth through new estate home subdivisions to the north near Highway 401. There are approximately 18 residences in the town centre with driveways onto Highway 6 with residential development flanking either side of the central core. Three rural residences, 2 horse ranches and 3 other farm residences have driveways along the route outside of the town centre.

3.5 Cultural Heritage and Archaeology

The following is a summary of the cultural heritage/archaeology baseline conditions information from the Flamborough Quarry Haul Route Study Cultural Heritage and Archaeological Report (Report J), completed by Archaeologix Inc (August, 2008).

A cultural heritage and archaeological study was conducted for an approximately 20 kilometre stretch of various roads straddling the City of Hamilton and the Regional Municipality of Halton plus the roughly 28 kilometre stretch of Highway 6 between Highway 401 and Highway 403. This study surveyed the lands within approximately 100 metres to each side of the roads that were identified as possibly undergoing alterations to facilitate the quarry related traffic. The alternative routes run through the historic village of Campbellville (now part of the Town of Milton in the Regional Municipality of Halton), near the intersection of two railway systems at Guelph Junction, through the historic village of Mountsberg, and close to Freelton (now within the Regional Municipality of Hamilton), and north on Highway 6 through Puslinch Township to Highway 401.

The lack of good soil, as mentioned in the agricultural report and the generally wet conditions indicate low archaeological potential in many areas. Generally, the roads have soft shoulders and have shallow ditches running on either side but exhibit very little construction disturbance beyond those ditches meaning that any needed road widening would most likely impact undisturbed soil. However, the routes exhibit considerable topographic variation, running across knolls in many cases that could have higher archaeological potential. Bronte Creek and numerous small streams run throughout the area meaning that nearby water sources also contribute to higher potential in certain areas.

The lands included in the study area are still largely rural, comprising cultivated fields and pastureland intermixed with extensive areas of cedar swamp. Signs of the ways in which the earliest settlers impacted the land can still be seen in the boulders lining and separating fields, indicative of the difficult job of clearing the rocky land. More recent effects can be seen in the paved roads, the ditches along the roads, railroad lines, and telephone poles. Although few nineteenth-century fences were observed along the roads surveyed, several residents had built reproductions of the rail and stump fences erected by the area's pioneers.

3.6 Air Quality and Health Risk Assessment

The following is a summary of the baseline conditions information from the Air Quality and Health Impacts Report (Report G), completed by RWDI Air Inc. (September, 2008).

Table 3-1 summarizes a variety of Volatile Organic Compound (VOC) concentrations considered as representative existing air quality concentrations within the Study Area. Ambient air concentrations for pollutants associated with vehicle exhaust emissions that are considered to be representative of the Study Area are provided in **Table 3-2**. The data were summarized from the MOE (2003) report entitled "Air Quality in Ontario – 2003 Report" and represent air quality conditions measured across the province in 2003. Year 2003 coincides with the most recent annual average daily traffic (AADT) volumes provided by the Ontario Ministry of Transportation (MTO) for King's Highways, secondary highways and tertiary roads, which are also presented in **Table 3-2**.

Table 3-1: Representative Rural 50th Percentile Volatile Organic Compound

Substance	50th Percentile ($\mu g/m^3$)	Current AAQC($\mu g/m^3$)
Formaldehyde	N/A	65
1,3-Butadiene	0.05	N/A
Acetylene	0.41	56,000
Benzene	0.357	N/A
Propane	1.484	N/A

Notes: N/A stands for "not available".

Table 3-2: Summary of AAQC Exceedences of Representative Ambient Pollutant Concentrations

Substance	MOE Monitoring Station	Average Traffic Volume (AADT)	50th Percentile (µg/m³)	90th Percentile (µg/m³)	Ambient Air Quality Criteria (AAQC) (ug/m3)		50th Percentile Above/Below AAQC		90th Percentile	
					1 hour	24 hour	1 hour	24 hour	1 hour	24 hour
CO	Ontario Average [1]	N/A	506	906	36,200	N/A	Below	N/A	Below	N/A
NO2	Hwy 3 and Blue Line Road, Simcoe (# 22071)	9,950	14	34	400	200	Below	Below	Below	Below
PM2.5 TEOM	Hwy 3 and Blue Line Road, Simcoe (# 22071)	9,950	6	15	N/A	30	N/A	Below	N/A	Below
	Hwy 117 and Paint Lake Road, Dorset (# 49010) [2]	1,850	5	11			N/A	Below	N/A	Below
	Hwy 21 and County Road 83, Grand Bend (# 15020) [2]	3,800	7	17			N/A	Below	N/A	Below
SO2	Ontario Average [1]	N/A	3	15	690	275	Below	Below	Below	Below
O3	Hwy 3 and Blue Line Road, Simcoe (# 22071)	9,950	66	114	165	N/A	Below	N/A	Below	N/A
	Hwy 117 and Paint Lake Road, Dorset (# 49010)	1,850	64	97			Below	N/A	Below	N/A
	Hwy 21 and County Road 83, Grand Bend (# 15020)	3,800	62	95			Below	N/A	Below	N/A
	Hwy 47/ East of Hwy 48, Stouffville (# 48002)	8,950	60	97			Below	N/A	Below	N/A

Notes: [1] Concentrations do not include monitoring stations in the GTA, Hamilton and Windsor areas
[2] INS indicated that there was an insufficient amount of data to calculate a valid annual mean. An adequate annual mean requires at least 75% valid data per quarter.

The 50th percentile values are considered representative of typical long-term ambient background conditions and are appropriate for evaluating potential health impacts associated with long-term exposure to substances in air. The 90th percentile values are representative of air quality conditions that exist infrequently and are appropriate for evaluating potential impacts associated with short-term exposure to elevated concentrations such as those which may exist for short periods of time during episodic events associated with regional smog or regional trans-boundary air pollution. The data presented in **Table 3-1** and **Table 3-2** indicate that the concentrations for all substances were less than the applicable AAQCs. This indicates that exposure to these concentrations of substances in air is not expected to cause adverse health impacts.

The data presented in **Table 3-3** indicate that based on AQI readings from representative monitoring stations, air quality in the study area may be characterized as good to very good approximately 90 percent of the time. This is consistent with the finding that pollutant levels at the stations were less than the applicable AAQCs, as summarized above. On days during which air quality was considered moderate or poor, the MOE monitoring data indicated that the elevated AQI readings were due primarily to elevated levels of ozone, and to a lesser extent PM2.5. Elevated levels of these substances are often associated with regional photochemical smog events and trans-boundary pollution (MOE, 2005).

Table 3-3: 2006 AQI Summary Readings for Selected Areas

City/Town	Percentage of Valid Hours in AQI Range					Days with at Least 1 Hour > 49
	Very Good	Good	Moderate	Poor	Very Poor	
	0-15	16-31	32-49	50-99	100+	
Grand Bend	33..1	57.3	9.2	0.4	0	10
Dorset	34.6	58.6	6.7	0	0	1
Guelph	36.5	53.6	9.7	0.2	0	4
Burlington	44..5	46.1	9.1	0.3	0	7

Adapted from Air Quality in Ontario - 2006 Report (MOE, 2006)

Data from MOE monitoring stations considered to be representative of air quality within the Study Area indicate that air quality within the Study Area is expected to be good. This is based on the fact that pollutant concentrations were all less than the applicable AAQCs and the measured AQI levels were good to very good approximately 90 percent of the time. It is unlikely that any significant changes in overall air quality within the Study Area will result from selecting one haul route over another.

In order to prioritize the haul route alternatives based on air quality and potential human health impacts, it was necessary to adopt different analysis criteria and indicators and compare results. The approach used for this analysis and results are summarized in **Section 10** and fully described in Report G.

3.7 Noise

The following is a summary of the baseline conditions information from the Noise Report (Report H), completed by RWDI Air Inc. (September, 2008).

The minimum hourly traffic noise levels are 1-hour energy-average sound exposure (Leq (1hr) dBA) values, during the hour with the least traffic, typically between 3pm and 4pm for Highway 6, and typically between 10am and 11am for other roads. Correspondingly, the maximum hourly traffic noise levels typically occur between 5pm and 6pm. The average sound level is the energy equivalent average over the entire 12-hour period of haul route activity, between 7am and 7pm (an Leq (12hr) value).

The acoustic environment in the study area is characterized by three distinct environment types – urban, semi rural, and rural. For each of the following three examples, 25 m setback distances will be used for illustrative purposes:

- Urban acoustic environments exist along major traffic corridors such as Highway 6. Daytime traffic noise levels along Highway 6, north of Campbellville Road at a distance of 25 meters, are predicted to be between 67 dBA and 73 dBA.

- Semi-rural acoustic environments exist along highly travelled minor traffic corridors such as Campbellville Rd. For example, daytime traffic noise levels along Campbellville Rd, from CNR tracks to Guelph Line, at a distance of 25 meters, are predicted to be between 55 dBA and 58 dBA.

- Rural acoustic environments exist along infrequently travelled minor traffic corridors such as Milburough Line. For example, daytime traffic noise levels along Milburough Line, north of Concession 11E and south of Campbellville Rd, at a distance of 25 meters, are predicted to be between 45 dBA and 49 dBA.

3.8 Vibration

The following is a summary of the baseline conditions information from the Vibration Report (Report I), completed by RWDI Air Inc. (August, 2008).

Ground-borne vibration from transportation systems can be a concern for nearby residents. Extremely high vibration levels can cause buildings to shake, windows to rattle, and rumbling sounds to be heard. Ground-borne vibration impacts frequently occur for rail transportation systems, such as freight and passenger trains, light rapid transit systems, and subway lines. However, vibration impacts from roadway sources such as heavy truck traffic and bus traffic are extremely uncommon (FTA 2006).

Vibration impacts can be broken down into two categories: perceptible vibration, which ground-borne vibration can produce perceptible ("feelable") levels of motion within buildings, and ground-borne noise, where ground-borne vibration is radiated by building walls as audible sound.

Typical background vibration levels due to distant traffic or the motion of vegetation (trees) driven by the wind, are at approximately 0.01 mm/s.

The St. Mary's haul route alternatives are located north of Highway 5 and south of Highway 401 between Highway 6 and Guelph Line. The study area is predominantly rural, with homes and farms along the various roadways. There are also a few villages and some smaller built up areas.

3.9 Pavement Engineering

The following is a summary of the geotechnical and pavement engineering baseline conditions information from the Pavement Engineering Report (Report L), completed by Golder Associates Inc. (August, 2008).

An informal windshield survey was performed at the site by Golder staff on January 8 and 9, 2008 by driving along each alternative haul route segment previously identified by iTRANS at a speed of approximately 50-60 km/hr, and noting the condition of the pavement surface. A simple rating of 0 (worst) to 10 (best), in increments of 2, was assigned to each road segment. The types of pavement distresses, such as cracking, rutting, and potholing were observed, together with the condition of the shoulders and drainage. The survey was limited to the relevant segments of Concession 11E, Campbellville Road, Centre Road, Milburough Line, Twiss Road, and Reid Side Road. Highway 6 was not included in the survey. The observed conditions are shown in **Table 3-4:** Observed Pavement Conditions.

Table 3-4: Observed Pavement Conditions

Observed Pavement Condition	
Route 1	
Concession 11 E, Milburough Line to Centre Road	**Condition rated 10** Smooth surface, asphalt Road narrow, no shoulders New surface treatment applied 0.7 km of swampy land, north side
Concession 11 E, Centre Road to Highway 6	**Condition rated 10** Smooth New asphalt Narrow, no shoulders

Observed Pavement Condition	
Route 2	
Concession 11 E, Milburough Line to Centre Road	**Condition rated 10** Smooth surface, asphalt Road narrow, no shoulders New surface treatment applied 0.7 km of swampy land, north side
Centre Road, Concession 11E to Campbellville Road	**Condition rated 10** Very new asphalt surface Road narrow, no shoulders
Campbellville Road, Centre Road to Highway 6	**Condition rated 6** Transverse cracking Some centreline cracking Occasional patching Some alligator cracking
Route 3	
Milburough Line, Concession 11 E to Campbellville Road	**Condition rated 6** Chip seal surface, good condition Road narrow, no ditches, poorly drained
Campbellville Road, Milburough Line to Twiss Road	**Condition rated 4** Longitudinal cracking Alligator cracking Edge breaks Routing and sealing done
Twiss Road, Campbellville Road to Reid Sideroad	**Condition rated 8** Half of its length chip sealed, some edge Cracking Half of its length asphalt, very good condition
Reid Sideroad, Twiss Road to Hwy 401 ramp	**Condition rated 8** Good surface, asphalt Some transverse cracking

Note that Alternative Haul Routes 4 and 5 are combinations of Alternative Haul Routes 1-3.

Existing drainage was poor along the alternative routes. Based on the observations made during the windshield survey, drainage improvements to varying degrees will be required along any haul route selected as the preferred route.

None of the existing pavements on the alternative routes will be able to support the anticipated heavy traffic imposed by quarry haul trucks. The pavements on the selected route will need to be upgraded.

3.10 Storm Water and Structural

The following is a summary of the storm water and structural related baseline conditions information from the Municipal Structure and Drainage Report (Report L), completed by R.J. Burnside and Associates Ltd. (August, 2008).

3.10.1 Stormwater

The Alternative Haul Routes cross a number of small watercourses within the Bronte Creek watershed. These watercourses are within four subwatersheds, namely:

- Upper Bronte Creek
- Mountsberg Creek
- Flamborough Creek
- Killbride Creek

Upper Bronte Creek is approximately 52.0 km^2 in area, has a shallow gradient of 0.3% and flows through a series of wetlands associated with the Beverly Swamp Complex from Morriston to Carlisle where is meets Mountsberg Creek. The proposed haul route crosses Upper Bronte Creek at two locations; C03 and C04 (described below).

Mountsberg Creek is approximately 46.7 km^2 in area, has a shallow gradient of 0.3% and drains predominantly rural and agricultural lands north of Highway 401, through the Mountsberg Reservoir and meets the Upper Bronte Creek in Carlisle. The proposed haul route crosses Mountsberg Creek at one location; C02. This is the same location where flows have been recently monitored (SW-MC3). This work concluded that the Creek routinely experiences flows above 0.3 m^3/s and flows of over 1.0 m^3/s during the spring and fall (Stantec 2007). Baseflows of 0.08 to 0.10 m^3/s have been measured in the Creek.

Kilbride Creek, like Mountsberg Creek, originates well above Highway 401. Its headwaters are above the Niagara Escarpment within the Guelph Junction Wetland Complex and is fed along much of its length by groundwater. The drainage area is approximately 34.6 km^2 and has a shallow gradient of 0.5%. Land-use is dominated by rural and agricultural activities. The proposed haul route crosses Kilbride Creek at one location, C01.

Flamborough Creek is the smallest subwatershed is the area and drains approximately 8.7 km^2. It originates from a series of wetlands associated with the Lower Mountsberg Creek complex and the North Progreston Swamp. There are no large crossings of the creek associated with the proposed haul route. The tributary of Flamborough Creek that flows past the proposed quarry site frequently experiences flows of 0.02 to 0.10 m^3/s in the spring and fall with prolonged periods of no flow in the summer (Stantec 2007).

The alternative haul routes will not cause a change in the flow regime (2-year return period to 100-year return period events) at any of the crossings. The size of each crossing is dependent on, amongst other factors, the road function and the total span as defined by the Ministry of Transportation. It may be necessary to modify the size of a particular crossing to accommodate the preferred haul route.

3.10.2 Structures

Four structures are located along the proposed haul routes as follows:

C01 – Located on Link 13 - Campbellville Road East of Nassagawaya 1st Line
C02 – Located on Link 18 - Concession 11 East of Centre Road
C03 – Located on Link 17 - Concession 11 East of Hwy 6
C04 – Located on Link 11 - Campbellville Road East of Hwy 6

It has been assumed that any structures located on the provincial Highway 6, an existing and designated truck route, are not expected to require alterations. It is anticipated that alterations will be made to roadside facilities located on the final haul route. In evaluating each of the alternatives, the requirements for alterations to the existing structures should be considered.

Each of the haul route alternatives has the potential to be impacted by the presence of one or more of the structures as follows.

- Alternative Route 1 – Potential impacts on structures C02 and C03
- Alternative Route 2 – Potential impacts on structures C02 and C04
- Alternative Route 3 – Potential impacts on structure C01
- Alternative Route 4 – Potential impacts on structures C01, C02 and C03
- Alternative Route 5 – Potential impacts on structures C01, C02 and C04

Each of the four structures was visually inspected to the extent possible, given the weather conditions, snow cover and access limitations on the date of the inspection.

The following observations were made.

C01 – Campbellville Road East of Nassagawaya 1st Line

This structure is more accurately described as a system of three corrugated steel pipe arch culverts. Each culvert is approximately 1.8 x 1.2 meters in size and there is approximately 1.2 - 1.5 meters of fill above the structure obverts. None of the culverts showed structure distress or deformation but there are minor defecets along the seams between culvert sections. The material has rusted in some locations.

The roadside protection across the structure consists of three-cable guiderail on wooden posts. The cable guiderail was noted to be loose and some posts were out of alignment. A three cable guiderail system may not be an appropriate system for this location.

C02 – Concession 11 East of Centre Road

This structure is a cast-in-place concrete rigid frame type of structure, approximately 7.0 meters in span by 1.5 meters in rise. There is less than 600 mm of fill over the structure, and as such, it is classified as a bridge under the Canadian Highway Bridge Design Code.

The structure is in good structural condition with no evidence of load-related distress. There was evidence that the structure soffit was wet in certain locations, but this may be due to water running in from the fascia rather than seeping through the deck. There was no evidence of material leaching through the concrete. A couple of minor concrete pop-outs were noted.

The structure barrier over the structure is three-cable guiderail on timber posts. This type of system is not appropriate for use on bridge structures.

C03 – Concession 11 East of Highway 6

This structure is a cast-in-place concrete rigid frame type of structure approximately 5.0 meters in span x 1.0 meter rise. There is less than 600 mm of fill over the structure, and as such, it is classified as a bridge under the Canadian Highway Bridge Design Code.

The structure was in good structural condition with no evidence of load-related distress. There was evidence that water had leaking down the face of the fascia and potentially between the concrete curb and the deck. The area was wet and stained, although there was no obvious scaling or deterioration noted at present. The structure’s soffit was wet in certain areas, but this may have been a result of water running in from the fascia rather than seeping through the deck. There was no evidence of material leaching through the concrete.

There was no barrier protection provided across the structure.

C04 – Campbellville Road East of Highway 6

This structure is a cast-in-place concrete rigid frame type of structure approximately 6.0 meters in span x 1.0 meter rise. There is less than 600 mm of fill over the structure, and as such, it is classified as a bridge under the Canadian Highway Bridge Design Code.

The structure was in good structural condition with no evidence of load-related distress. The structure’s soffit was wet in certain areas, but this may have been a result of water running in from the fascia rather than seeping through the deck. There was no evidence of material leaching through the concrete. There were a few areas of rusting on the soffit where cover to the reinforcement may be an issue. The top of the deck at the exterior was covered with a waterproofing wrap to prevent water (and salts) from seeping into the concrete.

3.11 Transportation and Safety

The following is a summary of the transportation baseline conditions from the Transportation Report (Report B) completed by iTRANS Consulting Inc. (October, 2008).

The study area (as recommended in the City of Hamilton's Terms of Reference) is generally bound by Highway 401 to the north, Guelph Line on the east, Highway 403 to the south and Highway 6 to the west. The following sections describe the characteristics of the transportation network in the study area in further detail.

3.11.1 Existing Road and Rail Network

The existing road and rail network, road jurisdiction, and road classification within the study area are illustrated in **Exhibit 3-3, Exhibit 3-4,** and **Exhibit 3-5**, respectively.

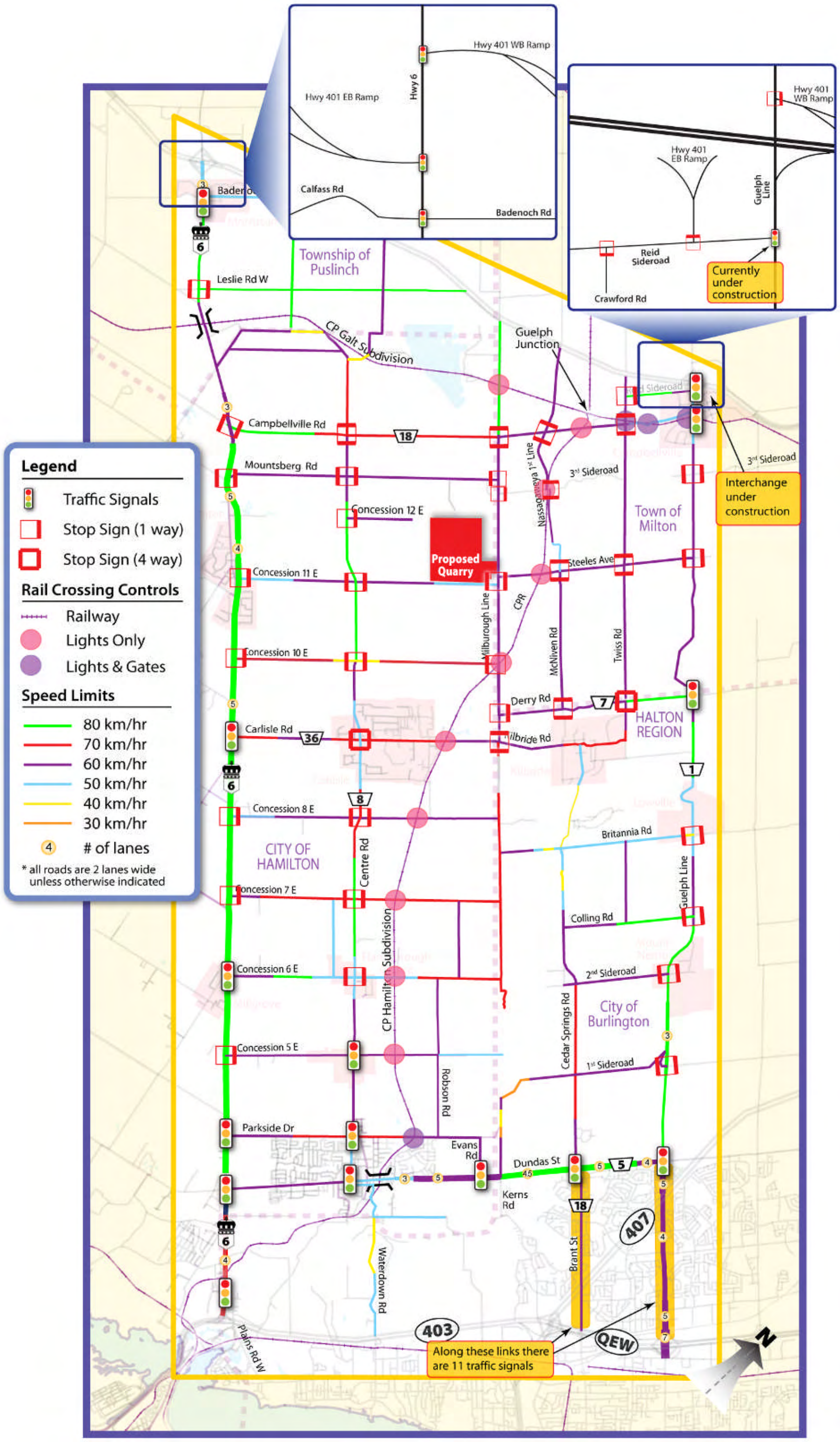


Exhibit 3-3: Existing Road and Rail Network

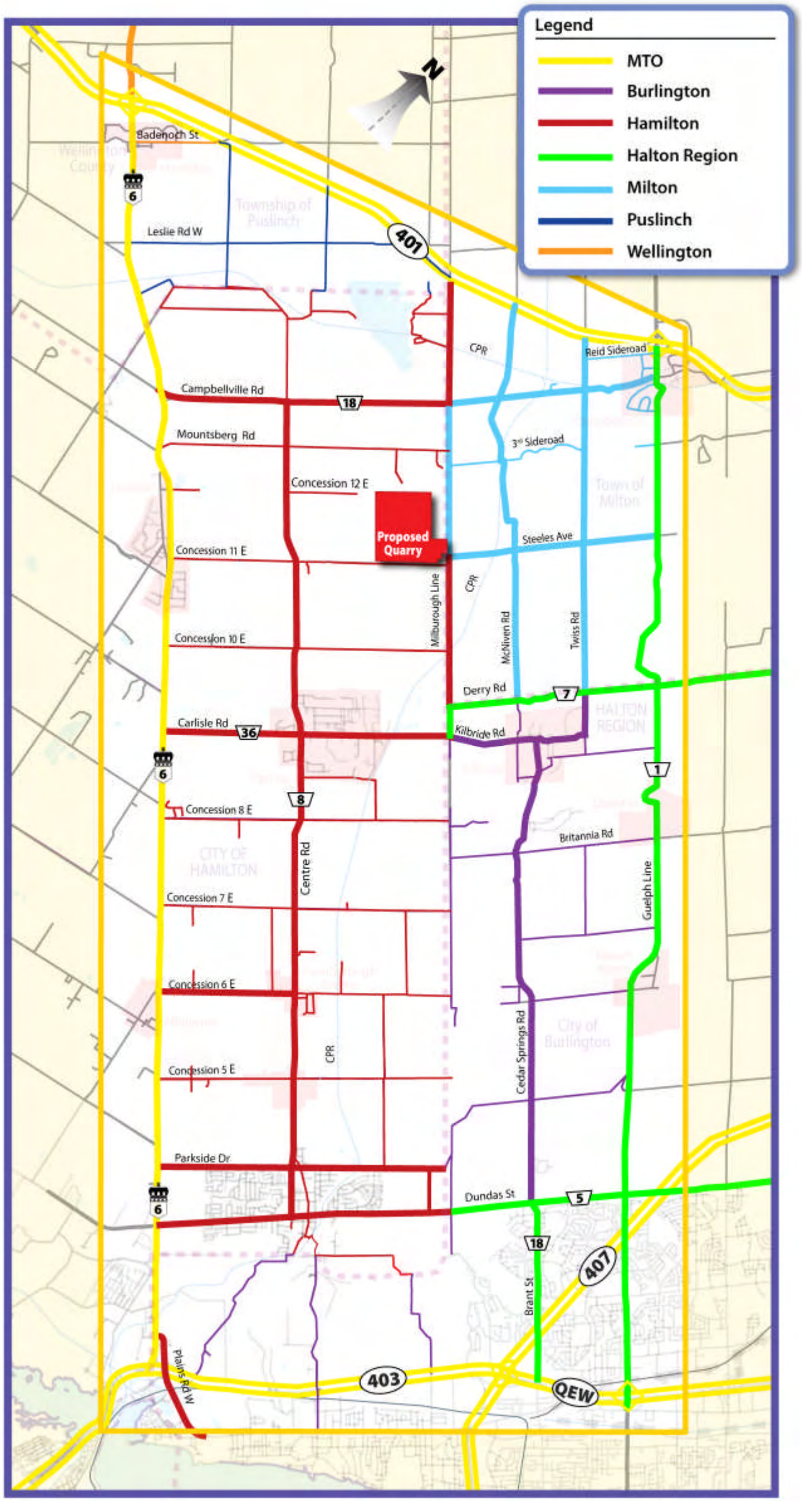
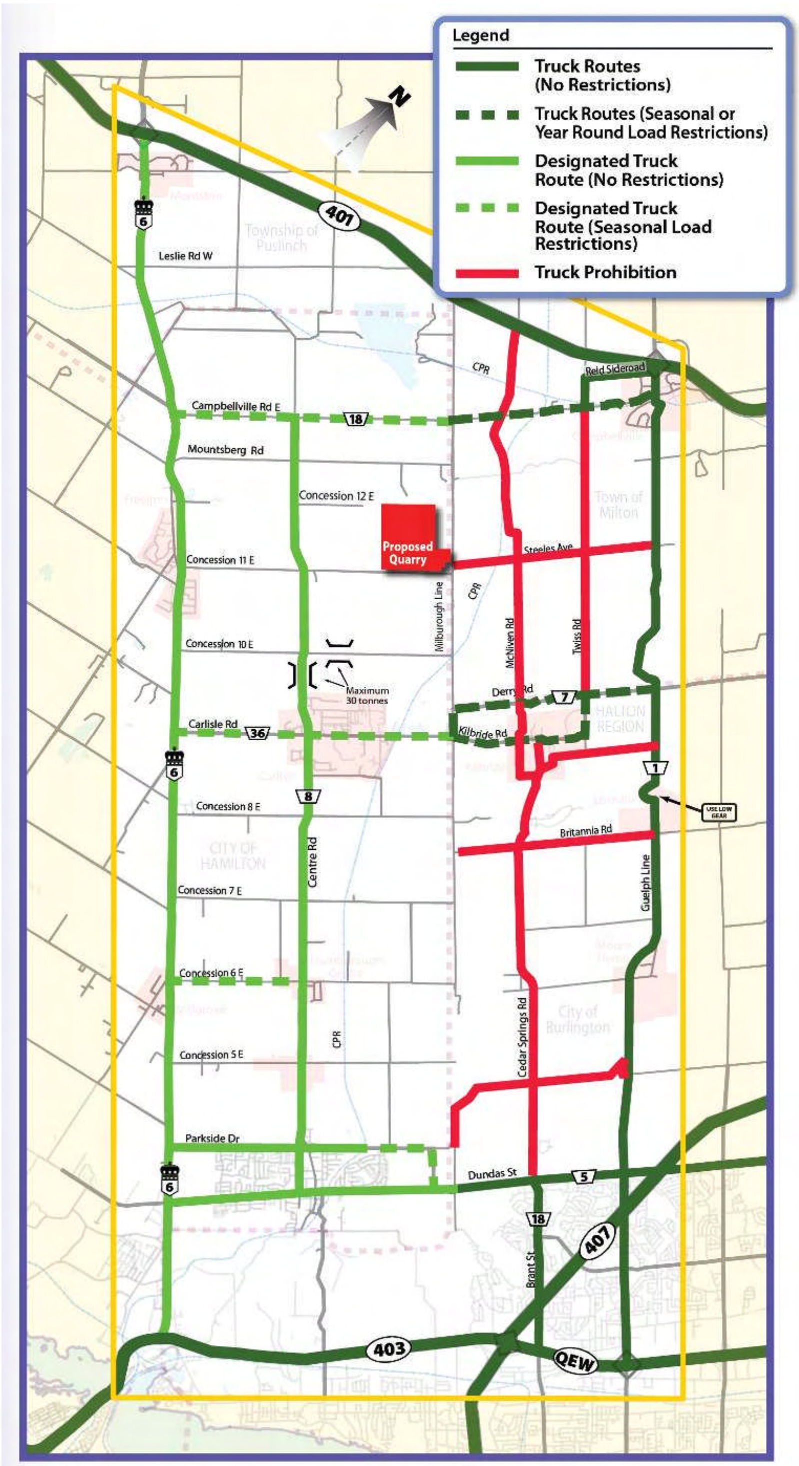


Exhibit 3-4: Road Jurisdictions

Exhibit 3-5: Road Classifications

3.11.2 Designated Truck Routes and Restrictions



The designated truck routes and load restrictions within the study area are illustrated in **Exhibit 3-6**. This exhibit is based on information obtained from municipal staff and the Burlington Rural Truck Route Map. Trucks are restricted at most of the minor arterial roads and collector roads in the Town of Milton.

This exhibit represents the information available prior to the recent Milton Truck Restriction By-law.

Exhibit 3-6: Designated Truck Routes and Load Restrictions

3.11.3 Existing Cycling and Multi-Use Trail Networks

3.11.3.1 City of Hamilton

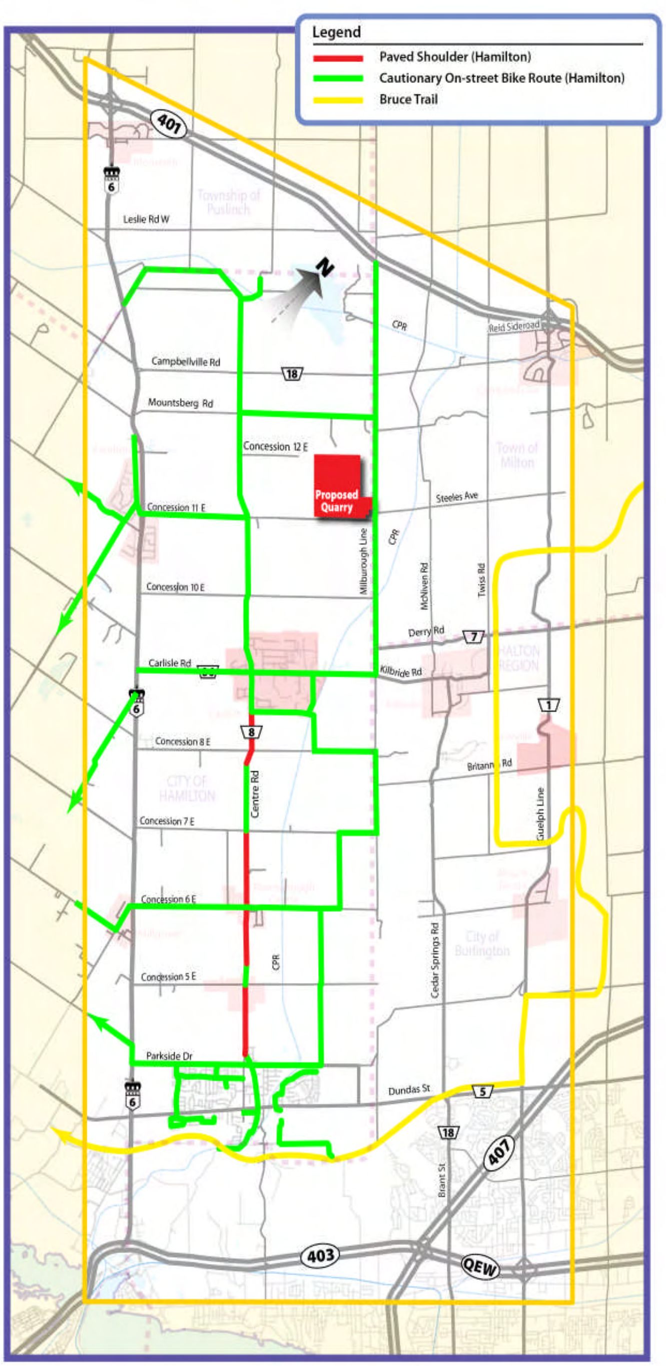


Exhibit 3-7: Hamilton On-Street Cycling Network and the Bruce Trail

The City of Hamilton's Existing Cycling Network within the study area consists of on-street cautionary un-signed bike routes and paved shoulders. The City's existing cycling network is illustrated in the Hamilton Bike Routes, Trails and Parks map, dated March 2008. Cautionary un-signed routes are defined as links in the network that have mostly low to moderate traffic volumes and no dedicated cycling infrastructure.

Information on the Bruce Trail was obtained from the Ontario Trails Cycling Map, dated 2002. The Bruce Trail is the oldest and longest continuous footpath in Canada. It runs along the Niagara Escarpment from Niagara to Tobermory, spanning more than 850 km of main trail and 250 km of side trails. This trail runs through the City of Hamilton as well as Halton Region.

The City's existing cycling network is illustrated in **Exhibit 3-7**. This exhibit also illustrates the location of the Bruce Trail within the study area.
The existing multi-use path network within the City of Hamilton is also illustrated in the City's TMP. **Exhibit 3-8** illustrates the multi-use path network within the study area. It should be noted that this exhibit does not illustrate the location of the Bruce Trail.

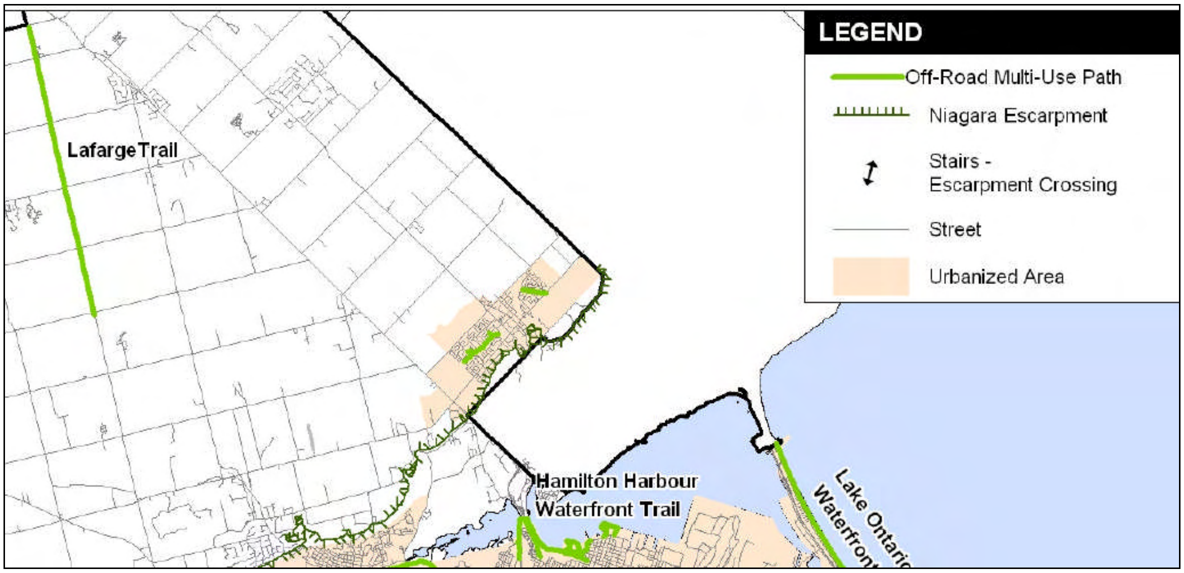


Exhibit 3-8: Hamilton's Existing Multi-Use Path Network

3.11.3.2 Region of Halton

The location of the existing cycling and off-road cycling facilities within the Region of Halton was obtained from the Region's 2004 Transportation Master Plan as well as the 2005 Cycling in Halton Map. The portion of the Cycling in Halton Map which illustrates the existing on road and multi-use trail network within the study area is shown in **Exhibit 3-8**. It should be noted that this exhibit does not illustrate the location of the Bruce Trail, which also runs through Halton Region. The location of the Bruce Trail is illustrated in **Exhibit 3-9**. There are two classifications of on road cycling facilities in Halton, on road bike facilities and on road suggested routes.

On road bike facilities are located on roads that have designated cycling lanes and paved shoulder and/or "Share the Road" signs. Designated cycling lanes are provided in urban areas while paved shoulders are provided in rural areas.

On road suggested routes are on roads with lower traffic volumes that provide continuity with other cycling facilities or provide a preferred route through a busy corridor. There are no designated bike lanes or signs on road suggested routes.

Within the study area, there are a number of roads that have extra caution advisories, due to changes in elevation, intersection sight lines and/or roads with higher traffic volumes.

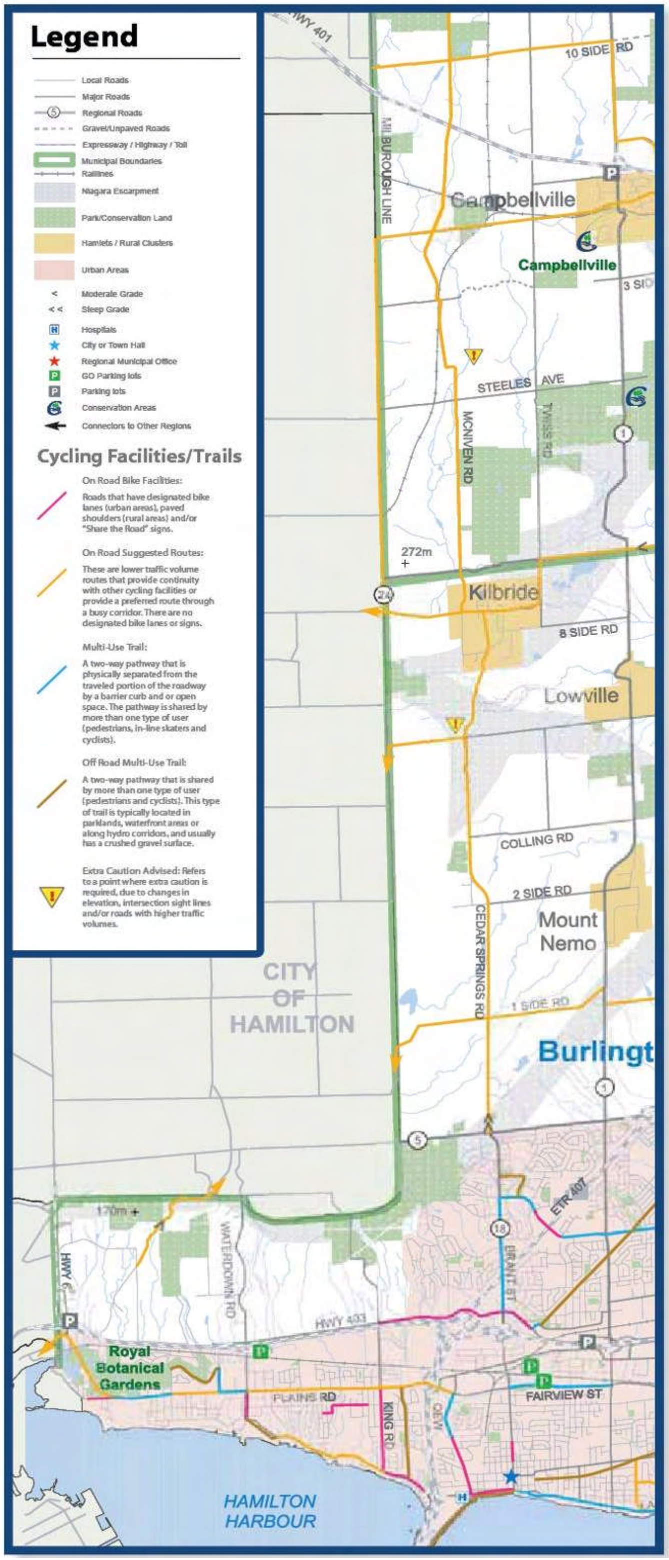


Exhibit 3-9: Halton's Cycling Facilities/Trails

3.11.3.3 Cycling Agencies

Information regarding the existing cycling network information was provided in part by the Burlington Cycling Committee, Hamilton Cycling Committee, and the City of Hamilton Traffic Engineering and Operations office.

3.11.3.4 Cycling Events

There are a number of cycling events held annually in the Study Area. One event in particular is the Tour de FORCE which is organized by Friends of Rural Communities and the Environment (FORCE). This event includes both a 50 km and 100 km cycling route that traverses many of the roads in the Study Area. The Study Area may also be used for cycling events held by other groups including the Hamilton Cycling Committee, Burlington Cycling Committee, Toronto Cycling Committee, Halton Outdoors Club, Regional Niagra Cycling Committee, Oakville Cycling Club, Ontario Cycling Alliance, Bike Toronto, and MACycle Co-op, the McMaster University cycling club.

3.11.4 School Bus and Public Transit Routes

Exhibit 3-10 illustrates the estimated number of school buses by route as well as the daily frequency per direction. This information was provided by the Hamilton-Wentworth District School Board, the Hamilton-Wentworth Catholic School Board, the Hamilton District School Board and the Halton Catholic District School Board.

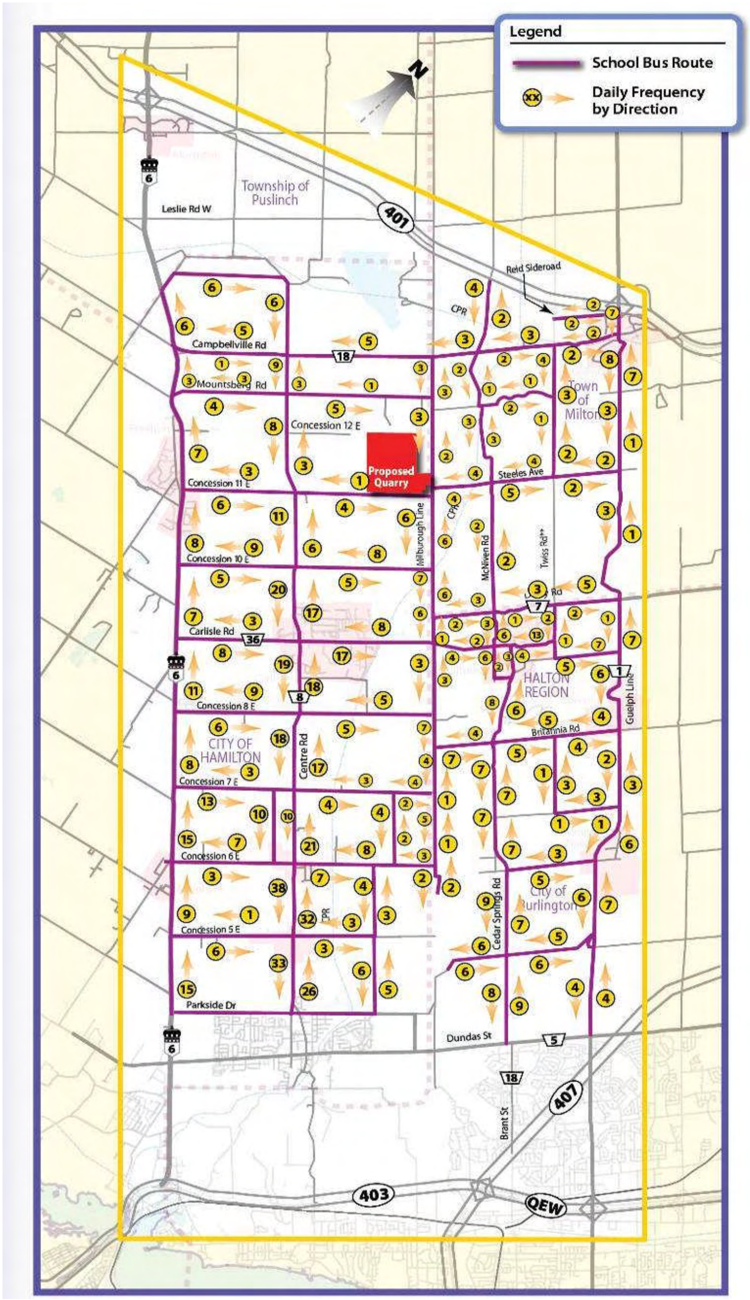


Exhibit 3-10: Estimated Number of School Buses by Route

3.11.5 Constraints

The constraints within the study area include schools, fire stations, settlement areas, locations with substandard visibility, long steep grades, parks and recreation areas, churches / cemeteries and community facilities. **Exhibit 3-11** illustrates the location of these constraints, which is based on information obtained from the Official Plans of Hamilton and Halton, Map Art and field investigations.

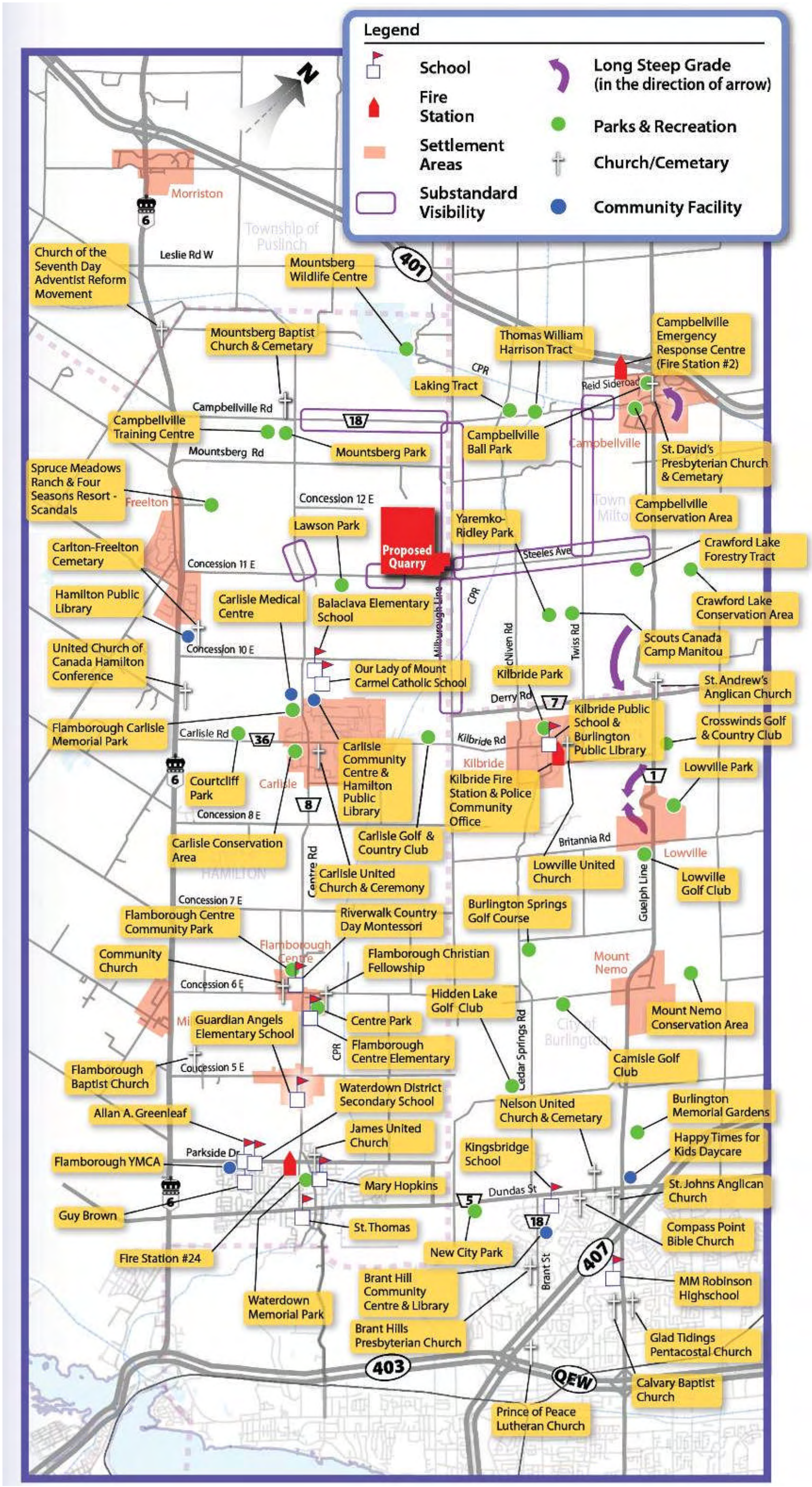


Exhibit 3-11: Constraints within the Study Area

4. AGGREGATES SUPPLY AND DEMAND

Mineral aggregates are a non-renewable resource that consist of predominantly sand, gravel, clay and bedrock. Aggregates are a required construction material, and are consumed in very large quantities to meet society's needs for construction and infrastructure development. Aggregate requirements are supplied through the establishment of pits and quarries (operations located in sand, gravel and clay deposits are called pits, and excavations in bedrock materials are called quarries[1]). The location of mineral aggregate pits and quarries depends on local geology and physiographic features, and whether the quantity and quality of the deposits warrant extraction.

To understand the origin and destination patterns of Flamborough Quarry truck trips, it is important to understand where the markets for aggregates are located, and how these markets develop. An area where the demand for aggregates exceeds the supply is said to have an aggregates deficiency. Knowledge of areas with a deficiency will provide a basis for analyzing potential haul routes and the distribution of truck trips.

4.1 Location of Mineral Aggregates

Mineral aggregate resources can be found in pockets across the province. Each source varies in quality and significance. **Exhibit 4-1** shows the location of deposits of primary aggregate resources in southern Ontario. (The map was prepared by the Ontario Ministry of Natural Resources, and does not take into account any land use, social, economic, or environmental constraints.)

Some areas have abundant resources, while others have little or none. **Exhibit 4-1** shows that the unconstrained Amabel Dolostone deposits of southern Ontario are concentrated in the Niagara Escarpment, Hamilton, Halton Region, and Grey County areas. They are coloured brown in **Exhibit 4-1** (the Amabel/Lockport formation).

[1] Hollingsworth, Brian, "Mineral Aggregates Issues Paper," prepared for the Smart Growth Central Ontario Zone, Ontario Ministry of Natural Resources, October 2002.

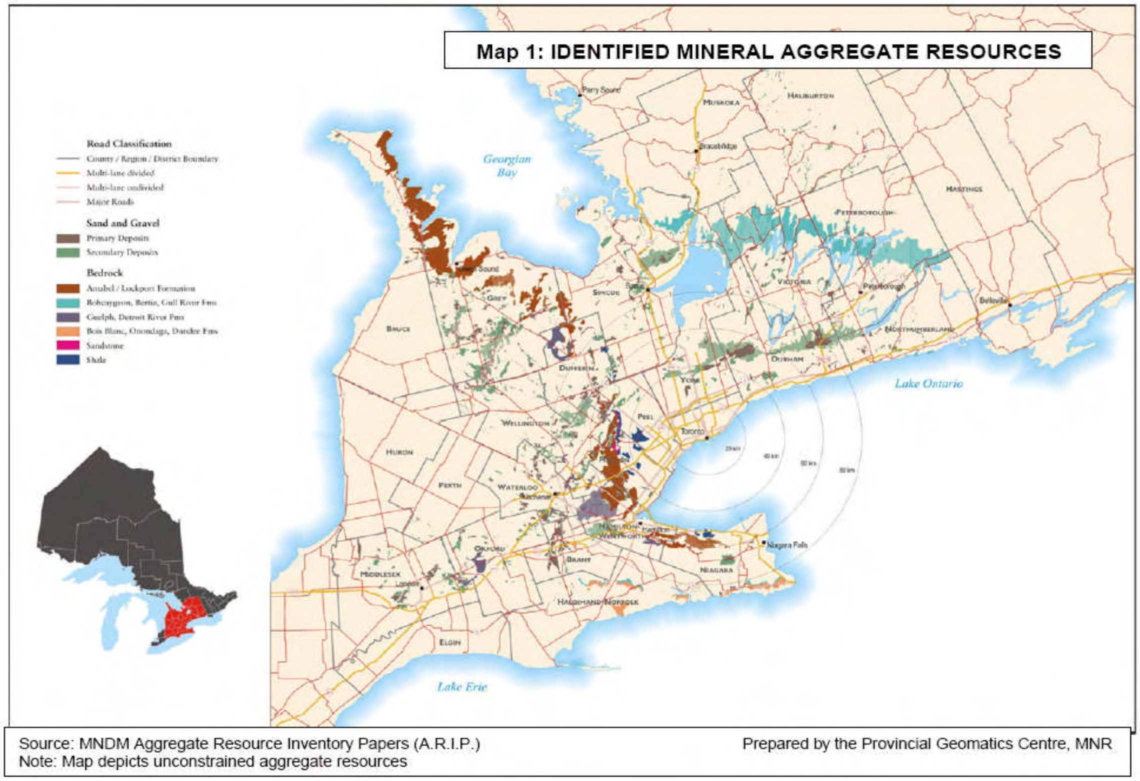


Exhibit 4-1: Identified Mineral Aggregate Resources in Southern Ontario

4.2 Areas of Supply and Demand for Aggregates

The demand for mineral aggregates fluctuates, and depends on local, regional, and provincial requirements. A deposit may have a local, regional and provincial significance, but because mineral aggregates are heavy, bulky and relatively low in price, local resources are always significant.

Clayton Research undertook a study which examined the difference between areas of aggregate supply and areas of aggregate demand. The study was documented in a paper prepared for the Smart Growth Central Ontario Zone in 2002[1].

Exhibit 4-2 shows the areas of aggregate production and consumption in Ontario in 1998 to 2000, as reported by Clayton Research. The Greater Toronto Area (GTA) (the largest population centre in the province) consumes far more aggregates than the area produces.

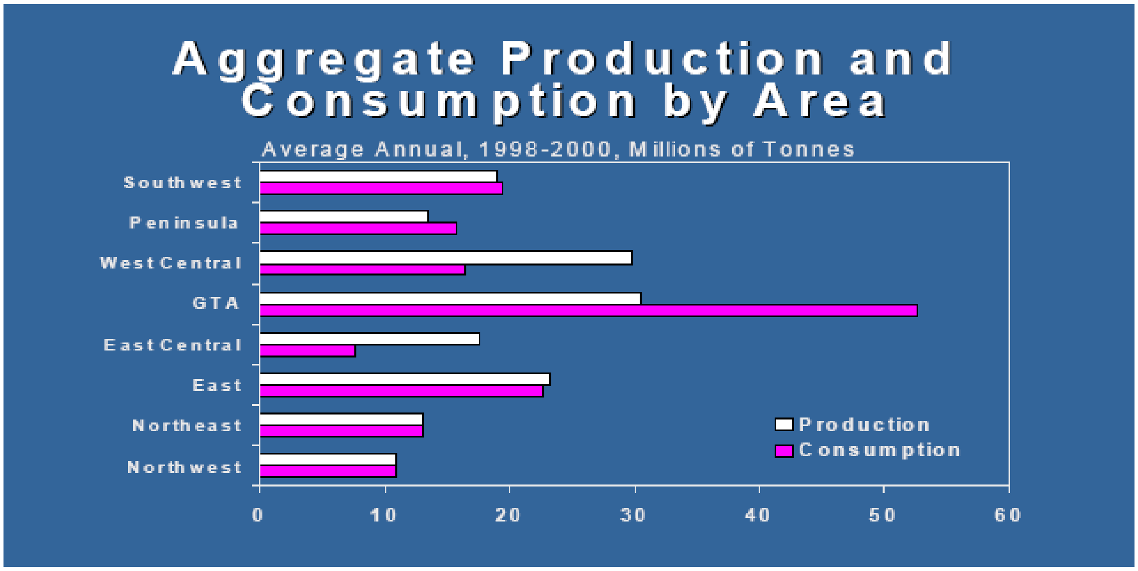


Exhibit 4-2: Aggregate Production and Consumption in Ontario by Area

The Clayton Research Study found that municipalities that have aggregate resources and are located close to the Greater Toronto Area (GTA) have the highest aggregate production. This finding confirms the significance of a local supply. This emphasizes the importance of the resource not only as a local supply but also as a regionally and provincially significant resource. The underlying message was that areas rich in aggregate resources need to share them with those without aggregate resources.

It is proposed that understanding the sources and markets on a Regional scale helps to provide an estimate of the current and future market demand for the Amabel Dolostone from the proposed quarry and can therefore be used to establish trip distribution patterns for the quarry trucks.

4.3 Assumptions for Analyzing the Market for Aggregates

The approach used in this study is to analyze the market for the mineral aggregates to be produced by the proposed Flamborough quarry based on the best information available.

The following assumptions are made:

1. All of the key market locations for the proposed quarry are located within the Greater Golden Horseshoe (GGH) area. This assumption is based on the discussion in **Sections 4.1** and **4.2**.
2. Population and employment growth is a surrogate for aggregate demand. This assumption is based on a study by the California Department of Conservation. The Department found that population change had a strong correlation with historical aggregate demand[2].
3. Licensed Permit Production by a lower tier municipality is a surrogate for aggregate supply. This assumption was necessary because tonnages by quarry are not available from any source as this information is considered proprietary data. Staff at The Ontario Aggregate Resources Corporation (TOARC) said that their 2006 statistical update is the best source of production information.

[2] Department of Conservation –California Geological Survey, "Aggregate Availability in California," 2006.

4.4 Population and Employment Data

Table 4-1 summarizes projected population and employment data for the GGH. The data are from the Places to Grow Growth Plan[3]. Due to the way the data were presented for the year 2031, some of the municipalities were combined. The combined municipalities are:

- County of Peterborough and the City of Peterborough
- County of Simcoe, City of Barrie, and City of Orillia
- County of Wellington and City of Guelph
- County of Brant and City of Bradford

The last two columns show the combined population and employment growth (our surrogate for aggregate demand (**Section 4.3**)), and the expected growth between 2011 and 2031.

Table 4-1: Distribution of Projected Population and Employment in the Greater Golden Horseshoe, 2011 and 2031[3]

	Population 000's			Employment 000's			Population + Employment Growth	
	2011	**2031**	**Growth**	**2011**	**2031**	**Growth**	**Total Growth 000's**	**Total Growth**
Region of Durham	660	960	300	260	350	90	390	11.7%
Region of York	1,060	1,500	440	590	780	190	630	18.9%
City of Toronto	2,760	3,080	320	1,540	1,640	100	420	12.6%
Region of Peel	1,320	1,640	320	730	870	140	460	13.8%
Halton Region	520	780	260	280	390	110	370	11.1%
City of Hamilton	540	660	120	230	300	70	190	5.7%
County of Northumberland	87	96	9	32	33	1	10	0.3%
County of Peterborough/City of Peterborough	137	149	12	58	60	2	14	0.4%
City of Kawartha Lakes	80	100	20	23	27	4	24	0.7%
County of Simcoe/City of Barrie/City of Orillia	484	667	183	196	254	58	241	7.2%
County of Dufferin	62	80	18	22	27	5	23	0.7%
County of Wellington/City of Guelph	223	321	98	117	158	41	139	4.2%
Region of Waterloo	526	729	203	282	366	84	287	8.6%
County of Brant/City of Brantford	141	173	32	62	71	9	41	1.2%
County of Haldimand	49	56	7	19	20	1	8	0.2%
Region of Niagara	442	511	69	201	218	17	86	2.6%
Total GGH	**9,091**	**11,502**	**2,411**	**4,642**	**5,564**	**922**	**3,333**	

[3] Ministry of Public Infrastructure Renewal, "Places to Grow Growth Plan for the Greater Golden Horseshoe," 2006. Schedule 3 – Distribution of Population & Employment for the Greater Golden Horseshoe 2001-2031.

4.5 Production of Aggregates (All Types), 2006

Table 4-2 shows licensed permit production for aggregates for each municipality in 2006, as published by TOARC. These data do not distinguish between aggregate types, and include sand and gravel, crushed stone, clay/shale, and other stone.

The number of tonnes produced by each municipality is the municipality's supply of aggregates. The total supply for the GGH in 2006 was 93,045,000 metric tonnes. **Table 4-2** also shows the percentage of the total supply produced in each municipality. Halton region and the City of Hamilton are major suppliers of aggregates in the GGH, together accounting for 20.6 percent of the total supply.

Table 4-2: Licensed Permit Production of Aggregates by Municipality (metric tonnes), 2006[4]

Municipality	Aggregate Supply	
	Metric Tonnes	**%**
Region of Durham	12,239,000	13.2%
Region of York	959,000	1.0%
City of Toronto	0	0.0%
Region of Peel	5,316,000	5.7%
Halton Region	9,589,000	10.3%
City of Hamilton	9,589,000	10.3%
County of Northumberland	3,387,000	3.6%
County of Peterborough/City of Peterborough	2,600,000	2.8%
City of Kawartha Lakes	6,453,000	6.9%
County of Simcoe/City of Barrie/City of Orillia	13,350,000	14.3%
County of Dufferin	3,057,000	3.3%
County of Wellington/ City of Guelph	8,354,000	9.0%
Region of Waterloo	9,174,000	9.9%
County of Brant/City of Brantford	2,268,000	2.4%
County of Haldimand	1,819,000	2.0%
Region of Niagara	4,891,000	5.3%
Total GGH	**93,045,000**	**100.0%**

[4] The Ontario Aggregate Resources Corporation (TOARC), "Preliminary Aggregates in Ontario Statistical Update," 2006. Table 2-Licence and Wayside Permit Production by Lower Tier Municipality.

4.5.1 Areas of Aggregate Surplus and Deficiency (All Aggregate Types), 2006

Table 4-3 shows the difference between each municipality's supply of aggregates and demand for aggregates. Where the difference is positive, the municipality has an aggregate surplus. Where the difference is negative, the municipality has an aggregate deficiency.

Table 4-3: Identification of Aggregate Surplus and Deficiencies, 2006

	Aggregate Supply	Aggregate Demand	Difference (Supply – Demand)
Region of Durham	13.2%	11.7%	1.5%
Region of York	1.0%	19.0%	-17.9%
City of Toronto	0.0%	12.6%	-12.6%
Region of Peel	5.7%	13.8%	-8.1%
Halton Region	10.3%	11.1%	-0.8%
City of Hamilton	10.3%	5.7%	4.6%
County of Northumberland	3.6%	0.3%	3.3%
County of Peterborough/City of Peterborough	2.8%	0.4%	2.4%
City of Kawartha Lakes	6.9%	0.7%	6.2%
County of Simcoe/City of Barrie/City of Orillia	14.3%	7.2%	7.1%
County of Dufferin	3.3%	0.7%	2.6%
County of Wellington/ City of Guelph	9.0%	4.2%	4.8%
Region of Waterloo	9.9%	8.6%	1.2%
County of Brant/ City of Brantford	2.4%	1.2%	1.2%
County of Haldimand	2.0%	0.2%	1.7%
Region of Niagara	5.3%	2.6%	2.7%
Total GGH	**100%**	**100.**	**0.0%**

Four municipalities are likely to experience an aggregate deficiency in the years ahead: Region of York (-18%), City of Toronto (-13%), Region of Peel (-8%), and Halton Region (-1%). The four municipalities are shown in purple in **Exhibit 4-3**.

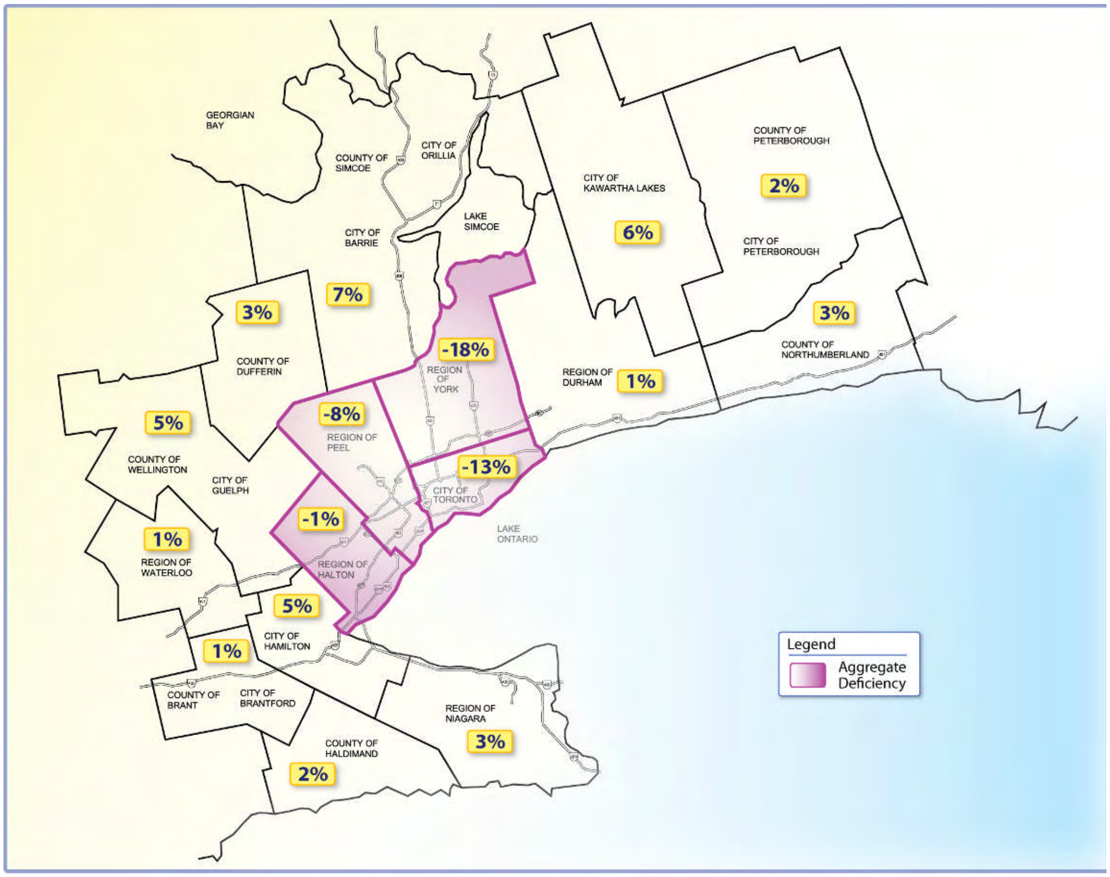


Exhibit 4-3: Areas with an Aggregate Demand Surplus and Deficiency, 2006

4.5.2 Reconciliation of Supply and Demand for Aggregates (All Types) across Greater Golden Horseshoe

The information shown in **Table 4-3** and **Exhibit 4-3** was used to distribute the aggregates from the surplus regions to the regions with deficiencies. The assumptions made to conduct the distribution were established to be reasonable and conservative.

The distribution of the aggregates was carried out in two stages. In Stage 1, aggregate distribution was estimated by assuming that demand was first met from bordering municipalities that had a surplus. **Table 4-4** presents a matrix for Stage 1. Aggregate deficient municipalities are shown across the top, and aggregate surplus municipalities are shown down the left side. The cells in the matrix show the percentage that we estimate will be transported between neighbouring municipalities.

Table 4-4: Matrix of Stage 1 of the Aggregate Distribution for 2006

			Deficient Municipalities				
			Region of York	City of Toronto	Region of Peel	Halton Region	Surplus Remaining
Original Deficiency			*-18.00%*	*-13.00%*	*-8.00%*	*-1.00%*	
Stage 1 Resulting Deficiency			*-13.00%*	*-9.50%*	*-1.25%*	*0.00%*	
Surplus Municipalities	Region of Durham	1.00%	0.50%	0.50%			0.00%
	City of Hamilton	5.00%	1.00%	2.50%	1.00%	0.50%	0.00%
	County of Northumberland	3.00%		0.50%			2.50%
	County of Peterborough/City of Peterborough	2.00%					2.00%
	City of Kawartha Lakes	6.00%					6.00%
	County of Simcoe/City of Barrie/City of Orillia	7.00%	3.50%		1.75%		1.75%
	County of Dufferin	3.00%			1.50%		1.50%
	County of Wellington/City of Guelph	5.00%			2.50%	0.50%	2.00%
	Region of Waterloo	1.00%					1.00%
	County of Brant/City of Brantford	1.00%					1.00%
	County of Haldimand	2.00%					2.00%
	Region of Niagara	3.00%					3.00%

The Region of Durham, for example, has a 1.0% surplus. We assume that 0.5% will go to York Region and 0.5% will go to the City of Toronto to help alleviate the aggregate deficiencies in these two areas. Durham is left in equilibrium and the two bordering municipalities have a smaller deficit. It is important to note that as demand from outside of the GGH is also anticipated, we do not expect that all of the municipalities will achieve equilibrium.

Exhibit 4-4 provides a map showing how the Stage 1 distribution shown in **Table 4-4** was applied. The Stage 1 distribution is shown in red.

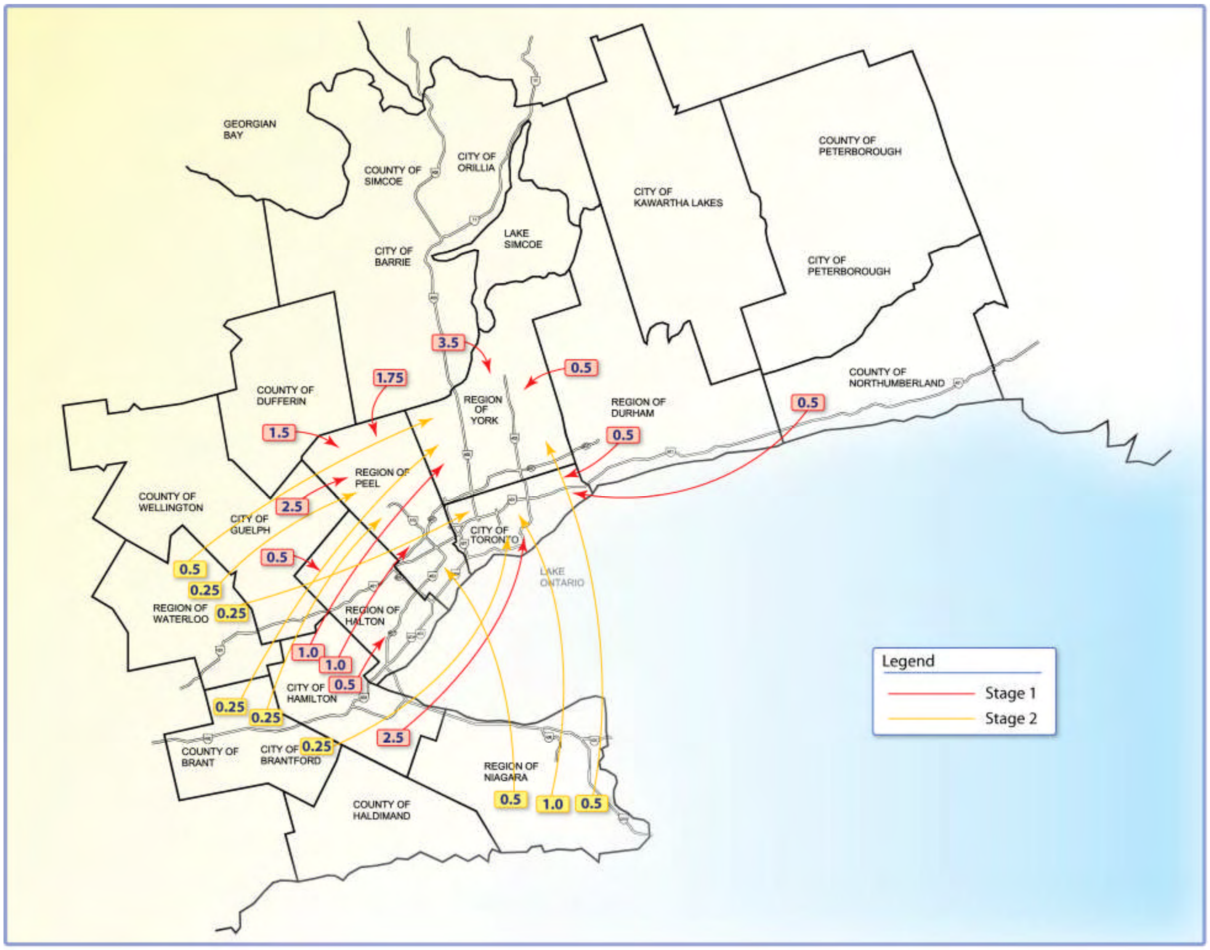


Exhibit 4-4: Stage 1 and Stage 2 of the Aggregate Distribution for 2006

The matrix shown in **Table 4-5** shows how Stage 2 of the distribution of the aggregates was carried out. The blue text shows our estimates of the aggregate transfers from municipalities that are not on the border of a deficient region, but are connected by a 400 series highway.

The last column in **Table 4-5** shows the surplus aggregates remaining in each municipality. The Stage 2 surpluses are also shown in yellow in **Exhibit 4-4**. The surpluses are mostly very low (0.0% to 2.0%).

Table 4-5: Matrix of Stage 2 of the Aggregate Distribution for 2006

			Deficient Municipalities				
			Region of York	City of Toronto	Region of Peel	Halton Region	Surplus Remaining
Original Deficiency			*-18.00%*	*-13.00%*	*-8.00%*	*-1.00%*	
Stage 1 Resulting Deficiency			*-13.00%*	*-10.00%*	*-1.00%*	*0.00%*	
Stage 2 Resulting Deficiency			*-11.75%*	*-7.75%*	*-0.25%*	*0.00%*	
Surplus Municipalities	Region of Durham	1.00%	0.50%	0.50%			0.00%
	City of Hamilton	5.00%	1.00%	2.50%	1.00%	0.50%	0.00%
	County of Northumberland	3.00%		0.50%			2.50%
	County of Peterborough/City of Peterborough	2.00%					2.00%
	City of Kawartha Lakes	6.00%					6.00%
	County of Simcoe/City of Barrie/City of Orillia	7.00%	3.50%		1.75%		1.75%
	County of Dufferin	3.00%			1.50%		1.50%
	County of Wellington/City of Guelph	5.00%			2.50%	0.50%	2.00%
	Region of Waterloo	1.00%	0.50%	0.25%	0.25%		0.00%
	County of Brant/City of Brantford	1.00%	0.25%	0.25%	0.25%		0.25%
	County of Haldimand	2.00%					2.00%
	Region of Niagara	3.00%	0.50%	1.00%	0.50%		1.00%

Table 4-5 shows that existing aggregate supply can eliminate the deficiency in Halton Region and significantly reduce it to a negligible level in the Region of Peel (to -0.25%). Although the analysis tried to balance the supply and demand of the aggregates among the municipalities, two areas continue to have a significant deficiency after the Stage 2 distribution: the Region of York (-11.75%), and the City of Toronto (-7.75%).

Exhibit 4-5 shows the final estimated aggregate surplus and aggregate deficiency by municipality after the Stage 1 and Stage 2 analysis.

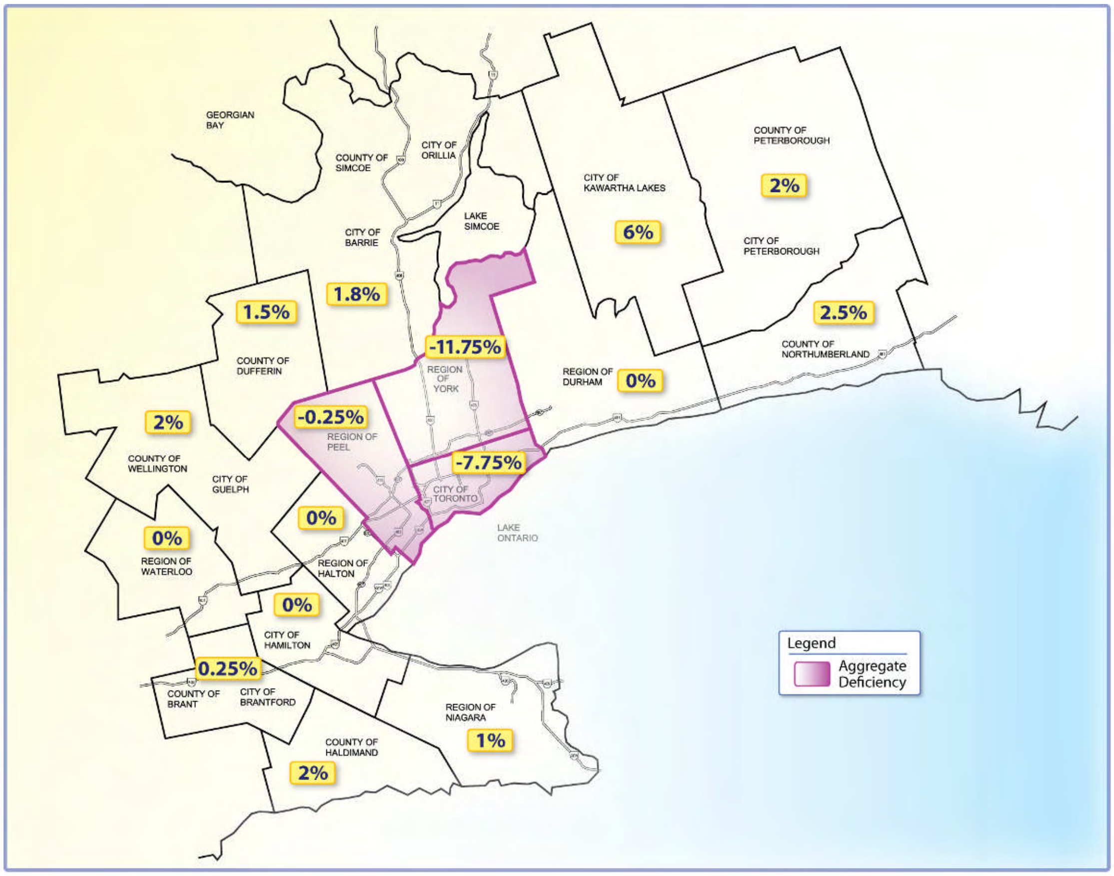


Exhibit 4-5: Estimated Aggregate Surplus and Aggregate Deficiency by Municipality after Stage 1 and Stage 2 Analysis

4.6 Production of Crushed Stone, 2007

The proposed quarry will produce Amabel Dolostone, a high quality crushed stone. As mentioned in **Section 1.1.1**, Amabel Dolostone is the most durable aggregate material found in Southern Ontario.

Unfortunately, it is very difficult to obtain detailed information about quarry operations because the information is proprietary. We were, however, able to approach the author of the 2002 “Mineral Aggregates Issues Paper” to update our data on aggregate supply, and in particular separate crushed stone supply from sand and gravel[5]. MNR makes a distinction between "crushed stone" which is derived from bedrock sources (mainly limestone and dolomite including Amabel formation) and "sand and gravel" or unconsolidated material.

[5] Hollingsworth, Brian, “Mineral Aggregates Issues Paper – Update,” not yet published, 2007.

The interchangeability of the aggregate type is largely dependant on its intended application. Either type of aggregate may be used for base and granular materials, however, certain product specifications, notably high strength concrete and some types of asphalt paving (e.g., for 400 series highways), require high quality limestone. The chemical properties of the Amabel formation make it the highest quality of limestone available in the province.

Exhibit 4-6 shows the total aggregate production in 2007 and compares the sand/gravel and crushed stone produced by municipality. The 2007 data do not include the County of Northumberland.

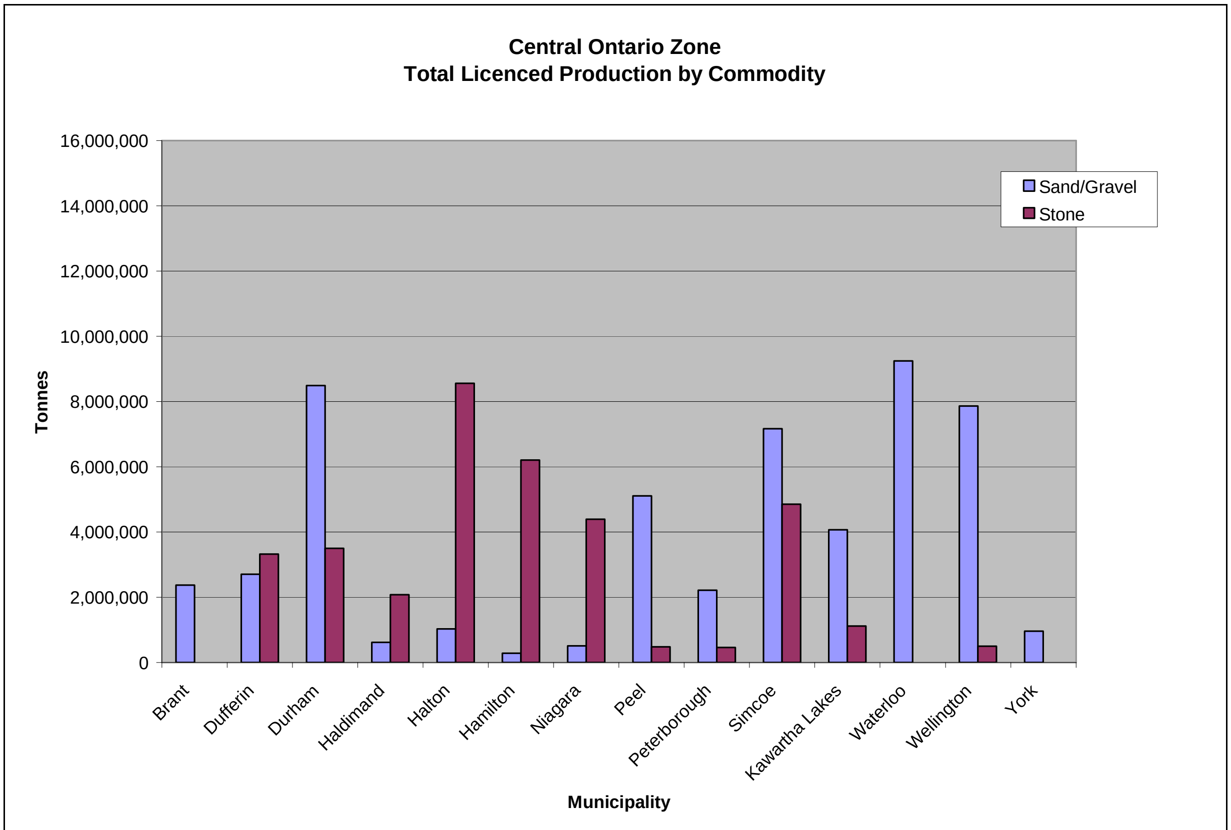


Exhibit 4-6: Comparison of Sand/Gravel Production and Crushed Stone Aggregate Production by Municipality, 2007

4.6.1 Areas of Crushed Stone Surplus and Deficiency, 2007

Table 4-2 showed that the total GGH supply of aggregates in 2006 was 93,045,000 metric tonnes. **Table 4-6** shows that the crushed stone production in the GGH in 2007 was 35,447,869 metric tonnes. **Table 4-6** also shows the percentage of crushed stone production for each municipality.

Table 4-6: Crushed Stone Production by Municipality, 2007

	Crushed Stone Supply	
	Metric Tonnes	%
Region of Durham	3,495,297	9.9%
Region of York	0	0.0%
City of Toronto	0	0.0%
Region of Peel	481,578	1.4%
Halton Region	8,559,670	24.1%
City of Hamilton	6,204,388	17.5%
County of Peterborough/City of Peterborough	458,534	1.3%
City of Kawartha Lakes	1,115,968	3.1%
County of Simcoe/City of Barrie/City of Orillia	4,851,831	13.7%
County of Dufferin	3,320,385	9.4%
County of Wellington/City of Guelph	492,741	1.4%
Region of Waterloo	0	0.0%
County of Brant/City of Brantford	0	0.0%
County of Haldimand	2,078,295	5.9%
Region of Niagara	4,389,182	12.4%
Total GGH	**35,447,869**	**100.0%**

Similar to **Table 4-3**, **Table 4-7** shows the difference between each municipality's supply of crushed stone and demand for crushed stone. Where the difference is positive, the municipality has a crushed stone surplus. Where the difference is negative, the municipality has a crushed stone deficiency.

Table 4-7: Identification of Crushed Stone Surplus and Deficiencies, 2007

	Aggregate Supply	Aggregate Demand	Difference (Supply – Demand)
Region of Durham	9.9%	11.7%	-1.9%
Region of York	0.0%	18.9%	-19.0%
City of Toronto	0.0%	12.6%	-12.6%
Region of Peel	1.4%	13.8%	-12.5%
Halton Region	24.1%	11.1%	13.0%
City of Hamilton	17.5%	5.7%	11.8%
County of Peterborough/City of Peterborough	1.3%	0.4%	0.9%
City of Kawartha Lakes	3.1%	0.7%	2.4%
County of Simcoe/City of Barrie /City of Orillia	13.7%	7.3%	6.4%
County of Dufferin	9.4%	0.7%	8.7%
County of Wellington/City of Guelph	1.4%	4.2%	-2.8%
Region of Waterloo	0.0%	8.6%	-8.6%
County of Brant/City of Brantford	0.0%	1.2%	-1.2%
County of Haldimand	5.9%	0.2%	5.6%
Region of Niagara	12.4%	2.6%	9.8%
Total GGH	**100.0%**	**100.0%**	**0.0%**

Seven municipalities have a crushed stone deficiency. The seven municipalities are Durham Region (-1.9%), the Region of York (-19%), the City of Toronto (-12.6%), the Region of Peel (-12.5%), the County of Wellington (-2.8%), the Region of Waterloo (-8.6%), and the County of Brant (-1.2%).

All the municipalities are shown on the map in **Exhibit 4-7**. Municipalities with a crushed stone deficiency are shown in purple.

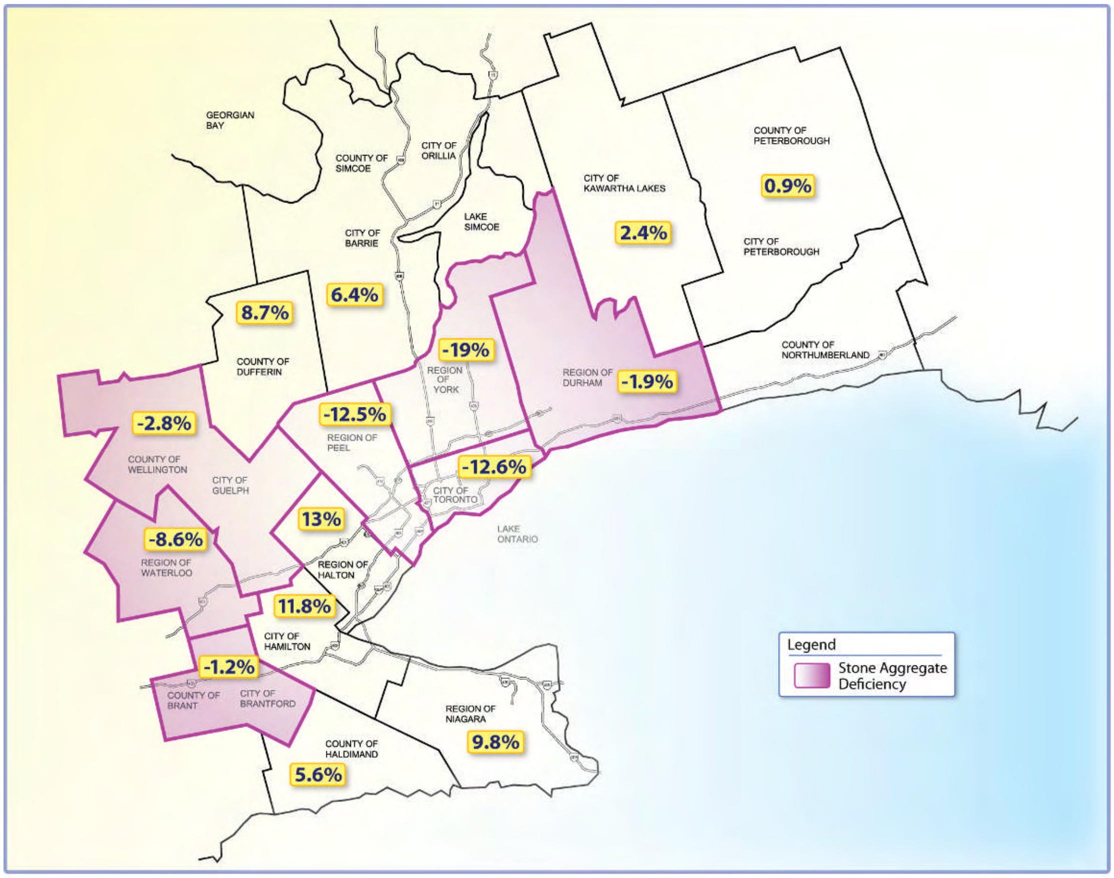


Exhibit 4-7: Areas with a Crushed Stone Surplus and Deficiency, 2007

If the deficient municipality is assigned to a geographical quadrant (relative to the location of the proposed quarry), and the quadrant's portion of the overall deficiency is calculated, the breakdown is as follows:

- Northwest (20.0 %)
  - County of Wellington
  - Region of Waterloo
- Northeast (78 %)
  - Region of Peel
  - Region of York
  - City of Toronto
  - Durham Region
- Southwest (2 %)
  - County of Brant
- Southeast (0 %)
  - (no deficient municipalities)

It is clear that most of the deficiency is in the northeast quadrant.

4.6.2 Reconciliation of Supply and Demand for Crushed Stone across Greater Golden Horseshoe

The information shown in **Table 4-8** and **Exhibit 4-7** was used to distribute the crushed stone from the surplus regions to the regions with deficiencies. The assumptions made to conduct the distribution were established to be reasonable and conservative.

The distribution of the aggregates was carried out and the crushed stone distribution was estimated by assuming that demand was first met from bordering municipalities that had a surplus and then by municipalities connected by a 400 series highway. The cells in the matrix show the percentage that we estimate will be transported between municipalities.

Table 4-8 presents a matrix that lists the crushed stone deficient municipalities across the top, and crushed stone surplus municipalities down the left side. After the distribution, two municipalities had a deficiency: the Region of York (-12.5 %), and the City of Toronto -9.1 %).

Table 4-8: Matrix of Stage of the Crushed Stone Distribution for 2007

			Deficient Municipalities							
			Region of Durham	Region of York	City of Toronto	Region of Peel	County of Welling-ton	Region of Waterloo	County of Brant	Surplus Remaining
Original Deficiency			*-1.9%*	*-19.0%*	*-12.6%*	*-12.5%*	*-2.8%*	*-8.6%*	*-1.2%*	
Resulting Deficiency			*0.0%*	*-12.5%*	*-9.1%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	
Surplus Municipalities	Halton Region	13.0%		1.5%	0.9%	6.0%	2.0%	2.6%		0.0%
	City of Hamilton	11.8%		1.5%	0.6%	2.5%				0.0%
	County of Peterborough	0.9%	0.4%							0.5%
	City of Kawartha Lakes	2.4%	1.5%							0.9%
	County of Simcoe	6.4%		2.0%		2.0%				2.4%
	County of Dufferin	8.7%				2.0%	0.8%			5.9%
	County of Haldimand	5.6%								5.6%
	Region of Niagara	9.8%		1.5%	2.0%					6.3%

Exhibit 4-8 provides a map showing how the distribution shown in **Table 4-8** was applied. The distribution is shown in red.

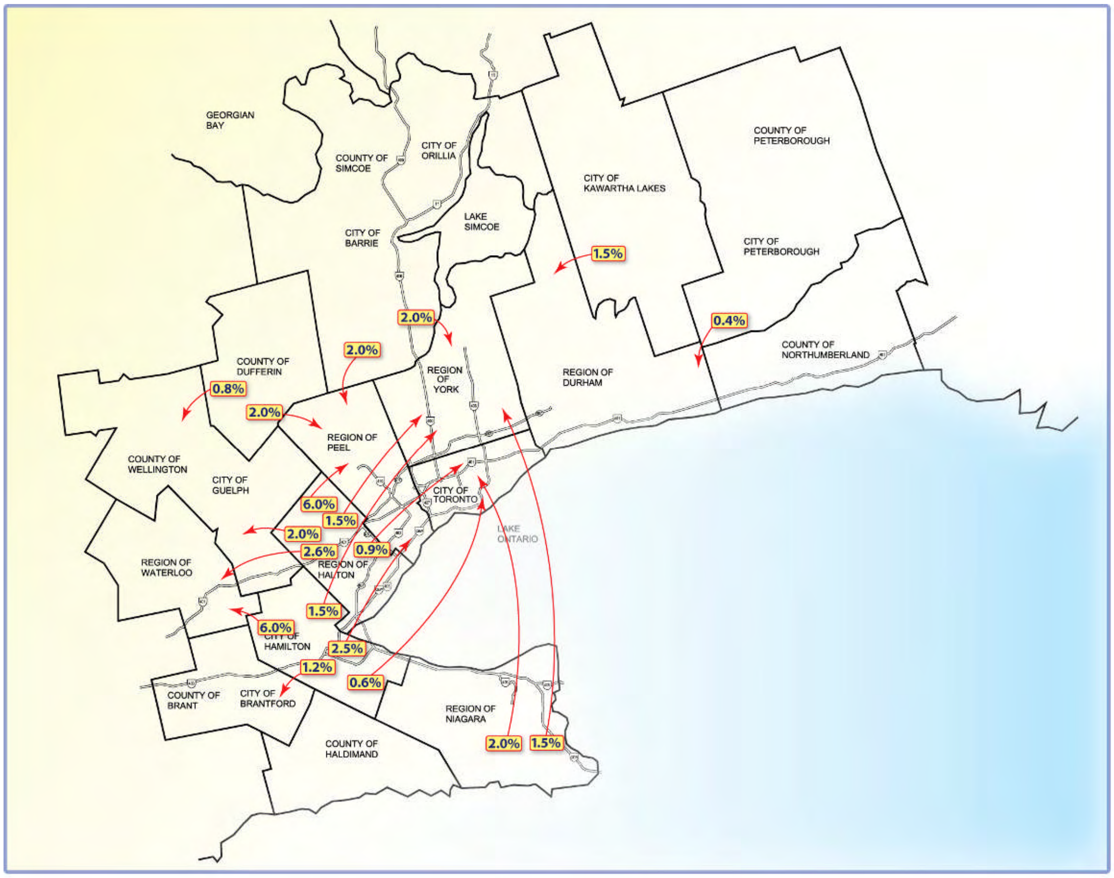


Exhibit 4-8: Crushed Stone Distribution for 2007

Exhibit 4-9 shows the final state of crushed stone deficiency in the GGH after the analysis.

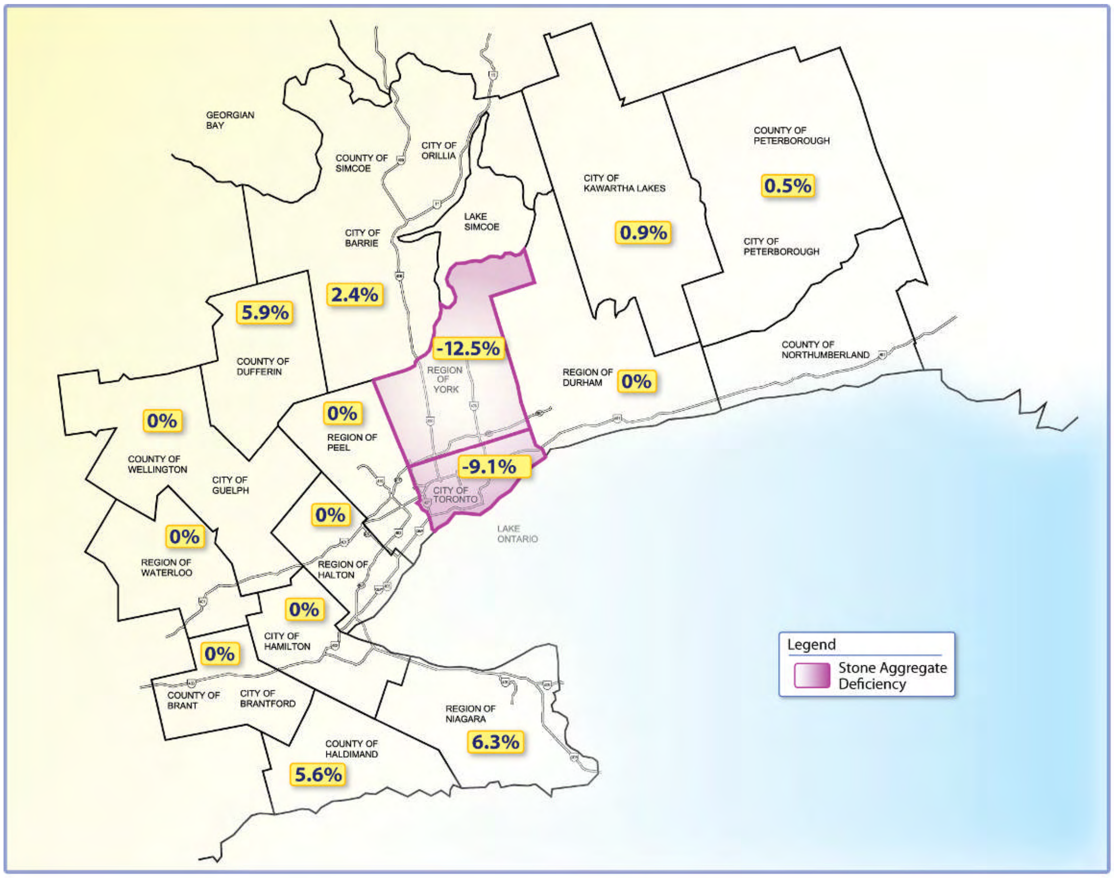


Exhibit 4-9: Final Demand for Crushed Stone, 2007

If the same quadrant breakdown used earlier is applied to the crushed stone deficiency values, it is clear that the northeast quadrant (which includes the Region of York and the City of Toronto) has 100 percent of the crushed stone deficiency.

Although the approach used in the distributions allocated all of the unmet crushed stone demand to the north east, the proposed distribution of Amabel Dolostone, as shown in **Exhibit 4-10**, takes the conservative view that some demand would also be unmet in other areas. The proposed distribution is made even more conservative given the locations of existing licensed quarries identified in red (**Exhibit 4-10**). For example, there is a licensed quarry in the south eastern quadrant of the study area that would be the most direct supplier to Burlington and another one on the west side of Highway 6 that would be most likely to service the Hamilton and Niagara corridor. Nonetheless, the proposed distribution of crushed stone from the proposed quarry was identified as:

- 75 % will be transported northeast
- 10% will be transported northwest
- 10% will be transported southeast
- 5% will be transported southwest

This distribution was applied to the 570 inbound and outbound truck trips from the proposed quarry (**Table 4-9**).

Table 4-9: Estimated Distribution of Quarry Trucks

Direction	Percentage	Quarry Trucks
Northeast	75%	430
Northwest	10%	55
Southeast	10%	55
Southwest	5%	30

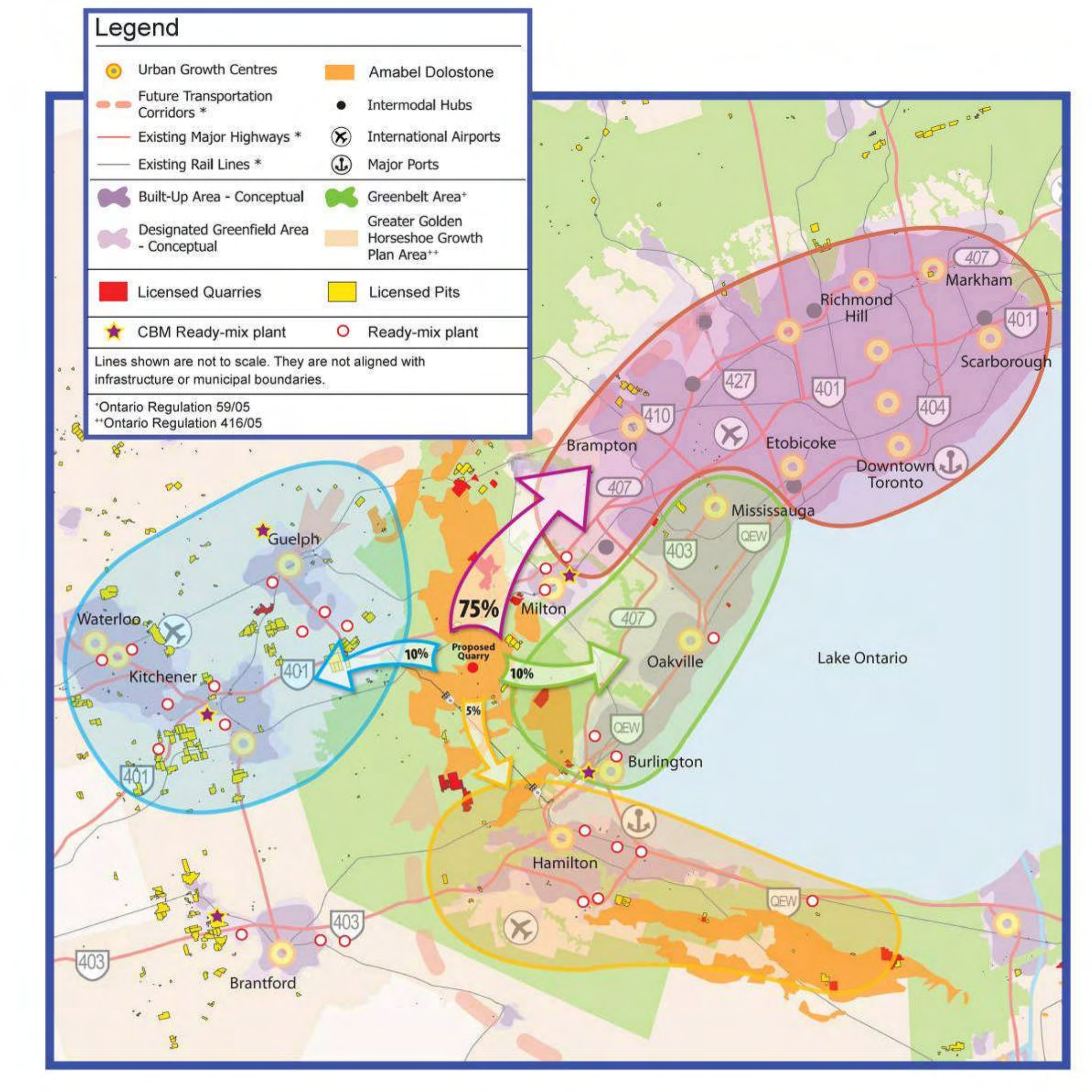


Exhibit 4-10: Proposed Distribution of Aggregate and illustration of Amabel Dolostone Deposits

4.7 Conclusion

To support the identified distribution patterns for the aggregate material from the proposed quarry, a review of regional sources and markets was undertaken. As detailed data are largely proprietary and unavailable for analysis, the study was limited to using the data available from the Ministry of Natural Resources and a limited number of other sources. It is, however, clear that Amabel Dolostone is not in abundant supply on a Regional level, and that it is in high demand due to its various uses in construction combined with the high rates of population and employment growth projected by the Places to Grow Growth Plan for the Greater Golden Horseshoe.

Deposits of Amabel Dolostone are concentrated in the Niagara Escarpment, Hamilton, Halton Region, and Grey County. Very few municipalities are able to obtain this type of aggregate from their own local resources.

After a careful and conservative analysis of the data available, the proposed distribution of Amabel Dolostone from the proposed St. Marys quarry was identified as follows:

- 75 % will be transported northeast
- 10% will be transported northwest
- 10% will be transported southeast
- 5% will be transported southwest

5. ALTERNATIVE TRANSPORTATION SOLUTIONS

In keeping with the Terms of Reference for this study, the study team undertook a review of alternative modes/solutions for the transportation of quarried material from the proposed St. Marys site. Two main transportation alternatives were considered:

- Rail
- Road

Given the character of the Amabel Dolostone market, it is expected that the proposed quarry will largely serve customers in the Region of York and the City of Toronto to the northeast of the quarry. The quarry will serve multiple customer destinations. These destinations can change constantly as a result of construction projects reaching completion and new projects being started.

The following sections outline the economic and environmental implications of adopting a rail or road transportation solution. As required by the Terms of Reference, special attention is given to the environmental implications.

Section 5.1 considers aggregate production and transportation policy in Southern Ontario. **Section 5.2** examines the implications of choosing rail. **Section 5.3** considers two rail options (a northern spur and a southern spur from an existing rail line). **Section 5.4** considers the environmental implications of the two rail options and the need for supporting new rail facilities at the quarry site. **Section 5.5** examines the implications of choosing road. **Section 5.6** summarizes the analysis of road and rail options, and selects the preferred mode of transport.

5.1 Aggregate Production and Transportation Policy in Ontario

The City of Hamilton and the Ministry of Natural Resources (MNR) provide insight into Ontario's policy regarding the production and transportation of aggregates.

MNR emphasizes the economic and environmental importance of minimizing hauling distances: "Approximately 85% of total aggregate production takes place in southern Ontario where the demand for aggregates and aggregate-derived products is the highest. The cost of transportation is estimated to be approximately 60% of the total cost of aggregate. Therefore, the economic value of an aggregate deposit is based not only on the quantity of the deposit, but also how close the deposit is to its final destination. Extracting aggregate resources close to where they are being utilized can also be considered the most environmentally sensitive alternative. Trucking resources long distances increases greenhouse gas emissions, which is one of the top environmental concerns in the world today[17]."

The City of Hamilton's Goods Movement Policy Paper[18] points out that "The rail mode is primarily used for long distance bulk good" and that "the opportunity for expansion of short-haul rail services in the GTA and City of Hamilton area is limited." The paper also points out that "it is estimated that two-thirds to three quarters of the truck traffic movements in the GTA and Hamilton are captive markets since they cannot be served by rail." The paper recognizes that "The biggest opportunities for rail are probably in the intermodal sector, moving goods manufactured and assembled in the GTA and City of Hamilton area and surrounding areas to and from other locations across Canada."

Although policy appears to favour road haulage for short distance, the project team considered rail as well as road haulage for the proposed quarry.

5.2 Rail Alternative

The single greatest advantage to using trains to transport aggregates from the quarry is that there would be relatively few aggregate trucks in the vicinity of the quarry. As suggested in **Section 5.1,** there are, however, a number of serious problems associated with rail:

- In particular, most aggregate customers do not have access to rail service. Rail does not serve most of the quarry's potential near term customers.
- New markets for aggregates are also unlikely to be served by rail.
- The rail alternative implies using trains to transport the aggregates from the quarry to:
  - A few destinations with direct rail access
  - A transfer station (possibly more than one transfer station), and then by truck to multiple destinations
- As there is no existing rail service at the quarry site, it would be necessary to construct a new rail spur from the existing Canadian Pacific (CP) rail line to the quarry. It is estimated that the rail spur would be one to two kilometres long and would require significant new construction and substantial land acquisition.
- A new spur line might have an environmental impact on the lands affected by construction and operation.
- To reach the quarry, a new spur line would require a new level rail crossing (on Milburough Line).
- New aggregate handling and transport facilities would be required at the quarry
- New aggregate handling, transfer and transport facilities would be required at each customer's site the quarry.

[17] Ministry of Natural Resources, "Managing Aggregate Resources." http://www.mnr.gov.on.ca/en/Business/Aggregates/2ColumnSubPage/STEL02_167024.html. (August 13, 2008)

[18] IBI Group, "Development of Policy Papers for Phase Two of the Transportation Master Plan for the City of Hamilton Goods Movement Policy Paper-Final Report," January 2005.

- If aggregates are transported to a transfer station and then transported by truck to individual customers who have no rail service, land would be required for the transfer station, and new handling, transfer and transport facilities would be required at the transfer station.
- The transfer station option requires triple handling of the aggregate material. Aggregates must be brought by truck to quarry railhead, transferred to the train, and then transferred back to a truck to travel to the final destination. Multiple handling of material is not efficient, adds to the cost of the material, and increases delivery times.

5.3 Two Options for Building a Spur Rail Line to the Quarry Site

Despite the business and logistical problems associated with rail, the possibility of bringing a spur line to the quarry site was examined in detail. The analysis examined the environmental impact of a spur line. Land ownership and other non-environmental factors were not considered.

Exhibit 5-1 shows the ecological land classification (ELC) mapping completed for the property and surrounding area. (The map was created by Stantec Consulting.)

Exhibit 5-1 shows the natural features that might be affected by choosing rail to transport the aggregates. The natural features include:

- Provincially Significant Wetlands (PSWs – Ministry of Natural Resources (MNR))
- Ecologically Sensitive Areas (ESAs – City of Hamilton)
- Deer wintering areas (MNR)
- Watercourses

There are two rail lines in the study area: the CP Hamilton Subdivision, and the CP Galt Subdivision. The CP Hamilton Subdivision runs roughly north-south just east of Centre Road, and then intersects Milburough Line near Concession 10 E and McNiven Road at 3rd Sideroad before intersecting the CP Galt Subdivision at Guelph Junction. This line is shown in black in **Exhibit 5-1**. The CP Galt Subdivision runs east-west crossing Campbellville Road just east of Twiss Road and remaining north of Campbellville west of Twiss Road. This line is shown in **Exhibit 3-1**.

The new rail spur would run east from the site and connect to the CP Hamilton Subdivision. Two alignments were considered. The northern option (marked in red and labelled 1 in **Exhibit 5-1**) is discussed in **Section 5.3.1**. The southern option (marked in red and labelled 2 in **Exhibit 5-1**) is discussed in **Section 5.3.2**. These two alignments were selected to avoid ESAs, PSWs and deer wintering areas as much as possible.

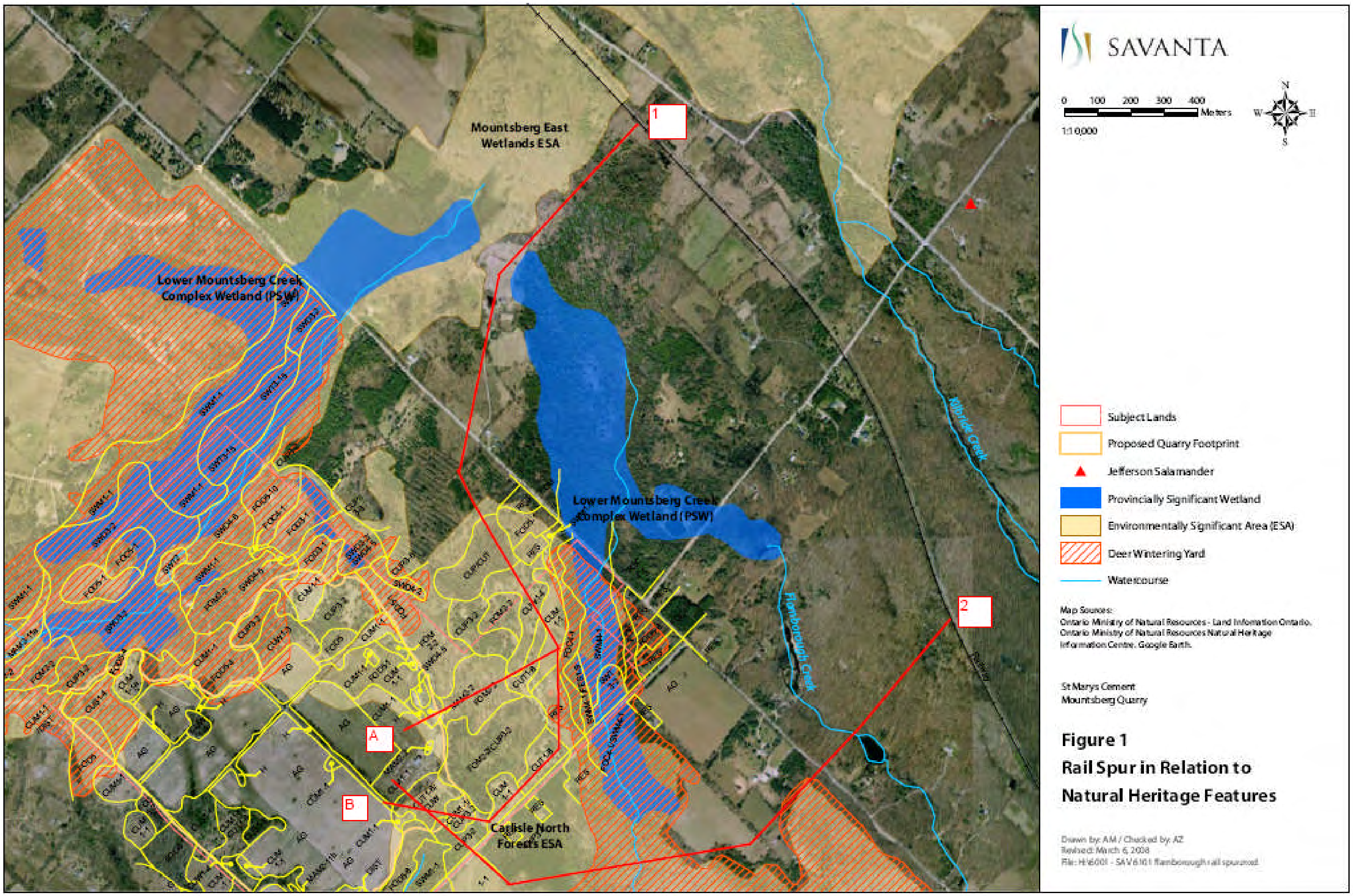


Exhibit 5-1: Potential Rail Spur in Relation to Natural Heritage Features

5.3.1 Rail Spur 1 – Northern Route Option

The northern rail spur option is 2.2 km long and crosses through woodland, but avoids intrusion into the ESAs and the deer wintering areas. The spur includes one road crossing, at Milburough Town Line. It enters the quarry property from the north and travels south and then west into the quarry property, mainly through disturbed cultural vegetation communities (plantations, woodland, thicket, and meadow). Intrusion into the more mature woodland communities is minimized. Where the cultural communities end, the rail spur traverses a band of more mature woodland before entering the proposed quarry footprint.

Two options (A and B in **Exhibit 5-1**) for crossing the more mature woodland were considered. Option A is shorter and cuts through a woodland unit that is less mature than surrounding units. Detailed field inspections suggest that Option A would have limited effects on the ecological characteristics of the remaining woodland. Option B passes through an area dominated by cultural communities, but we understand that limited space is available for the spur (i.e. the area would be constrained by berm construction, etc.).

5.3.2 Rail Spur 2 – Southern Route Option

The southern rail spur option is 1.7 km long. The alignment includes two road crossings, the first at Milburough Town Line to the west, and the second at 11th Concession to the north. The southern alignment travels from the main line through a treed swamp/lowland forest and a coldwater tributary of Flamboro Creek (i.e. a fish habitat). After crossing the Town line, but before the 11th Concession, the alignment passes through a deer wintering yard, and then crosses a second tributary of Flamboro Creek. After entering quarry property, the rail spur crosses a cultural meadow and a short band of mature woodland (White Pine Plantation) before reaching the quarry footprint.

5.4 Environmental Implications of the Rail Spur Options and New Rail Facilities at the Quarry Site

Table 5-1 summarizes the two rail spur options' key intrusions into natural features. Both alignments have effects on the local landscape and the natural heritage features and functions. The table shows that the northern alignment has fewer environmental effects than does the southern alignment.

Table 5-1: Key Intrusions into Natural Features

CRITERIA	NORTHERN ALIGNMENT	SOUTHERN ALIGNMENT
Approximate length	2.2 km	1.7 km
Intrusions into ESA	Yes – similar extent	Yes – similar extent
Intrusions into Deer Wintering Area	No	Yes – through approximately 300m of delineated habitat
Watercourse Crossings	No	Two
PSW Intrusions	None	None
Woodland Intrusions	Yes - similar	Yes - similar

Although the northern alignment minimizes the potential for direct environmental effects, the use of rail would require the creation of loading facilities (and perhaps other ancillary features) that would consume some additional lands and would result in additional indirect environmental effects.

The potential direct and indirect environmental effects of using rail are:
- Some forest removal (mature and cultural communities)
- Intrusions into the ESA
- Removal of some area of cultural meadow east of Milburough Line

The final extent of the rail spur options' environmental effects can, of course, only be assessed when final designs and alignments are considered.

5.5 Road Alternative

Road is the most common transportation choice for aggregates because transporting aggregates by truck has some important advantages over rail:
- As road transport is highly flexible, it is easy to serve multiple destinations directly from the quarry, and it is easy to accommodate changing customer patterns and requirements.
- Only one mode of transport is required, eliminating the need for transfers between train and truck.
- Road is regarded as the most cost-effective mode of transport.
- If road transportation is chosen, it is not necessary to build a new rail spur line through the surrounding natural environment.
- If road transportation is chosen, the need for expensive new rail infrastructure is minimized.

Road is also associated with several disadvantages. Truck traffic would increase on the designated haul route(s) in the vicinity of the quarry. Additional truck traffic implies an increase in traffic delay, congestion, noise, dust, vibration, and other disturbances to residents. Safety and the potential impact on the community and the natural environment must also be considered.

5.6 The Preferred Mode of Transport

The advantages and disadvantages of rail and road transportation, and the policies of MNR and the City of Hamilton were reviewed. The findings suggest that the preferred mode of transportation for the proposed quarry's aggregates is road.

The transport of aggregates by truck from the quarry directly to customers has major advantages in terms of cost and efficiency. In particular, only trucks can transport the aggregates directly from the quarry to each customer. In addition, the environmental disadvantages of trucks (upgrading of roads, increased traffic, and various types of pollution) are not overcome by choosing rail as an alternative. Mitigating measures will, of course, be introduced to counter the environmental disadvantages of trucks.

The cost advantages of hauling heavy loads by rail do not apply to the short distances between the proposed quarry and most of its customers. Rail would require investment in a new spur line from the quarry to the existing rail line. Even if this spur were built, most customers would still require truck delivery. As a result, rail requires investment in a new spur line, new rail facilities at the quarry site, and a transfer station (possibly more than one transfer station) where the aggregates would be transferred to trucks for delivery to multiple destinations.. The new rail line and supporting infrastructure would require an additional level rail crossing across Milburough Line, and would be at the expense of environmentally sensitive habitats including mature woodland, areas used by deer, meadows, and watercourses used by local fish species.

6. QUARRY TRIP GENERATION

6.1 Quarry Operations

The expected start of operations for the proposed Flamborough Quarry is subject to the timing of approvals. The quarry is proposed to operate year round, 12 hours per day Monday to Friday and 6 hours on Saturdays.

The estimated breakdown of truck types accessing the quarry is as follows:

- 40 tonne trailer 0%
- 35 tonne trailer 38%
- 23 tonne tri-axle 44%
- 12 tonne tandem 7%
- 3-6 tonne 11%

Photo 4 - 1: 35 Tonne Trailer Configuration

6.2 Quarry Trip Generation

6.2.1 Estimates for the Generation of Site Truck Traffic

In order to estimate the truck traffic that may be generated by the proposed Flamborough Quarry, a detailed review of tickets from three other existing pits in the general area was undertaken. The ticket information included the date of the ticket and the product name and quantity. From this information, specific assumptions can be developed and confirmed as described in this section.

The number of trips to be generated by the proposed quarry was identified by sorting the number of loads for a proxy location from highest to lowest and then selecting an appropriate percentile day.

An 85th percentile day was selected resulting in an estimated 570 trips into and 570 trips out of the quarry each day. The 85th percentile is a common threshold used in other applications within transportation engineering (such as setting speed limits or establishing design hours).

The number of trips generated by the traffic accessing the proxy location does not vary appreciably by day of week. Further there is no specific correlation in the proxy data associated with the number of trips generated and the month of the year. There are numerous representative days in August (the peak month for background traffic) that are very close to the selected 85th percentile day for site traffic. As a result, no further day of week or month of year factors were applied.

A proxy location provides a realistic and reliable measure of the characteristics of the expected truck types accessing the proposed quarry. The use of this data accounts for trucks that are not necessarily loaded to capacity and so provides for a more conservative estimate of trips generated by the quarry. The truck fleet distribution adopted for estimating the generation of site truck traffic is described in **Section 6.1**.

It is acknowledged that the use of double-trailers may increase in the future but only single unit dump trucks were used to provide a more conservative estimate of trips generated by the quarry. Both single unit and double-trailer trucks were used as design vehicles for the intersection geometric design.

If it is assumed that the quarry will operate for 5.5 days per week (based on hours of operation – 12 for Monday to Friday and 6 for Saturday), the result is a total for site generation very similar to what has been provided to the public and used in previous studies and is summarized as follows.

During an average maximum day, it is estimated that there will be 1140 truck trips consisting of 570 inbound and 570 outbound truck trips. The average maximum day is defined as a day when the number of trips exceeds the average daily per day by 35%. Therefore, the typical number of truck trips is much lower.

Based on aggregate operations elsewhere in Ontario [8], 12% of the shipping traffic travels during the AM peak hour and 10% during the PM peak hour. Peak hour refers to the street peak hour and not the facility peak hour. Therefore, during the AM peak hour, the proposed Flamborough Quarry is estimated to generate 70 trucks entering and 70 exiting. During the PM peak hour, it is estimated to generate 60 trucks entering and 60 trucks exiting. This is based on the assumption that the quarry is operating at maximum capacity (i.e. at the tonnage maximum of three million tonnes/year).

The distribution of quarry truck traffic is provided in **Section 5.6** following discussion on aggregate supply and demand.

[8] Walker Environmental Assessment, Traffic Impact Assessment, iTRANS Consulting, February 2006

6.2.2 Employee Trip Generation

The employee trip generation was derived based on staffing requirements, which were provided by St. Marys. The quarry will require approximately 30-35 staff to operate the quarry per shift. Staff typically work in 12-hour shifts. In addition to the staff, about 10-20 contractors can be anticipated for operations, maintenance and other miscellaneous tasks during the day. These trips are assumed to occur outside of the peak hours. To be conservative, we have assumed 35 employees for the peak AM and PM hours. The employee trip generation is summarized in **Table 6-1**.

Table 6-1: Quarry Employee Trip Generation

Time Period	In (vph)	Out (vph)
AM Peak	35	5
PM Peak	5	35

To be conservative, we assumed all trips for the 35 employees occur in the peak periods and a nominal 5 trips leaving to account for pick-up/drop off.

The trip distribution for the employee components of the development was based on a review of the information provided in the ***2006 Transportation Tomorrow Survey*** (TTS) conducted by the University of Toronto Joint Program. The review looked at the number of trips from all the TTS planning districts to the Flamborough district. The results were filtered based on work trips and a start time of between 6:30am to 9:30am. A summary of the raw TTS output is shown in **Table 6-2**.

Table 6-2: Raw TTS Output Summary

Trip Origin	Number of Trips	% of Distribution
Flamborough	1832	37.9%
Hamilton	956	19.8%
Burlington	591	12.2%
Cambridge	258	5.3%
Dundas	233	4.8%
Brantford	145	3.0%
Stoney Creek	127	2.6%
Ancaster	126	2.6%
Mississauga	124	2.6%
Brant	99	2.0%
Halton Hills	72	1.5%
Guelph	51	1.1%
Waterloo	36	0.7%
Puslinch	24	0.5%
Brampton	23	0.5%
Markham	20	0.4%
St Catharines	19	0.4%
Kitchener	19	0.4%
North Dumfries	18	0.4%
PD 8 of Toronto	17	0.4%
Milton	17	0.4%
Oakville	16	0.3%
Glanbrook	16	0.3%
Total	4839	100.0%

The trips were divided based on the likely travel route to the site. For the trips that originate in Flamborough, population density was used to determine trip location and then trips were assigned to the network based on the probable route. The employee trip distribution and assignment for the proposed development is summarized in **Table 6-3.**

Table 6-3: Quarry Employee Trip Distribution

Direction: To/From	**Via**	**In/Out**
East	Highway 401 via Guelph Line	3.8%
	Parkside Drive	4.7%
	Dundas Street	4.7%
West	Highway 401 via Highway 6	7.7%
	Concession 11 East	3.8%
North	Highway 6	1.0%
South	Highway 6	49.6%
	Centre Road	18.9%
	Milburough Townline	5.7%
Total		**100%**

The quarry employee site peak hour traffic volumes are shown in **Exhibit 6-1**.

Exhibit 6-1: Quarry Employee Site Traffic

To be inserted

7. ALTERNATIVE STRATEGIES FOR QUARRY TRUCKS

7.1 Alternative Strategies

There are two alternative strategies for quarry trucks. The selected alternative strategy will have a considerable influence on the selection of alternative haul route(s). The following section explains each alternative strategy in detail.

7.1.1 Alternative Strategy 1 – Quarry Trucks Permitted To Use Available Truck Routes

One option for the proposed quarry is to allow trucks to travel on roads where trucks are currently permitted but subject to load restrictions. Since Concession 11 E and Milburough Line are located adjacent to the proposed quarry, they are included for this alternative strategy as routes that would be available to trucks. These roads are illustrated in **Exhibit 7-1.**

By allowing trucks to use the shortest routes, this alternative has the major advantage of minimizing transport costs, road upgrades, and greenhouse gases emissions.

However, this alternative of permitting quarry trucks to use any available truck route where they are currently permitted is <u>not</u> being carried forward for two main reasons. The first reason is that truck traffic would increase on many more roads throughout the study area. The second reason is that the quarry truck traffic would affect many more residents within the study area.

Exhibit 7-1: Long List of Alternative Haul Routes

For these reasons, St. Marys is proposing a different strategy involving designated haul routes which would prohibit quarry trucks from using any road that is not a designated haul route.

7.1.2 Alternative Strategy 2 – Quarry Trucks Must Use Designated Haul Routes

St. Marys is proposing a haul route strategy for the proposed quarry, where quarry trucks would be compelled to travel on designated haul routes only. Quarry trucks would be prohibited from using any road that is not part of a designated haul route.

How can St. Marys compel quarry trucks to use only the designated haul route? Optional measures could include, but not be limited to:

- Traffic signage to designate the haul route(s);
- Truck prohibitions on roads that are not part of the haul route(s);
- Enforcement using hired police;
- Penalties for truckers who deviate from the designated haul route(s);
- "Hot line" for residents to call about quarry trucks that deviate from the designated haul route(s); and
- Additional options to compel trucks to use the designated haul route(s) are being considered.

7.2 Tools to Control Truck Traffic

One of the issues that has been raised is ensuring that truckers adhere to the designated haul route(s). At other locations, St. Marys has found that a process that is centred on their Truck Haulage and Safety Policy has been effective. The following sections outline St. Marys' truck policy and provides a case study of how it was effectively applied at their Limehouse Pit.

7.2.1 St. Marys Truck Policy

The following outlines CBM Aggregates, a division of St. Marys Cement Inc. (Canada) ("CBM"), Truck Haulage and Safety Policy that was first issued in June 2004 and revised in March 2007.

7.2.1.1 Purpose

This policy is designed to ensure:

- the occupational health and safety of all of CBM's employees, carriers, independent brokers, independent contractors and members of the public; and
- independent truck drivers hauling material off CBM property shall follow prescribed rules on and around CBM's operations.

CBM is committed to meeting or exceeding all of the legal requirements, duties, and the standards set by the applicable provincial health and safety legislation and highway traffic legislation.

7.2.1.2 Scope

Geographical: This policy is not limited specifically to CBM's sites, but also extends to the arterial routes that surround all of CBM's operations.

Persons Covered: This policy applies to:

- all carriers, independent brokers, independent contractors engaged to haul aggregates for CBM (referred to herein as "Carriers"); and
- CBM employees.

7.2.1.3 Responsibilities and Tasks of Carriers

Carriers will comply with the following rules, and will be responsible to ensure that all of their employees, agents or contractors who drive trucks will comply with the following rules:

1. Compliance with Policy and Laws. All drivers must have a full understanding of CBM's Aggregates Truck Haulage & Safety Policy, as amended from time to time, the Ontario Occupational Health and Safety Act, the Highway Traffic Act and its regulations, and adhere to the safe work procedures as detailed therein. Carriers will abide by all applicable federal, provincial, municipal laws and regulations, including by-laws and hours of operation.
2. Trucks shall not pass vehicles of any class on entrance haul roads at any CBM location and must observe the right of way.
3. There is no unnecessary stopping or parking on entrance inclines at any CBM location. In the event of breakdown, trucks must have wheels chocked and display warning flares or reflective indicators.
4. All trucks must be equipped with a properly functioning backup safety alarm and be maintained in accordance with the provisions of the ***Highway Traffic Act***, and its regulations.
5. Drivers must remain in their vehicles at all times when on CBM property except for the following designated areas: overload areas, scale house, tarping areas and "Designated Areas".
6. When drivers are out of their vehicles in the Designated Areas they must wear a safety vest, safety footwear and it is strongly recommended that drivers take reasonable precautions by wearing hard hats as well.
7. Drivers must tarp and inspect all loads, clean loose material from tailgates and sideboards at the tarping or overload areas only.
8. Drivers must obey all signs posted on CBM property and follow instructions issued by CBM staff while on CBM property.

9. After a load has been completely emptied at the stockpile area, the box must be lowered completely before the driver leaves the area. Under no circumstances should a driver have the truck in motion while the box is being lowered.
10. The use of intoxicating substances such as drugs and alcohol will not be permitted at CBM locations at any time. Persons under the influence of any intoxicating substance will not be allowed entry to CBM property.
11. CBM reserves the right to refuse to issue a weigh bill to a driver if the truck exceeds its gross allowable weight limits, or the driver cannot supply information as required.
12. Vehicles in excess of their MTO Gross Weight Documentation must dump surplus material before a loading ticket will be issued, with no exceptions.
13. Trucks <u>must</u> tare in every day. These measures are necessary to comply with the ***Ontario Highway Traffic Act.***
14. For any change in trailer configuration, drivers must supply a new Gross Allowable Weight document issued by the Ministry of Transportation to each CBM location that the truck hauls from.
15. All drivers must be aware of Ontario Regulation 213/91, as amended by Ontario Regulation 628/05, Construction Projects, made under the ***Occupational Health and Safety Act***, ("Construction Projects Regulation"), regarding safe distances from overhead power lines.
16. Drivers must be polite and courteous to local residents and avoid excessive engine noise including the use of engine brakes, except where safety considerations would merit such use.
17. When specified for a particular site, trucks are expected to follow designated haul routes.
18. Drivers must sign all free on board (FOB) tickets at the time of issue. All delivery tickets must be signed by the drivers and customers and returned to a CBM location preferably by the next business day.
19. Documentation Requirements**.** All Carriers must have, and supply CBM with, the following information upon initial entry onto the CBM premises (the "work place"), and thereafter upon request of CBM :
    a) Valid Driver's License for the class matching the type of vehicle driven;
    b) Ministry of Transportation Registered Gross Weight documents;
    c) A copy of vehicle permit (showing the owner of the vehicle and the registered gross weight of the vehicle);
    d) Proof of Insurance coverage, minimum of $2,000,000 (TWO MILLION DOLLARS);
    e) Valid Workplace Safety and Insurance Board ("WSIB") Clearance Certificate renewed every sixty days, or Independent Operator Clearance Certificate;
    f) Proof of valid C.V.O.R. certificate, maintained at an acceptable violation rate in accordance with the Ministry of Transportation's "Ontario's Safety Rating and Commercial Motor Vehicle Registration System Public Guideline"; provide a CVOR level II abstract upon request; and
    g) Proof of a current valid Annual Inspection Sticker and Certificate issued pursuant to the ***Highway Traffic Act***.

7.2.1.4 Violations by Carriers

Carriers which violate any of these rules will receive a maximum of two warnings. CBM will verbally warn the driver and will send a written warning to the Carrier. In the event that a third warning is given to any given driver, CBM reserves the right to:

a) refuse to load a truck operated by that driver at any or **ALL CBM** locations;
b) require that the Carrier replace that driver for any haulage services to be provided for CBM; or
c) terminate its agreement with the Carrier.

In the event of a serious infraction of this policy, CBM reserves the right to suspend a driver's loading privileges without issuing any prior warnings.

7.2.1.5 Responsibilities of CBM Employees

CBM employees who deal with Carriers have a responsibility to:

1. Ensure Carriers and drivers follow the policy set out above;
2. Immediately report trucks that do not follow this policy by way of the Contact Record Form. This form shall be submitted to the appropriate CBM personnel. Upon receiving the Contact Record Form, CBM shall take appropriate action to correct the infraction; and
3. Make certain that there are no exceptions to this policy.

St. Marys works diligently to monitor and enforce the above policy and takes corrective action if necessary. If a complaint is filed and corrective action is required a Contact Record Form is issued that documents the date of the complaint, person complaining, explanation of their concern, and action taken to correct their concern. This process results in a corrective action and a routine follow up is carried out.

7.2.2 Limehouse Pit Case Study

It is our recommendation that a designated haul route is the best approach combined with St. Marys Truck Haulage and Safety Policy. This policy has been applied successfully at other locations such as the Limehouse Pit in Halton Hills.

The Limehouse Pit is located north of the 401 close to the village of Limehouse. The site had many unique challenges and resulted in a single haul route that requires all trucks travel east from the site regardless of which direction they need to go. The haul route is from Highway 7 onto Sideroad 22, through the village of Limehouse to 5th Line. The main entrance is on 5th Line (**Exhibit 7-2**).

Exhibit 7-2: Location and Haul Route Illustration for the Limehouse Pit

St. Marys encourages local residents to call them directly with concerns about the quarry trucks and whenever possible provide them with the license plate number in order for them to take the appropriate action. This has been effective in the past to keep trucks on the designated haul routes. The feedback from the local municipality was encouraging stating, “Halton Hills staff has experienced positive corporate responses from CBM SMC to haulage related issues.” Local police explained that no issues have been brought to their attention concerning trucks not adhering to the designated haul routes.

Based on previous successes and benefits of using a designated haul route, Alternative Strategy 2 was selected and carried forward in the haul route evaluation.

7.2.3 Design Features

Wherever possible, the design of recommended road alterations will facilitate truck movements in the direction of the selected alternative haul route and inhibit un-designated movements. In combination with signage, these measures would include the strategic use of geometric design tools, raised medians, and concrete curb and gutter features in the design of the site access and recommended intersection alterations.

8. SELECTION OF ALTERNATIVE HAUL ROUTES

As required by the CART Terms of Reference, the study adopted a process for identifying, screening, analyzing, and evaluating alternative haul routes. This process has six steps and can be summarized as follows:

1. **Identification of initial long list of alternative haul routes** - Identify all reasonable potential haul routes in the study area. (The study area is shown in **Exhibit 8-1**) The result is an initial long list of alternative haul routes for input from the public and stakeholders.
2. **1st stage screening of initial long list of alternative haul routes** - Conduct an initial screening of the initial long list of alternative haul routes. Use the routes' environmental impacts for the screening criteria. The result is an initial short list of alternative haul routes which can be presented to the public and stakeholders for their input.
3. **2nd stage screening of selected alternative haul routes** - Conduct a detailed screening of the environmental impacts of alternative haul routes that were initially screened out, but which might have merit. Determine whether the routes should be included for consideration. The result is the final short list of alternative haul routes.
4. **Analyze the short list of alternative haul routes**.
5. **Evaluate the short list of alternative haul routes**.
6. **Select the preferred haul route(s)**.

Section 8 of this report describes the first set of three steps. **Section 8.1** identifies the initial list of haul routes for consideration. **Section 8.2** describes the first stage screening the haul route alternatives and **Section 8.3** describes the second stage screening.

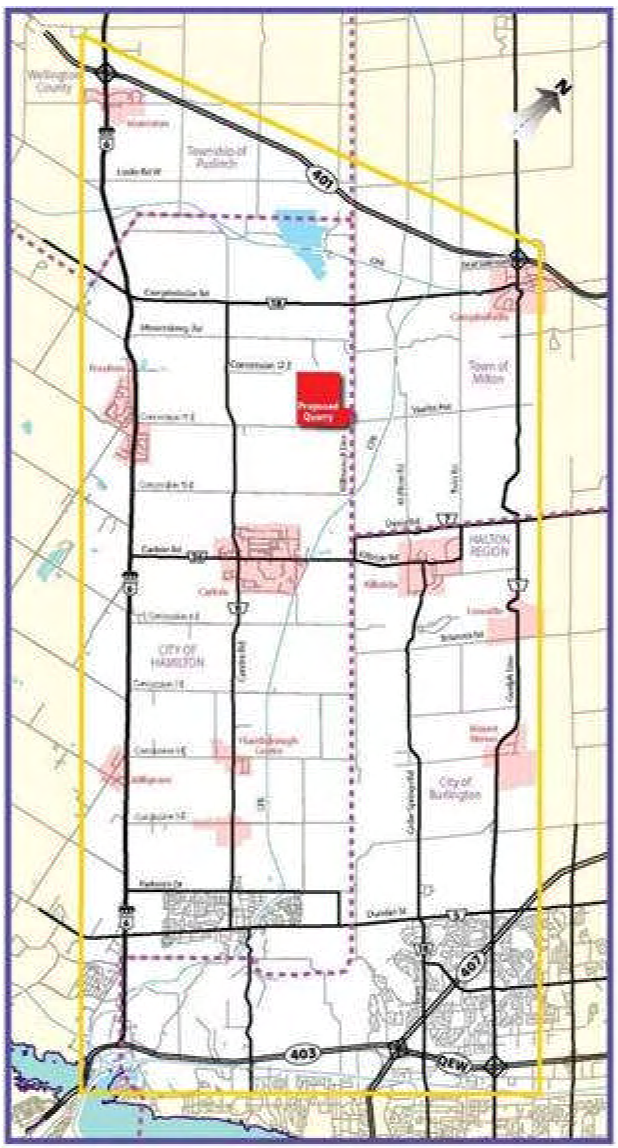


Exhibit 8-1: Study Area

Section 8.4 discusses the qualitative assessment and comparison that was done in combination with the screening to help develop the short list of haul routes.

Section 8.5 presents the final short list of five haul routes (three individual routes and two combination routes) on a map. **Section 8.6** describes each of the five alternative haul routes and provides a map of each route.

The haul route study will describe the second set of three steps, i.e. the analysis, the evaluation, and the selection of the preferred haul route(s).

8.1 Identification of the Initial Long List of Alternative Haul Routes

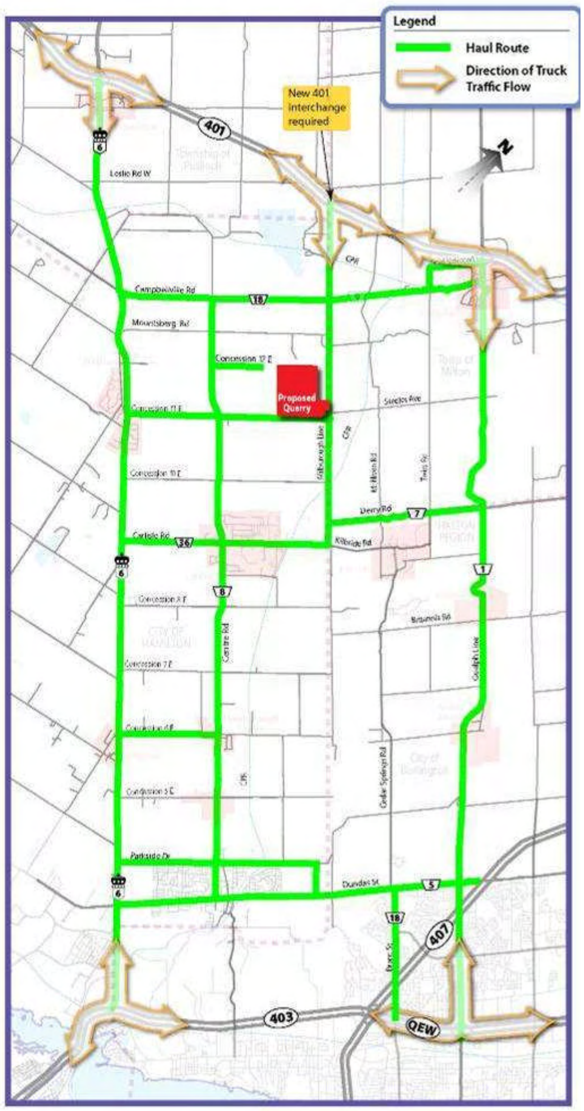


Exhibit 8-2: Long List of Alternative Haul Routes

The first step involved the identification of an initial long list of alternative haul routes. The process started by listing all reasonable haul route links in the study area.

A road link was included in the list if it satisfied any one of the following criteria:

- Existing truck route
- Existing arterial road
- Existing provincial highway
- Existing road that borders the site, i.e. Concession 11 E, Concession 12 E, and Milburough Line.

Exhibit 8-2 shows the resulting initial long list of alternative haul routes. The routes are shown in green.

8.2 1st Stage of Screening of Initial Long List of Alternative Haul Routes

All of the alternative haul routes on the initial long list were reviewed and screened link by link to eliminate routes that had a significant number of adverse impacts and disadvantages. The alternative haul routes had a total of 27 links.

Each link was reviewed individually. The screening was applied at a high level and used available secondary source data. The elimination of a link as a potential haul route did not depend on a single criterion, but on the overall advantages and disadvantages of the road link.

The following screening criteria were applied:
- Avoid settlements and built-up areas
- Avoid schools and parks
- Avoid roads with significant engineering and safety deficiencies
- Avoid significant impacts on the natural environment
- Avoid routes that would need extensions or new road construction (to minimize environmental impacts)

8.2.1 Eliminated Road Links

The screening eliminated 16 road links. They are shown in **Exhibit 8-3.**

The eliminated links are listed below with a brief summary of the high level rationale used in the elimination. **Section 8.2.2** provides a comprehensive analysis of all 27 route links.

Link 2 Centre Road – From Concession 11 E to Carlisle Road
Constraints include:
- Passes through the heart of the Carlisle community
- Passes by two schools
- Passes by community centre and park
- Reconstruction and widening required

Link 3 Centre Road – From Carlisle Road to Dundas Street
Constraints include:
- Passes through the heart of the Carlisle community
- Passes through Flamborough Centre
- Passes through Concession 5 E settlement area
- Passes though Waterdown
- Passes by four schools and four parks
- Reconstruction and widening required

Link 4 Milburough Line – From Highway 401 to Campbellville Road

Constraints include:

- Not an existing truck route
- Questionable feasibility for new 401 interchange
- Passes by Mountsberg Wildlife Centre
- Significant engineering deficiencies
- Major reconstruction and widening required

Link 6 Milburough Line – From Concession 11 E to Derry Road

Constraints include:

- Not an existing truck route
- Significant engineering and safety deficiencies
- Major reconstruction and widening required
- Potential impacts on Environmentally Significant Area

Link 7 Brant Street – From Dundas Street to QEW

Constraints include:

- Passes through heavily built up area in Burlington
- Numerous homes backing on to Brant
- Numerous businesses along Brant
- Cannot access QEW Niagara without going on Fairview or Plains Road

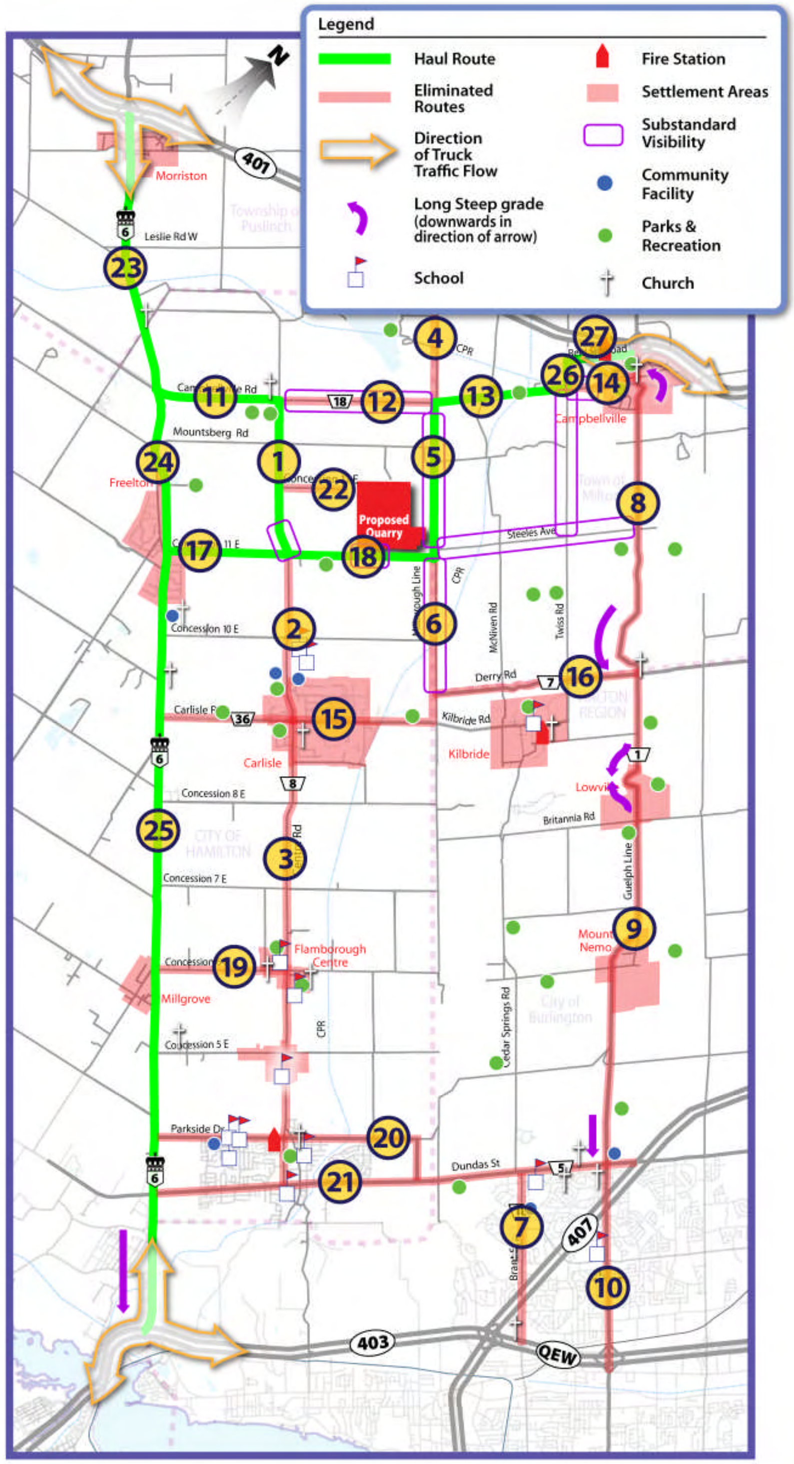


Exhibit 8-3: Eliminated Haul Route Linkages

Link 8 Guelph Line – From Highway 401 to Derry Road
Constraints include:
- Passes through the heart of Campbellville
- Passes by many businesses
- Potential conflicts with auto traffic and pedestrians
- Passes by church, and several parks/conservation areas
- Long steep grades north of Derry Road and south of Campbellville
- Guelph Line not easily accessible for trucks from the quarry site

Link 9 Guelph Line – From Derry Road to Dundas Street
Constraints include:
- Passes through Lowville community
- Passes through Mount Nemo community
- Potential conflicts with auto traffic and pedestrians
- Passes by parks and conservation area
- Long steep grades in Lowville area and north of Dundas Street
- Guelph Line not easily accessible for trucks from the quarry site

Link 10 Guelph Line – From Dundas Street to QEW
Constraints include:
- Passes through heavily-built up area in Burlington
- Numerous homes backing on to Guelph Line
- Numerous businesses along Guelph Line
- Guelph Line not easily accessible for trucks from the quarry site

Link 12 Campbellville Road – From Centre Road to Milburough Line
Constraints include:
- Significant visibility problems with ‘roller coaster’ alignment
- Major reconstruction required with significant implications to adjacent properties/accesses expected

Link 14 Campbellville Road – From Twiss Road to Guelph Line
Constraints include:
- Passes through Campbellville built-up area
- Numerous homes and driveways
- Deficient road alignment at CP crossing
- Passes by Campbellville Conservation Area:
- Major physical constraints at Guelph Line intersection for turning truck traffic
- Cannot access 401 without passing through business heart of Campbellville

Link 15 Carlisle Road – From Highway 6 to Milburough Line
Constraints include:
- Passes through heart of Carlisle community
- Passes by a park and conservation area
- Potential conflicts with autos and pedestrians
- Reconstruction and widening required
- Numerous homes and businesses

Link 16 Derry Road – From Milburough Line to Guelph Line
Constraints include:
- Milburough not suitable access route to Derry
- Reconstruction and widening required.

Link 19 Concession 6 E – From Highway 6 to Centre Road
Constraints include:
- Passes through Flamborough Centre,
- Not easily accessible for trucks from quarry site

Link 20 Parkside Drive – From Centre Road to Evans Road
Constraints include:
- Passes through Waterdown built-up area
- Numerous homes along the route
- Significant conflicts with pedestrians and auto traffic

Link 21 Dundas Street – From Centre Road to Evans Road
Constraints include:
- Passes through heart of Waterdown
- Significant conflicts with pedestrians and auto traffic
- Significant traffic congestion and delays

Link 22 Concession 12 E
Constraints include:
- Not an existing truck route
- Significant impacts on the natural environment
- Significant reconstruction and widening required

8.2.2 Evaluation of Each Haul Route Link

Each of the 27 route links were then considered in detail in terms of the advantages and disadvantages associated with the evaluation criteria listed in the City of Hamilton's Terms of Reference. The results are summarized in tabular format in **Appendix B**.

This section summarizes the main findings. There are no known cultural heritage characteristics to evaluate at this time.

In addition to this discussion, **Section 8.4** provides further explanation regarding the qualitative assessment and comparison that was used to help develop the short list of haul routes.

8.2.2.1 Link 1: Centre Road from Campbellville Road to Concession 11 E

Advantages: This route link is an existing designated truck route with no restrictions on vehicular traffic. There are no businesses along this link, and it is not located in a heavily built-up area.

Disadvantages: The Mountsberg Baptist Church and Cemetery are located on the west side of Centre Road near Campbellville Road, but worship takes place on Sunday at 9:45 am when the quarry is not planned to be in operation. There are approximately 45 driveways along this link, and the link is also part of an on-street bike route. During weekdays, approximately 23 school buses use this link daily.

Photo 8 - 1: Mountsberg Baptist Church and Cemetery

Conclusion: Given the proximity of this road section to the proposed site, and the potential to minimize impacts to the social, economic and cultural aspects of the community, the road section is recommended for consideration as a potential haul route.

8.2.2.2 Link 2: Centre Road from Concession 11 E to Carlisle Road

Advantages: This route link is an existing designated truck route with no restrictions to vehicular traffic. South of Concession 10 E, however, there is a bridge that restricts loads to a maximum of 30 tonnes.

Disadvantages: The link is part of an on-street bike route, and passes through the heart of the Carlisle community. The link includes six businesses, two schools (Balaclava Elementary School and Our Lady of Mount Carmel Catholic School) and several community facilities (Carlisle Community Centre, the Hamilton Public Library, Carlisle Medical Centre, and Flamborough Carlisle Memorial Park). On weekdays, approximately 54 school buses use this link daily

Photo 8 - 2: Our Lady of Mount Carmel Catholic School

Photo 8 - 3: Balaclava Elementary School

Photo 8 - 4: Flamborough Carlisle Memorial Park

Photo 8 - 5: Carlisle Medical Centre

Conclusion: If additional heavy truck traffic was introduced to this recreational-oriented area, this link would likely experience impacts that are disadvantageous to the social and economic environment. For this reason, it is recommended that this route link not be carried forward as a potential haul route.

8.2.2.3 Link 3: Centre Road from Carlisle Road to Dundas Street

Advantage: This route link is a designated truck route with no restrictions.

Disadvantages: Several natural areas are located along this route. These areas are classified as ESAs, and include the Carlisle Conservation Area located on the west side of Centre Road between Carlisle Road and Concession 8 E. Disturbance to the natural areas should be avoided where possible.

There are community recreational facilities, public-use parks, and open spaces along this link. The link passes through four settlement areas (Carlisle community, Flamborough Centre, Waterdown community, and the Concession 5 E settlement area), four schools

(Riverwalk Country Day Montessori School, Guardian Angels Elementary School, Flamborough Centre Elementary School and St. Thomas School), several parks (Flamborough Centre Community Park, Centre Park and Waterdown Memorial Park), and two churches (Carlisle United Church and Cemetery, and St. Thomas The Apostle Church). In addition to these community features, there are also 27 businesses along the link. On weekdays, approximately 232 school buses use this link daily.

Photo 8 - 6: Carlisle United Church and Cemetery

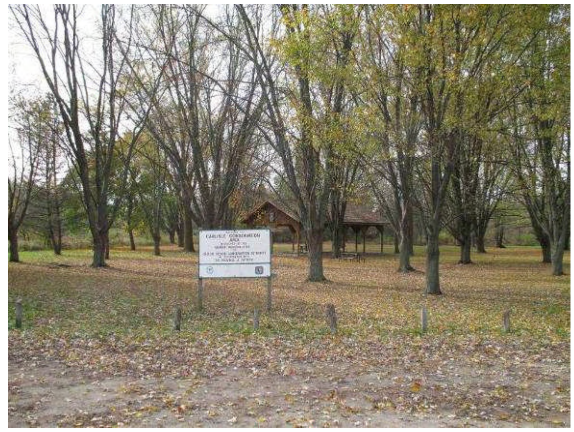


Photo 8 - 7: Carlisle United Church and Cemetery

Photo 8 - 8: Flamborough Centre Elementary School

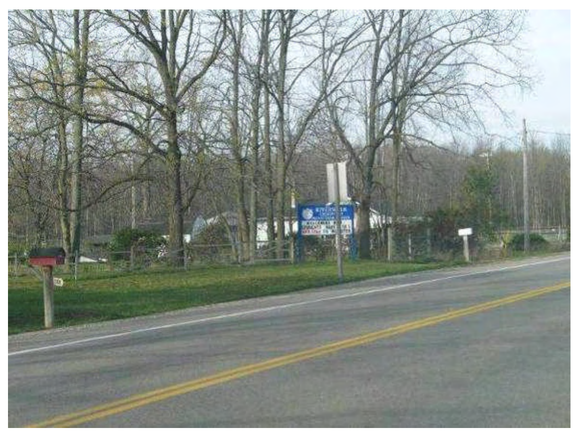


Photo 8 - 9: Riverwalk Country Day Montessori School

Photo 8 - 10: Flamborough Leisure Park Centre

Photo 8 - 11: Carlisle Community Centre

Photo 8 - 12: Business along Centre Road

Photo 8 - 13: Business along Centre Road

Photo 8 - 14: Business along Centre Road

Photo 8 - 15: Business along Centre Road

Photo 8 - 16: Business along Centre Road

Photo 8 - 17: Business along Centre Road

Photo 8 - 18: Business along Centre Road

Photo 8 - 19: Business along Centre Road

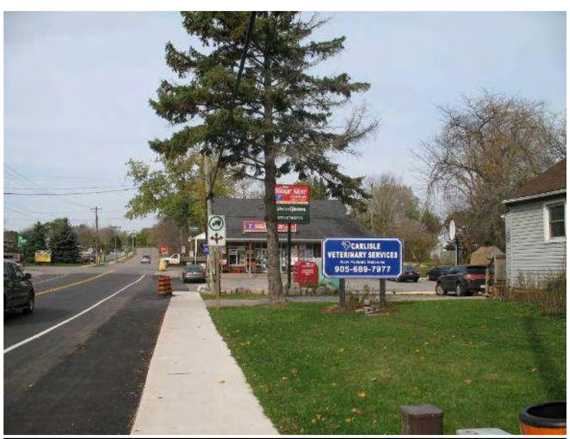


Photo 8 - 20: Business along Centre Road

Photo 8 - 21: Business along Centre Road

The link includes a cautionary on-street bike route, and site observations show that there is heavy traffic congestion through the Waterdown community during the peak traffic hours. Since Link 2 (**Section 8.2.2.2**) was not carried forward, this route link is discontinuous from the proposed site.

Conclusion: Given the concentration of schools, community facilities, and businesses, and the corresponding impacts to the social, economic and cultural aspects of the community, it is recommended that this route link not be carried forward as a potential haul route.

8.2.2.4 Link 4: Milburough Line from Highway 401 to Campbellville Road

Advantages: This route link is a designated truck route with seasonal load restrictions. Few residential dwellings and businesses are located along this link.

Disadvantages: There is an existing railway crossing with lights-only traffic control and an on-street bike route. There is an ESA, conservation land, and the Mountsberg Wildlife Centre which is open year round and hosts a variety of activities for all ages.

A new interchange with Highway 401 has been suggested by the public for this section of Milburough Line. Current road conditions will not, however, support an interchange. A significant change to the character of the roadway would be required. The link also has some significant engineering deficiencies that will require major reconstruction and road widening.

Photo 8 - 22: Mountsberg Conservation Area

Conclusion: Although very few residential dwellings and businesses are located along this route, the construction of a new interchange will result in a significant change to the area. For this reason, it is recommended that this link be reassessed in the second stage evaluation of potential haul routes.

8.2.2.5 Link 5: Milburough Line from Campbellville Road to Concession 11 E

Advantages: This link provides the most direct access from the quarry site to Highway 401 and destinations to the east, but the link has a seasonal load restriction. Community facilities along the link are limited.

Disadvantages: Along this link, there is an on-street suggested bike route that passes approximately 23 residential driveways. On weekdays, approximately 11 school buses use this link daily. There is an ESA and a business. As visibility on the link is substandard, reconstruction and widening will be required.

Photo 8 - 23: Sample driveway along Milburough Line

<u>Conclusion:</u> This link offers the potential to minimize the overall impacts to the social, economic and cultural aspects of the overall community of the study area by avoiding other more sensitive areas. It is therefore recommended that this link be carried forward as a potential haul route.

8.2.2.6 Link 6: Milburough Line from Concession 11 E to Derry Road

<u>Advantage:</u> This road link has no advantages to note at this time.

<u>Disadvantages:</u> This link is not a designated truck route, and does not provide a direct route to Highway 401. Like link No. 5 (**Section 8.2.2.5**), visibility on the link is substandard. As there are significant engineering deficiencies, the link would require reconstruction and widening.

On-street bike route passes numerous residential driveways and a business. On weekdays, approximately 25 school buses use this link daily. Near Concession 10 E, there is a rail crossing that is controlled by lights only. The link passes several ESAs.

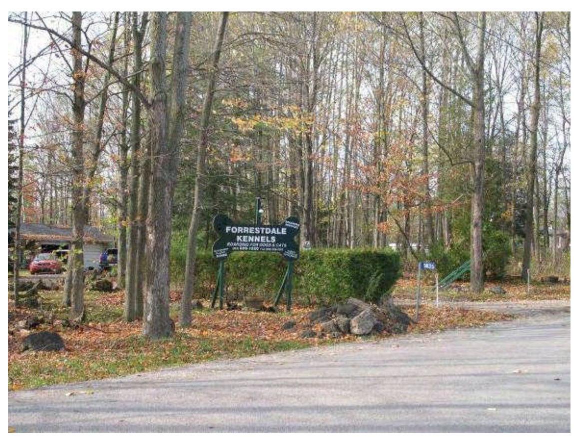


Photo 8 - 24: Business along Milburough Line

<u>Conclusion:</u> Given the potential impacts to the terrestrial environment and the minimal strategic benefit of this particular road link, it is recommended that this link not be carried forward for further consideration as a potential haul route.

8.2.2.7 Link 7: Brant Street from Dundas Street to QEW

Advantage: This link is a truck route with no restrictions.

Disadvantages: The link passes through a heavily-built up area in Burlington, and numerous businesses and homes back onto Brant Street. Several community facilities are located along the link: Kingsbridge School, the Brant Hill Community Centre and Library, and two churches (Brant Hills Presbyterian Church, and Prince of Peace Lutheran Church).

Conclusion: Given the discontinuous nature of the route from the proposed quarry site, and given that the QEW Niagara cannot be accessed without going through Fairview Road or Plains Road, it is recommended that this link not be carried forward for further consideration as a potential haul route.

8.2.2.8 Link 8: Guelph Line from Highway 401 to Derry Road

Advantage: This link is a truck route with no restrictions and no designated cycling facilities.

Disadvantages: This link does not provide access to Highway 401 without passing through the business heart of the Campbellville community. Additional truck traffic passing through Campbellville may create conflicts with vehicular traffic and pedestrians. On Guelph Line, just south of Campbellville, there is a rail crossing controlled by lights and gates.

Within Campbellville, there are seven businesses (with numerous other businesses to the south), two churches (St. David’s Presbyterian Church and Cemetery, and St. Andrew’s Anglican Church), and the Campbellville Ball Park. The link also passes several conservation lands including: Campbellville Conservation Area, Crawford Lake Forestry Tract, and Crawford Lake Conservation Area. North of Derry Road and south of Campbellville, the grades are long and steep. On weekdays, approximately 30 school buses use this link daily.

The geometric conditions at the intersection of Guelph Line and Campbellville Road are not conducive to expansion. It is not advisable to increase the truck traffic, particularly truck traffic turning left off Campbellville Road to go north, or coming south and turning right, .

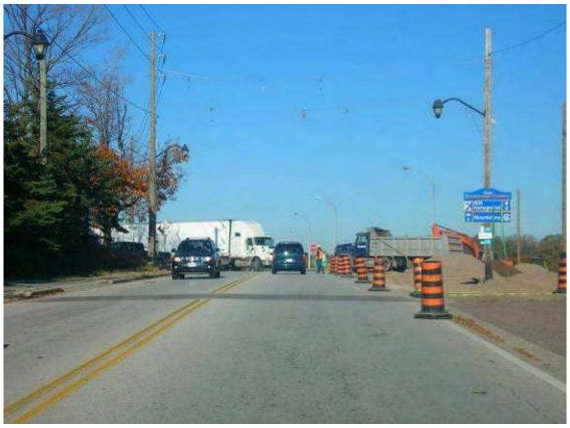


Photo 8 - 25: Guelph Line, near construction zone at Highway 401 Interchange

Photo 8 - 26: Guelph Line at the heart of Campbellville

Conclusion: Given that this route includes long steep, grades north of Derry Road and south of Campbellville, the challenging Guelph Line and Campbellville Road intersection, and large potential social and economic impacts, it is recommended that this link not be a carried forward for further consideration as a potential haul route.

8.2.2.9 Link 9: Guelph Line from Derry Road to Dundas Street

Advantage: This road link is a truck route with no restrictions to vehicular traffic and no on-street cycling facilities.

Disadvantages: The link passes through two settlement areas (Lowville and Mount Nemo). There are long steep grades in Lowville and north of Dundas Street. The link includes recreational facilities, such as the Crosswinds Golf and Country Club and Lowville Golf Club, and community facilities such as the Happy Times for Kids Day Care. On weekdays, approximately 47 school buses use this link daily.

There are several parks and conservation lands including Mount Nemo Conservation Area, the Lowville Park, and Burlington Memorial Gardens.

Photo 8 - 27: Crosswinds Golf and Country Club

Conclusion: Given that truck traffic would have to negotiate several steep grades, and given the potential impacts to Lowville and Mount Nemo's social environment, it is recommended that this link not be a carried forward for further consideration as a potential haul route.

8.2.2.10 Link 10: Guelph Line from Dundas Street to QEW

Advantage: This road link is part of a truck route with no restrictions.

Disadvantages: The link passes through a heavily built-up area in Burlington. There are numerous homes, businesses, churches and schools. Community facilities that might be impacted include three churches (St. John's Anglican Church, Calvary Baptist Church, and Glad Tidings Pentecostal Church), and one high school (MM Robinson High School.) On weekdays, approximately eight school buses travel this link daily.

Conclusion: Given the discontinuous nature of the route, it is recommended that this link not be carried forward for further consideration as a potential haul route.

8.2.2.11 Link 11: Campbellville Road from Highway 6 to Centre Road

Advantage: This link is part of a truck route with seasonal load restrictions.

Disadvantages: The link passes by an ESA and two businesses, one of which is the Campbellville Training Centre just west of Centre Road. The Mountsberg Baptist Church and Cemetery is located on the west side of Centre Road near Campbellville Road, but worship takes place on Sunday at 9:45 am when the quarry is not proposed to be in operation.

There are 15 residential driveways along the link. On weekdays, approximately six school buses use this link daily.

Photo 8 - 28: Campbellville Training Centre

Photo 8 - 29: Mountsberg Baptist Church

Photo 8 - 30: Business along Campbellville Road

Conclusion: While it will be necessary to provide consideration for potential impacts to the cultural and economic aspects of the community in this area, the road section does offer direct accessibility to Highway 6 while avoiding other more sensitive areas. It is therefore recommended that this link be carried forward as a potential haul route.

8.2.2.12 Link 12: Campbellville Road from Centre Road to Milburough Line

Advantage: This link is part of a truck route with seasonal load restrictions.

Disadvantages: The link passes through two ESAs. There are five businesses and approximately 38 residential driveways. On weekdays, approximately five school buses use this link daily.

Photo 8 - 31: Business along Campbellville Road

Photo 8 - 32: Business along Campbellville Road

Photo 8 - 33: Business along Campbellville Road

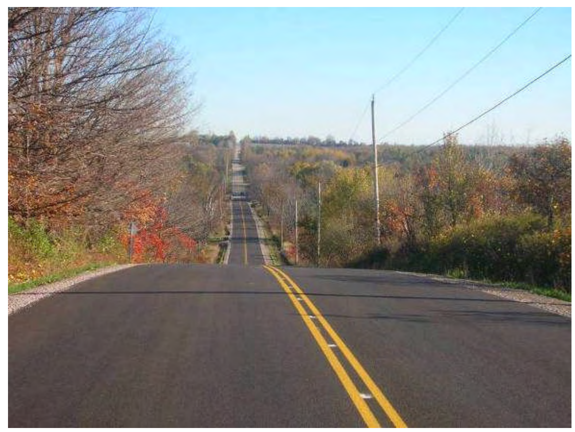


Photo 8 - 34: 'Roller-coaster' alignment along this route link on Campbellville Road

The link has visibility problems due to the 'roller-coaster' alignment. Major road reconstruction and grading would be required to improve the vertical alignment. This would require property acquisition, and would have a substantial impact on adjacent residential dwellings.

Conclusion: Although the reconstruction necessary on this link is expected to have significant impacts to existing land uses, and to have terrestrial and social implications, the close proximity of this road section to the proposed site and the link's resulting potential as a haul route merit further consideration. As a result, this link was listed for reassessment during the second stage evaluation.

8.2.2.13 Link 13: Campbellville Road from Milburough Line to Twiss Road

Advantage: This link is part of a truck route with year round load restrictions.

Disadvantages: West of Twiss Road, the link intersects a CP rail crossing that is controlled by lights only. There are 17 residential driveways and a single business along the link. On weekdays, approximately eight school buses use this link daily. The link passes by Laking Tract and Thomas William Harrison Tract, and is part of an on road suggested bike route.

Photo 8 - 35: Laking Tract

Photo 8 - 36: Thomas William Harrison Tract

Conclusion: While it will be necessary to provide consideration for potential impacts to the social aspects of the community in the area, the road section offers the potential of providing access to and from the proposed site while avoiding other more sensitive areas. It is recommended that this link be carried forward as a potential haul route.

8.2.2.14 Link 14: Campbellville Road from Twiss Road to Guelph Line

Advantage: This link is part of a truck route with year round load restrictions.

Disadvantages: East of Twiss Road, the link intersects a CP rail crossing with lights and gates. The horizontal alignment at this crossing is deficient.

The link passes through the built-up area of Campbellville, and has many businesses and residential driveways. Major physical building constraints at the Guelph Line intersection will impede turning truck traffic. (See description for Link 8 in **Section 8.2.2.8**.).

Photo 8 - 37: Campbellville Conservation Area **Photo 8 - 38: Business along Campbellville Road**

This route link is part of an on road suggested bike route, and passes by the Campbellville Conservation Area. On weekdays approximately four school buses use this link daily.

Conclusion: Since trucks cannot access Highway 401 without passing through the business heart of the Campbellville community (resulting in significant social impacts), it is recommended that this link not be carried forward as a potential haul route.

8.2.2.15 Link 15: Carlisle Road from Highway 6 to Milburough Line

Advantage: This route is a designated truck route with seasonal load restrictions.

Disadvantages: The link passes through a CP railway crossing controlled by lights only. The link also passes an ESA just east of Highway 6, Courtcliffe Park, the Carlisle Conservation Area west of Centre Road, and the Carlisle Golf and Country Club.

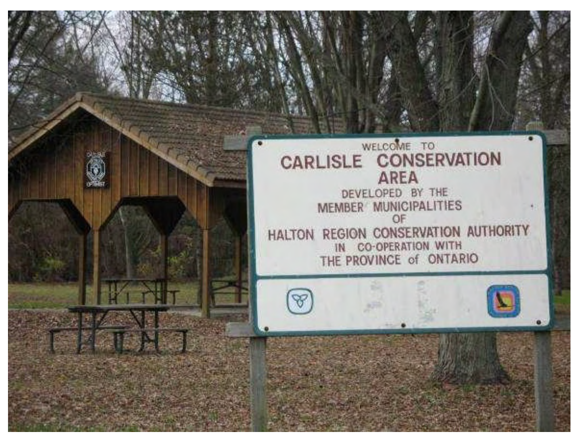


Photo 8 - 39: Courtcliffe Park **Photo 8 - 40: Carlisle Conservation Area**

This link is designated as an on-street bike route, and runs through the heart of the Carlisle community where numerous homes and businesses are located. On weekdays, approximately 36 school buses use this link daily.

Photo 8 - 41: Carlisle Golf and Country Club

Photo 8 - 42: Business along Carlisle Road

Photo 8 - 43: Business along Carlisle Road

Photo 8 - 44: Business along Carlisle Road

Photo 8 - 45: Southeast corner of Carlisle Road and Highway 6

Photo 8 - 46: Southeast corner of Carlisle Road and Highway 6

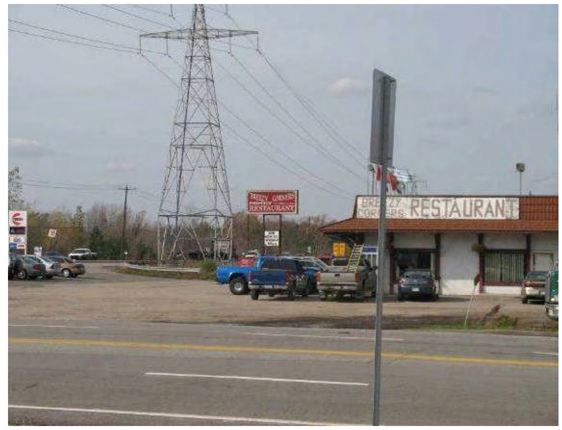


Photo 8 - 47: Northeast corner of Carlisle Road and Highway 6

Vehicles and pedestrian movements at numerous driveways and accesses along the link could potentially be impacted.

Conclusion: Given the potential social, economic, cultural and terrestrial impacts, it is recommended that this route link not be carried forward for consideration as a potential haul route.

8.2.2.16 Link 16: Derry Road from Milburough Line to Guelph Line

Advantage: This route is a designated truck route with seasonal load restrictions.

Disadvantages: The link has significant engineering and safety deficiencies which would require attention if the truck use increased. Several businesses are located along the link, and east of Twiss road, the link is a suggested on road bike route. On weekdays, approximately 16 school buses use the link daily. As Milburough Line south of Concession 11 is not recommended as a potential haul route, there is no connection to Derry Road from the site.

Photo 8 - 48: Business along Derry Road

Photo 8 - 49: Business along Derry Road

Photo 8 - 50: Business along Derry Road

Photo 8 - 51: Business along Derry Road

Conclusion: Given the potential social and economic impacts, and given the limited strategic importance of this road section to the proposed quarry's traffic, it is recommended that this link not be carried forward as a potential haul route.

8.2.2.17 Link 17: Concession 11 E from Highway 6 to Centre Road

Advantage: As this route provides direct access from the quarry site to Highway 6, the link would be easily accessible for trucks travelling to and from the proposed quarry site.

Disadvantages: The link is not an existing truck route. It passes by an Area of Natural and Scientific Interest (ANSI) and an ESA. The link has approximately 37 existing driveways that could potentially be impacted, and it is a cautionary, unsigned on-street bike route. On weekdays, approximately nine school buses use this link daily.

Conclusion: It will be necessary to provide consideration for potential impacts to the terrestrial and social aspects of the community in this area, but the road section offers the potential for providing accessibility to traffic travelling to and from the proposed site and for avoiding other more sensitive areas. It is recommended that this route be carried forward as a potential haul route.

8.2.2.18 Link 18: Concession 11 E from Centre Road to Milburough Line

Advantage: This route borders the site and is therefore easily accessible to trucks travelling to and from the quarry site.

Disadvantages: The link is not an existing truck route, and it passes by an ESA and Lawson Park. Approximately 44 existing driveways and accesses along the link could potentially be impacted. On weekdays, approximately five school buses use this link daily.

Photo 8 - 52: Lawson Park

Conclusion: While it will be necessary to provide consideration for the potential social impacts on the community in this area, the road section offers the potential for providing accessibility to the traffic travelling to and from the proposed site, and for avoiding other more sensitive areas. It is recommended that this route be carried forward as a potential haul route.

8.2.2.19 Link 19: Concession 6 E from Highway 6 to Centre Road

Advantage: This route link is a designated truck route with seasonal load restrictions.

Disadvantages: The link is part of an on-street bike route, and passes through the heart of the Flamborough community where several parks and recreational facilities are located. Facilities that could potentially be impacted include two parks (Flamborough Centre Community, and Centre Park), two churches (Community Church, and Flamborough Christian Fellowship), and a school (Flamborough Centre Elementary School). On weekdays, approximately 10 school buses use this link daily.

Conclusion: Given the nature of the social and cultural considerations, and the lack of suitable connection to Concession 6 E, it is recommended that this route not be carried forward as a potential haul route.

8.2.2.20 Link 20: Parkside Drive from Highway 6 to Evans Road

Advantage: This route link is a designated truck route with no restrictions west of Beeforth Road. East of Beeforth Road, the route link is a designated truck route with seasonal load restrictions.

Disadvantages: The link is part of an on-street bike route west of Beeforth Road. The link passes through the built-up area of Waterdown where there are numerous homes and businesses. Community facilities on this link include the Flamborough YMCA, the Waterdown Memorial Park, three schools (Allan A. Greenleaf School, Guy Brown School, and Waterdown District Secondary School), one church (James United Church) and Fire Station #24. The link has a CP railway crossing controlled by lights and gates.

Conclusion: Given the potential social impacts on the area, and given the discontinuous nature of this road section from the proposed site (due to recommendations made in this report for other links), it is recommended that this route be excluded as a potential haul route.

8.2.2.21 Link 21: Dundas Street from Highway 6 to Guelph Line

Advantage: This route is a designated truck route with no load restrictions.

Disadvantages: The link passes through the heart of the Waterdown community where there are numerous homes and businesses. Community facilities that may be impacted include two schools (St. Thomas, and Kingsbridge School), two churches (Nelson United Church and Cemetery, and St. John's Anglican Church), and New City Park.

Conclusion: Given the potential social impacts to the area and local community facilities, it is recommended that this route be excluded as a potential haul route.

8.2.2.22 Link 22: Concession 12 E

Advantage: This route link borders the proposed quarry site.

Disadvantages: The link is not an existing truck route. Most of the link route runs through a large ESA, and the link terminates at sensitive wetlands. Although the link is close to the proposed site, the existing link would need to be extended, requiring construction on protected wetlands.

Conclusion: Given the considerable environmental impacts, it is recommended that this road section be excluded as a potential haul route.

8.2.2.23 Link 23: Highway 6 from Highway 401 to Campbellville Road

Advantage: This route link is part of an existing designated truck route with no restrictions. The link provides direct access to Highway 401.

Disadvantages: The passes through an ESA and through the Morriston community which currently experiences congested conditions resulting from high volumes of truck traffic. The road link passes approximately 32 residential driveways and approximately 20 commercial driveways. A community feature that may be impacted is the Church of the Seventh Day Adventist Reform Movement. On weekdays, approximately six school buses use this link daily.

Photo 8-52: Business Plaza in Morriston Community

Conclusion: Given that Highway 6 is a provincial roadway designed to service all types of vehicles, it is recommended that this link be carried forward as a potential haul route.

8.2.2.24 Link 24: Highway 6 from Campbellville Road to Concession 11E

Advantage: This route link is part of an existing designated truck route with no restrictions. The link provides access to Highway 401 and Highway 403.

Disadvantages: The link passes through an ESA and the Freelton community. It passes approximately 9 residential driveways and approximately five commercial driveways. A community feature that may be impacted includes the Carlton-Freelton Cemetery. On weekdays, approximately ten school buses use this link daily.

Photo 8-53: Carmel Cemetery in Freelton Community

Conclusion: Given that Highway 6 is a provincial roadway designed to service all types of vehicles, it is recommended that this link be carried forward as a potential haul route.

8.2.2.25 Link 25: Highway 6 from Concession 11 E to Highway 403

Advantage: This route link is part of an existing designated truck route with no restrictions. The link provides direct access to Highway 403.
Disadvantages: The link passes through ESAs and the Millgrove community. It passes approximately 128 residential driveways and approximately 61 commercial driveways. A community feature that may be impacted is the United Church of Hamilton Conference. On weekdays, approximately 73 school buses use this link daily.

Conclusion: Given that Highway 6 is a provincial roadway designed to service all types of vehicles, it is recommended that this link be carried forward as a potential haul route.

8.2.2.26 Link 26: Twiss Road from Campbellville Road to Reid Sideroad

Advantages: This route link is part of an existing designated truck route with no restrictions on vehicle types. Because this link provides access to Reid Sideroad and avoids going through Campbellville, it is likely to provide potentially fewer impacts than routes that pass through other more sensitive areas.

Disadvantages: The link intersects a CP rail crossing where there are three rail tracks. The crossing is controlled by lights and gates. This link passes several industrial businesses and three residential driveways.

Conclusion: Given that this link is part of an existing designated truck route, and that it avoids Campbellville and sensitive areas, it is recommended that this road section be carried forward as a potential haul route.

8.2.2.27 Link 27: Reid Sideroad from Twiss Road to Guelph Line

Advantage: This route link is part of an existing designated truck route with no restrictions to vehicular traffic. The link provides access to Highway 401 without going through Campbellville.

Disadvantages: The link passes by the Campbellville Emergency Response Centre (Fire Station #2) and a business. It passes 13 driveways in total. On weekdays, approximately four school buses use this link daily.

Photo 8-54: Campbellville Emergency Response Centre

Photo 8-55: Business along Reid Sideroad

Conclusion: Given that this link provides access to Highway 401 and avoids going directly through Campbellville, it is likely to provide potentially fewer impacts than routes through other more sensitive areas. As a result, it is recommended that this road section be carried forward as a potential haul route.

8.3 Second Stage Screening of Select Alternative Haul Routes

Using additional input obtained from the public and municipal stakeholders, a more detailed screening was carried out for two road links that were not initially recommended as potential haul route:

- Link 4 (Milburough Line from Campbellville Road to Highway 401)
- Link 12 (Campbellville Road from Centre Street to Milburough Line).

The second screening of these links included detailed examination of vertical profiles and the development of functional design drawings.

8.3.1 Milburough Line from Campbellville Road to Highway 401

Advantage: A new interchange at Milburough and Highway 401 will provide a direct route for truck traffic from the proposed site to a 400 series highway.

Disadvantages: The Hamilton GIS layers provided by the City of Hamilton suggest that the location of the new interchange may impact several environmental features in the general vicinity. North of Highway 401, there are MNR protected wetlands, and south of Highway 401, there is a large ESA. To reach the interchange, traffic would have to traverse north and south on Milburough passing conservation lands and a large ANSI. This road section may also carry more traffic in the future if local traffic finds the new access to Highway 401 convenient.

To help evaluate the possibility of a new interchange at Milburough and Highway 401, a function design of a trumpet intersection was created to provide an understanding of the extent of the land acquisitions that might be required. **Exhibit 8-4** illustrates how the proposed interchange design might look.

Conclusion: Given the significant environmental impacts a new interchange would create, the potential changes to the nature of Milburough Line, the significant implications for the area transportation network, and the required land acquisition, it is recommended that this road link not be carried forward as a potential haul route.

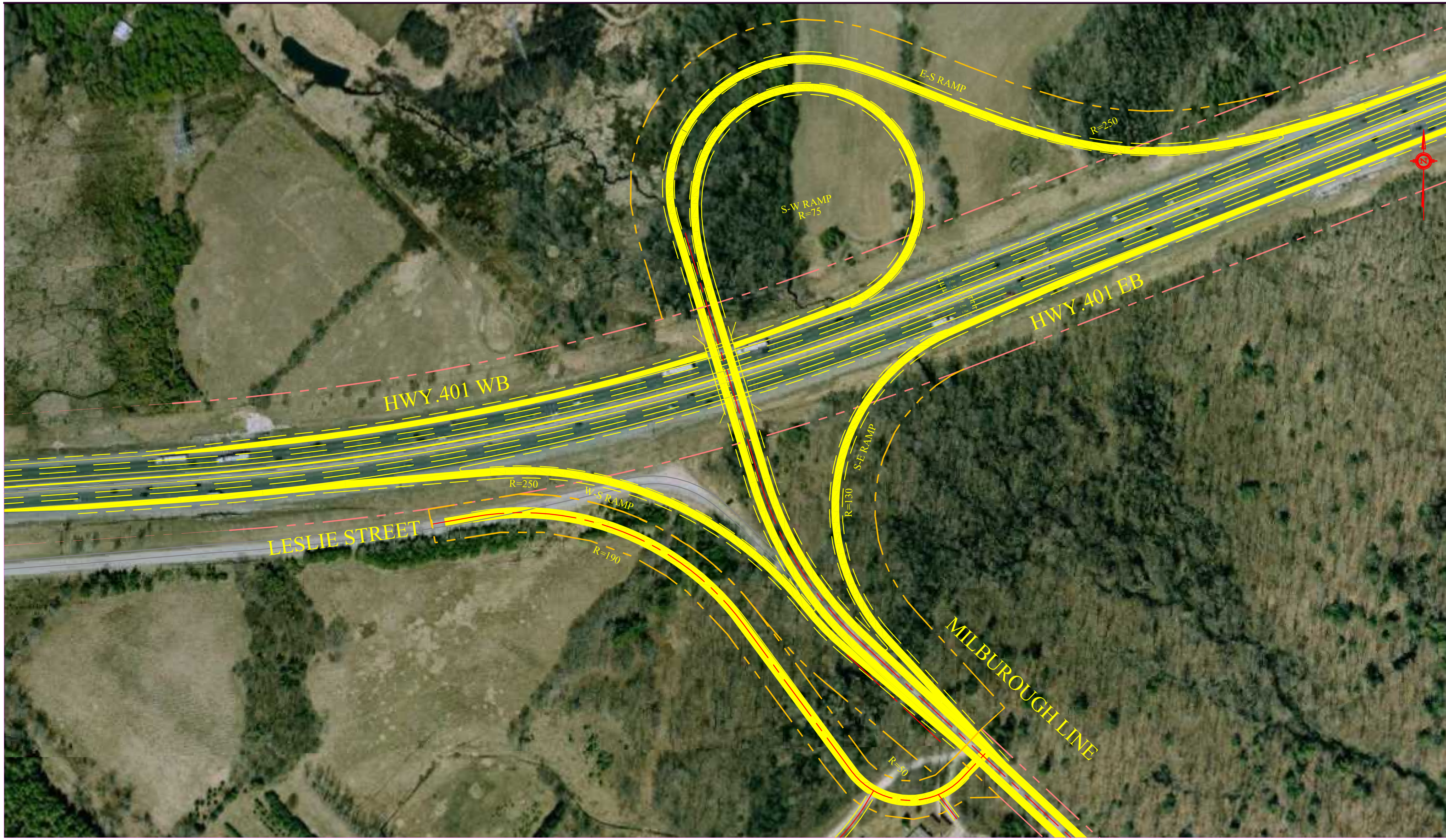


Exhibit 8- 4 Link 4 Plate 1

Possible Trumpet Interchange At Highway 401 & Milburough Line

Scale 1:2500

8.3.2 Campbellville Road from Centre Street to Milburough Line

Advantage: This road section has no obvious advantages.

Disadvantages: The existing vertical profile along Campbellville Road was reviewed in detail. There are several significant grades between Centre Street and Milburough Line.

Exhibit 8-5 through **Exhibit 8-9** show the existing grade and the proposed grade design for a posted speed limit of 70 km/h and a design speed of 80 km/h. Just east of Centre Road between Station 2+660 and Station 3+160, the grade is +8.75 percent. Between Station 3+200 and Station 3+500, the grade is -12.65 percent. From Station 4+800 to Station 5+360, the grade is +6.35 percent. The grade then drops to -8.20 percent between Station 5+360 and Station 5+560. The grade from Station 5+560 to Station 5+700 drops to -10.85 percent.

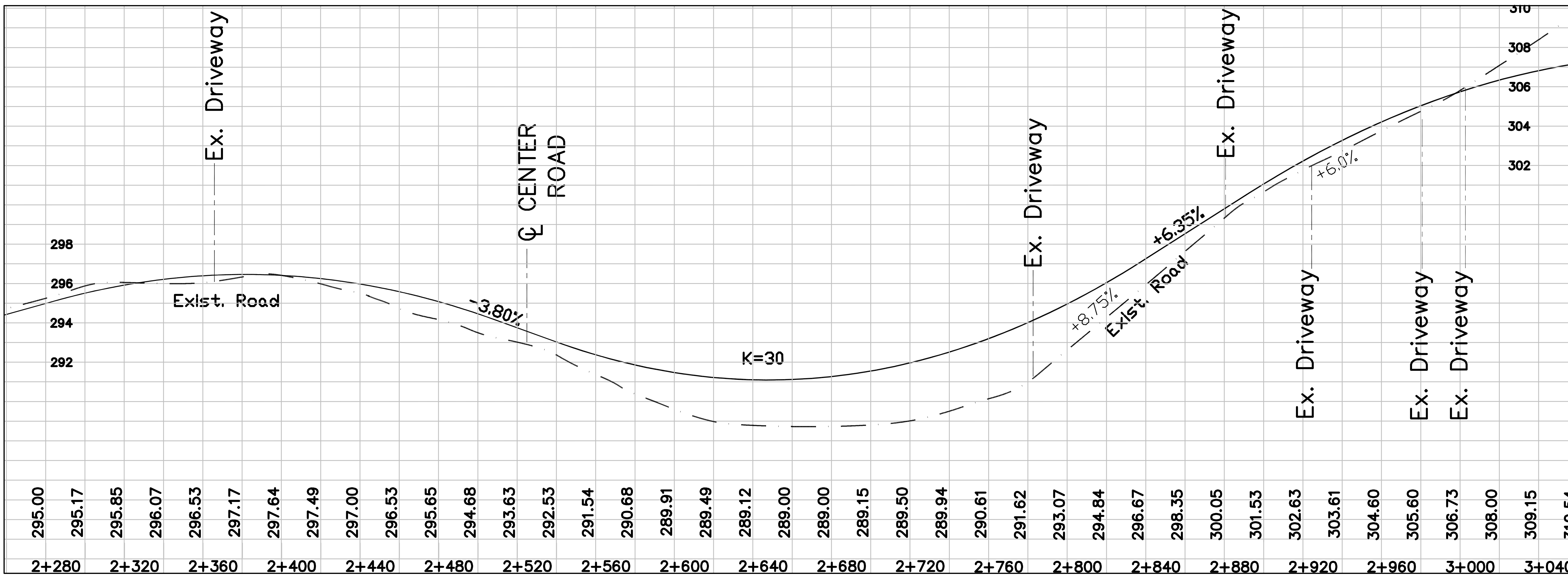
The proposed road grade will improve the vertical alignment, but would impact 34 residential driveways, 21 of which would be severely impacted by the road reconstruction. **Table 8 - 1** shows the impact road reconstruction on the driveways. The 34 driveways are grouped by Station section. The severity of the impact increases for driveways that are short in length and for driveways located where the differential between the existing and the proposed grade is large. Intense grading on this route will impact numerous properties and may require property acquisition.

Table 8 - 1: Number of driveways impacted by grading, by Station section

Station No. From	Station No. To	No. of Driveways	No. of Driveways Severely Impacted
2+520	2+660	0	0
2+660	3+160	6	2
3+160	3+720	3	2
3+720	4+200	4	4
4+200	4+420	0	0
4+420	4+720	5	4
4+720	5+360	9	2
5+360	5+840	7	7
Total		**34**	**21**

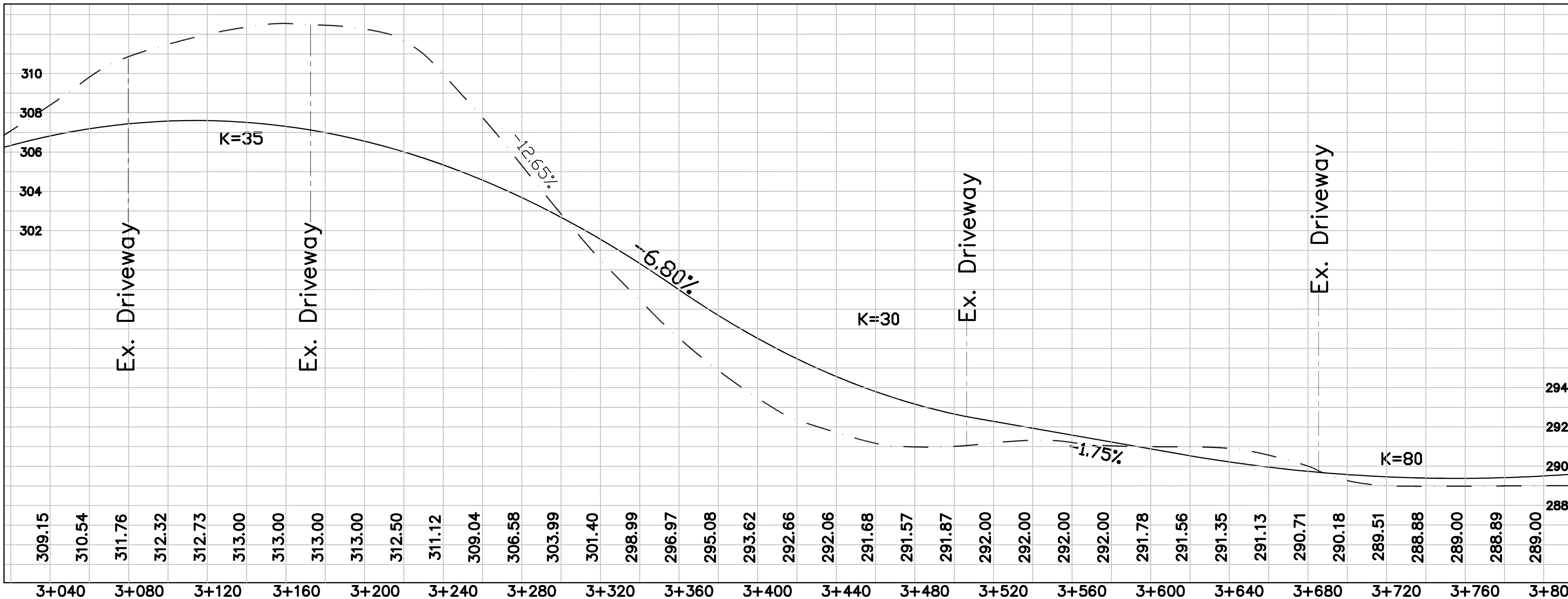
.

Conclusion: Given the large number of residential driveways and properties that would be significantly affected by bringing this stretch of Campbellville Road up to current design standards, it is recommended that this route link not be carried forward.



Design Speed 80 km/h
Posted Speed 70km/h

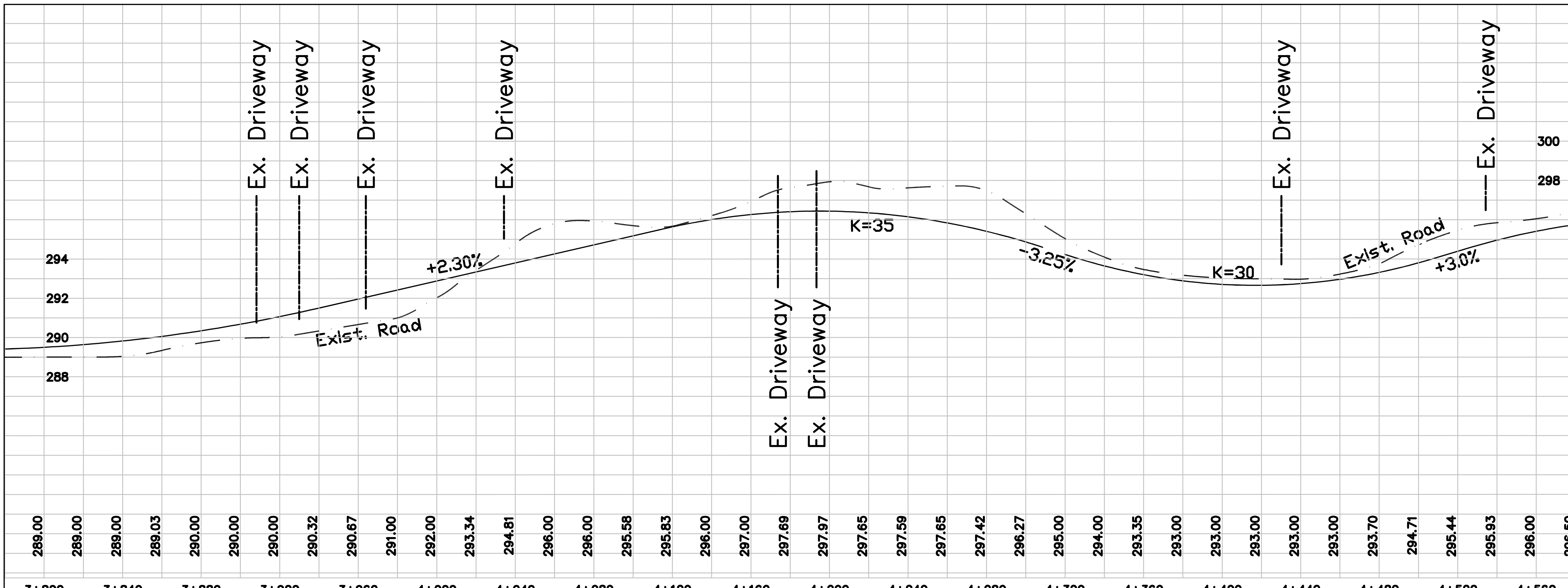
Exhibit 8 - 5 Link 12 - Plate 1
Campbellville Road from Centre Road to Milburough Line
Sta. 2+280 to Sta 3+040



Design Speed 80 km/h
Posted Speed 70km/h

Exhibit 8 - 6 Link 12 - Plate 2
Campbellville Road from Centre Road to Milburough Line
Sta. 3+040 to Sta 3+800

Scale 1:2000



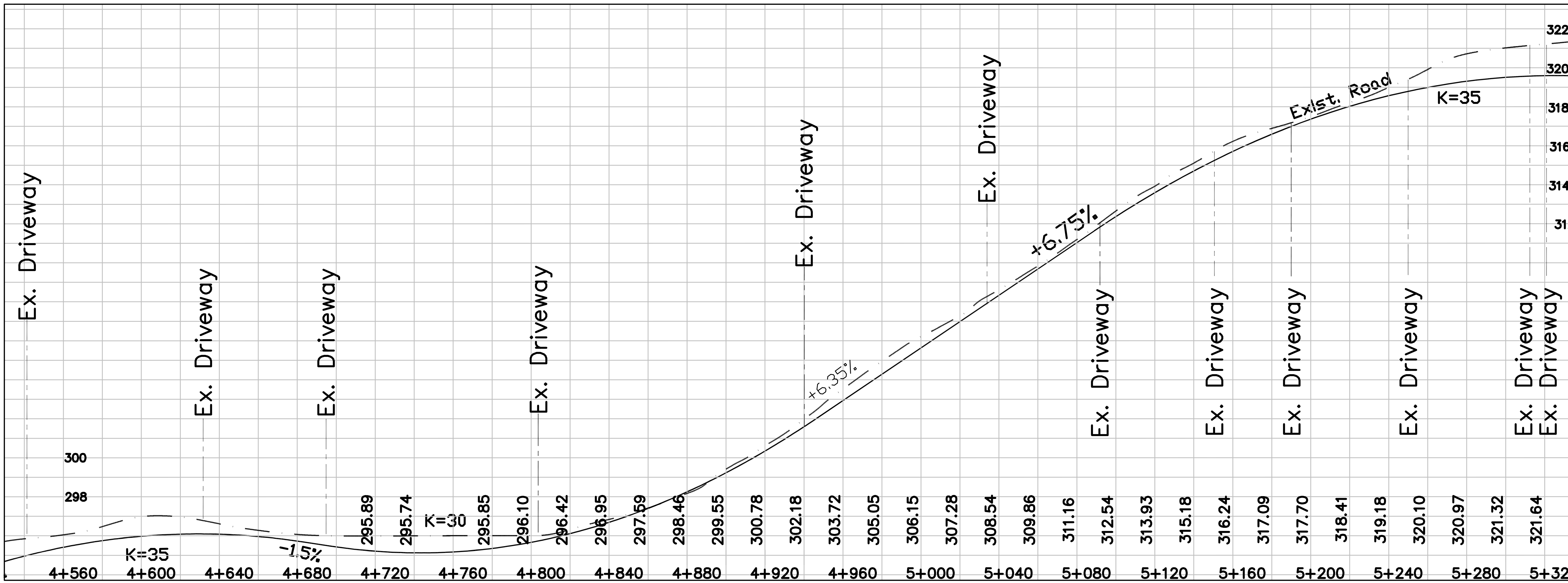
Design Speed 80 km/h
Posted Speed 70km/h

Exhibit 8 - 7 Link 12 - Plate 3
Campbellville Road from Centre Road to Milburough Line
Sta. 3+800 to Sta. 4+560

Scale 1:2000

March 2008

iTRANS



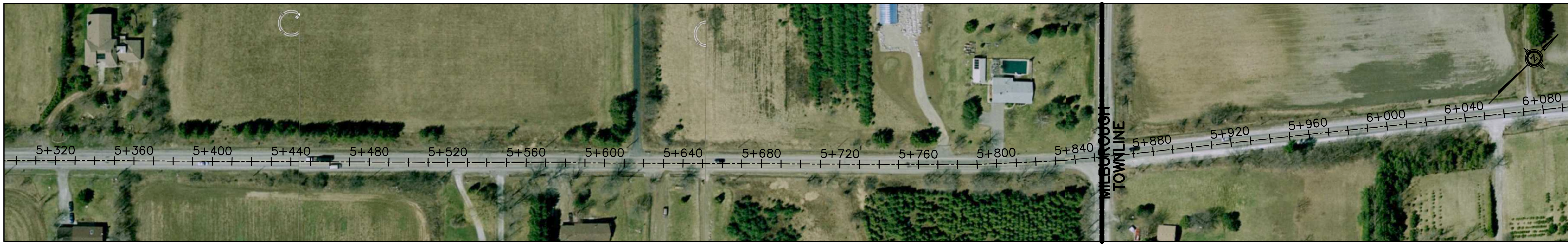
Design Speed 80 km/h
Posted Speed 70km/h

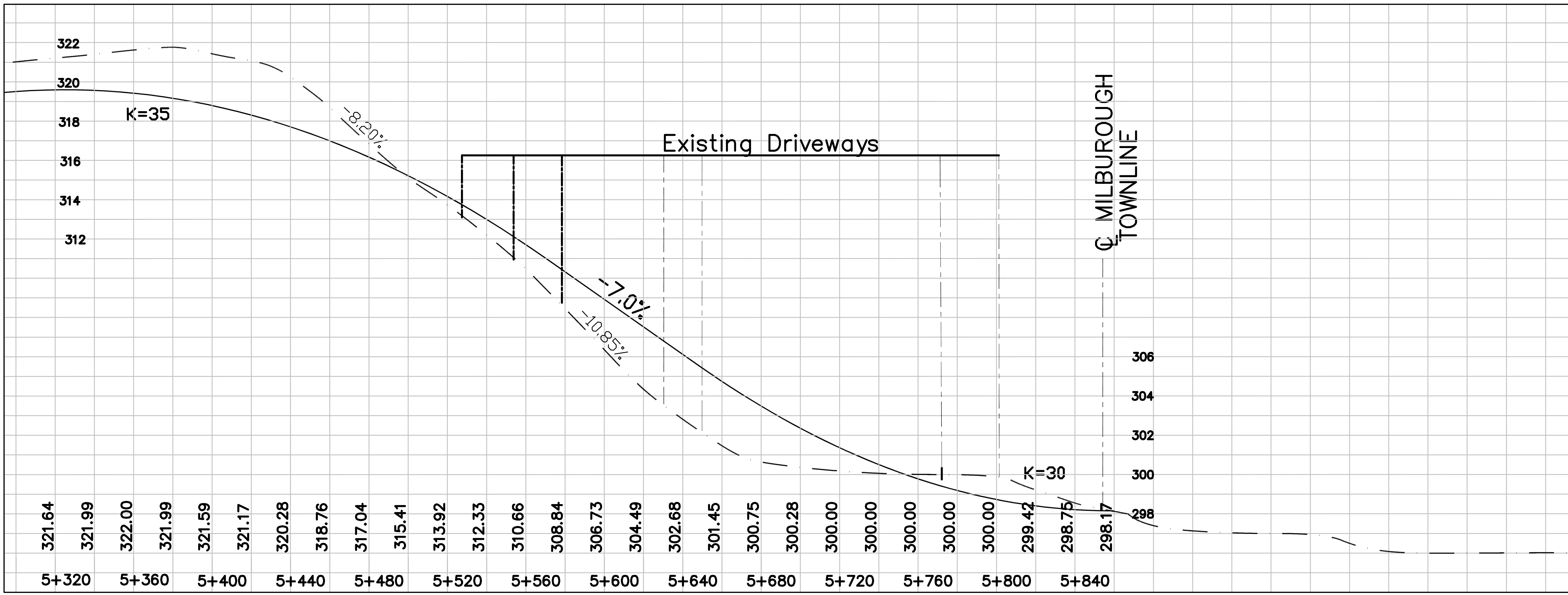
Exhibit 8 - 8 Link 12 - Plate 4
Campbellville Road from Centre Road to Milburough Line
Sta. 4+560 to Sta 5+320

Scale 1:2000

March 2008

iTRANS





Design Speed 80 km/h
Posted Speed 70km/h

Exhibit 8 - 9 Link 12 - Plate 5
Campbellville Road from Centre Road to Milburough Line
Sta.. 5+320 to Sta 6+080

Scale 1:2000

8.4 Qualitative Assessment to Develop Short List of Alternative Haul Routes

8.4.1 Comparison of the Alternative Links near the Intersection of Concession 11E and Milburough Line

Given the location of the proposed site near the intersection of Milburough Line and Concession 11E, the first set of alternative links that were assessed as possible haul route (i.e. connection of links to create a haul route) were: south on Milburough Line, north on Milburough Line, west on Concession 11E, and east on Steeles Avenue.

Steeles Avenue from Milburough Line to Guelph Line was not included in the long list of alternatives because of the substandard visibility along the roadway.

As described in **Section 8.2.2.6,** Milburough Line from Concession 11E to Derry Road was eliminated because of significant engineering and safety deficiencies. An example of the narrow right-of-way and horizontal alignment concerns along this link is illustrated in **Photo 8-56.**

Photo 8-56: Right-of-way and horizontal alignment along Milburough Line between Concession 11E and Derry Road

Milburough Line from Concession 11E to Derry Road is the only reasonable connection to Derry Road. Given this link was eliminated, the links of Derry Road between Milburough Line and Guelph Line and Carlisle Road between Milburough Line and Centre Road become discontinuous routes. Consequently, these two east-west links were also eliminated.

The two short listed links at the Concession 11E and Milburough Line intersection were Milburough Line from Concession 11E to Campbellville Road and Concession 11E from the proposed site to Centre Road. These links have the potential for fewer community and alignment impacts than Steeles or Milburough Line south of Concession 11E. As described in **Section 8.2.2.5** and **Section 8.2.2.12** respectively**,** each link was carried forward to be analyzed as part of the short list of alternatives.

Illustrated in **Photo 8-59** is an example of the straight alignment along Milburough Line between Concession 11E and Campbellville Road. This alignment is likely to offer fewer potential impacts than other possible road sections (such as Milburough Line south of Concession 11E shown in **Photo 8-58** for example).

Photo 8-59: Horizontal Alignment along Milburough Line between Concession 11E and Campbellville Road

8.4.2 Comparison of the Links at the Concession 11E and Centre Road Intersection

Following Concession 11E west, the next set of links that was qualitatively compared to help develop the short list of alternative haul routes was the set of links that intersect at Concession 11E and Centre Road. These links are Centre Road north to Campbellville Road, Concession 11E west to Highway 6, and Centre Road south to Carlisle Road.

Of these three links, the only one that was not carried forward to the short list of alternatives was Centre Road south from Concession 11E. As described in **Section 8.2.2.2,** this link was screened out because it passes through the heart of the Carlisle community, including six businesses, two schools and several other community facilities. One of the key criteria in the first stage of screening is to avoid bisecting settlement and built up areas.

As a result of this Centre Road link being eliminated, the following links were subsequently eliminated primarily because they become discontinuous to a 400 series highway: Centre Road (Carlisle Road to Dundas Street), Carlisle Road (Centre Road to Highway 6), Concession 6E (Centre Road to Highway 6), Parkside Drive (Evans Road to Highway 6), Dundas Street (Guelph Line to Highway 6), and Brant Street (Dundas Street to Highway 407).

The three other links at the Concession 11E and Centre Road intersection were carried forwared to the short list of alternatives. As described in **Section 8.2.2.17,** Concession 11E from Centre Road to Highway 6 has a suitable horizontal alignment and no significant engineering deficiencies. As described in **Section 8.2.2.1,** a primary advantage of Centre Road from Concession 11E to Campbellville Road is that it is an existing designated truck route. The suitability of Concession 11E from Milburough Line to Centre Road is discussed in **Section 8.2.2.18** and **Section 8.4.1.**

8.4.3 Comparison of the Links at the Miburough Line and Campbellville Intersection

Following Milburough Line north, the set of links that was compared using a qualitative assessment to help develop the short list of alternative haul routes was the three links that intersect at Campbellville Road and Milburough Line. Two of these links were eliminated, Milburough Line from Campbellville Road north to Highway 401 and Campbellville Road from Centre Road to Milburough Line, and the preferred link carried forward was Campbellville Road from Milburough Line east to Twiss Road.

As described in **Section 8.3.1,** Milburough Line from Campbellville Road to Highway 401 was not carried forward because of feasibility concerns for the new Highway 401 interchange and significant property acquisition would be required. A new interchange here would likely change local traffic patterns and result in a high volume of vehicles passing by the Mountsberg Wildlife Centre.

As described in **Section 8.3.2,** Campbellville Road from Milburough Line to Centre Road was not carried forward primarily because of concerns with the vertical profile that would require significant property acquisition and major reconstruction to resolve.

The link that was preferred and carried forward was Campbellville Road from Milburough Line to Twiss Road. As described in **Section 8.2.2.13**, an advantage of this link is that it is an existing truck route.

8.4.4 Qualitative Assessment of Remaining Links

As described in **Section 8.2.2.11**, the link of Campbellville Road from Highway 6 to Centre Road was a suitable haul route and carried forward to the short list primarily because it is a designated truck route and has no significant engineering deficiencies.

Although Highway 6 between Highway 401 and Highway 403 does bisect a number of communities, this highway was preferred and carried forward to the short list because it is a provincial facility and a designated truck route.

The only links that were eliminated from the long list and whose elimination has not been previously discussed in **Sections 8.4.1, 8.4.2** or **8.4.3,** are Concession 12E, Campbellville Road from Twiss Road to Guelph Line, and Guelph Line.

As described in **Section 8.2.2.22**, it is only reasonable to consider Concession 12E a potential haul route if it can provide access between the proposed site and Centre Road. This is not feasible because connection to the proposed site would require Concession 12E to be extended easterly through a protected wetland.

As discussed in **Section 8.2.2.14**, Campbellville Road from Twiss Road to Guelph Line was not carried forward because it bisects the settlement area of the Campbellville community. The link also passes by the Campbellville Conservation Area and there are major physical building constraints at the Guelph Line intersection that would impede truck turning.

The links that were identified and carried forward in part because they by-pass the settlement area of Campbellville and are existing truck routes were Twiss Road from Campbellville Road to Reid Sideroad (described in **Section 8.2.2.26**) and Reid Sideroad from Twiss Road to Guelph Line (described in **Section 8.2.2.27**). Reid Sideroad has been designed for heavy-truck traffic and has a wide right-of way. This route would allow quarry truck traffic on Reid Sideroad to by-pass the settlement area of Campbellville rather than bisecting the built-up area.

For the assessment of Guelph Line, Reid Sideroad is the only reasonable connection for quarry truck traffic between Guelph Line and the links that have been carried forward. As described in **Section 8.2.2.8,** the Guelph Line link between Reid Sideroad and Derry Road was eliminated because it bisects the settlement area of the Campbellville community. Within Campbellville the link passes by several businesses, two churches, and the Campbellville Ball Park.

Resulting from the elimination of the Guelph Line link from Reid Sideroad to Derry Road, the sections of Guelph Line south of Derry Road were subsequently eliminated.

8.5 Short List of Alternative Haul Routes

Using the information presented in earlier sections, **Exhibit 8-10** shows the short list of alternative haul routes. The routes are shown in green. The eliminated links are shown as a faint red line.

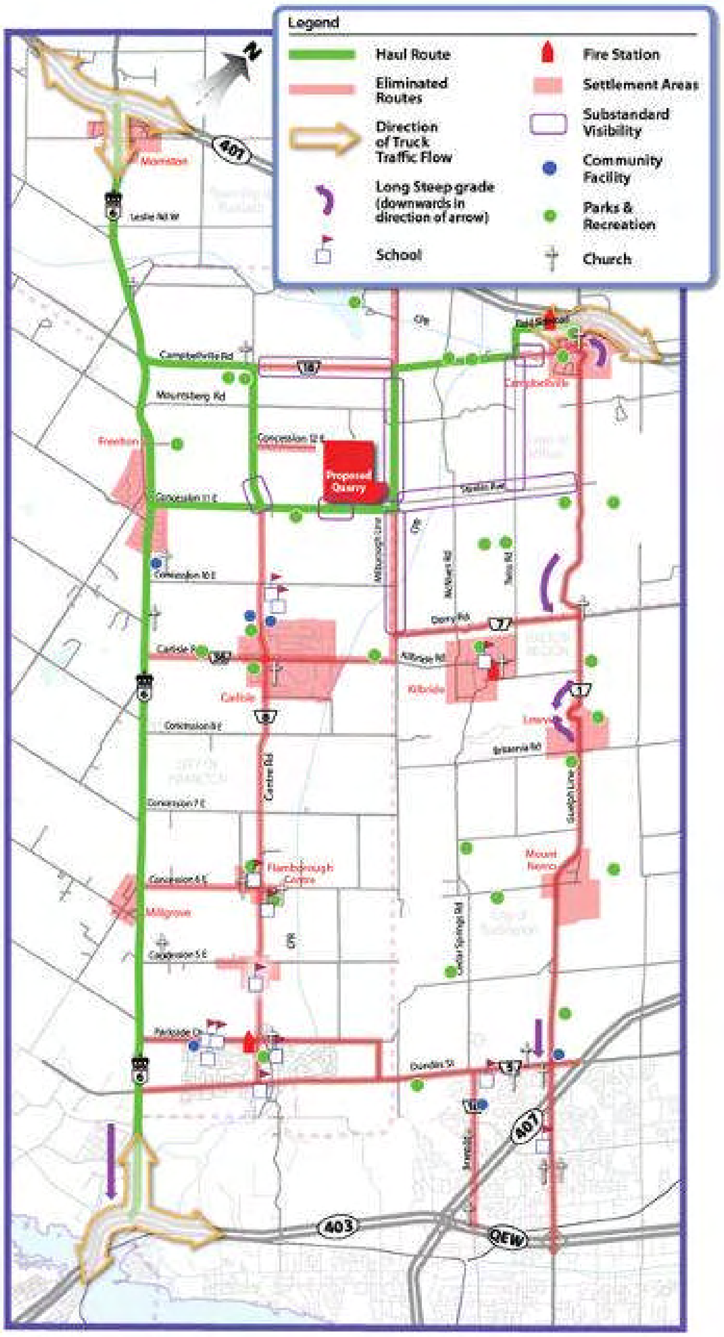


Exhibit 8-10: Short List of Alternative Haul Routes

8.6 Haul Route Alternatives

The links that have been carried forward to the short list were combined in all reasonable combinations that would provide a direct and complete haul route between the proposed quarry and the 400 series highways. These combined short listed links have been developed into five potential haul routes. Three of the routes are distinct alternative haul routes, and two of the routes are combination haul routes.

This Section describes each potential haul route in turn:

- Alternative Haul Route 1 – **Section 8.6.1, Exhibit 8-11**
- Alternative Haul Route 2 – **Section 8.6.2, Exhibit 8-12**
- Alternative Haul Route 3 – **Section 8.6.3, Exhibit 8-13**
- Alternative Haul Route 4 – **Section 8.6.4, Exhibit 8-14**
- Alternative Haul Route 5 – **Section 8.6.5, Exhibit 8-15**

The five potential haul routes are carried forward for detailed analysis in the haul route study.

8.6.1 Alternative Haul Route 1

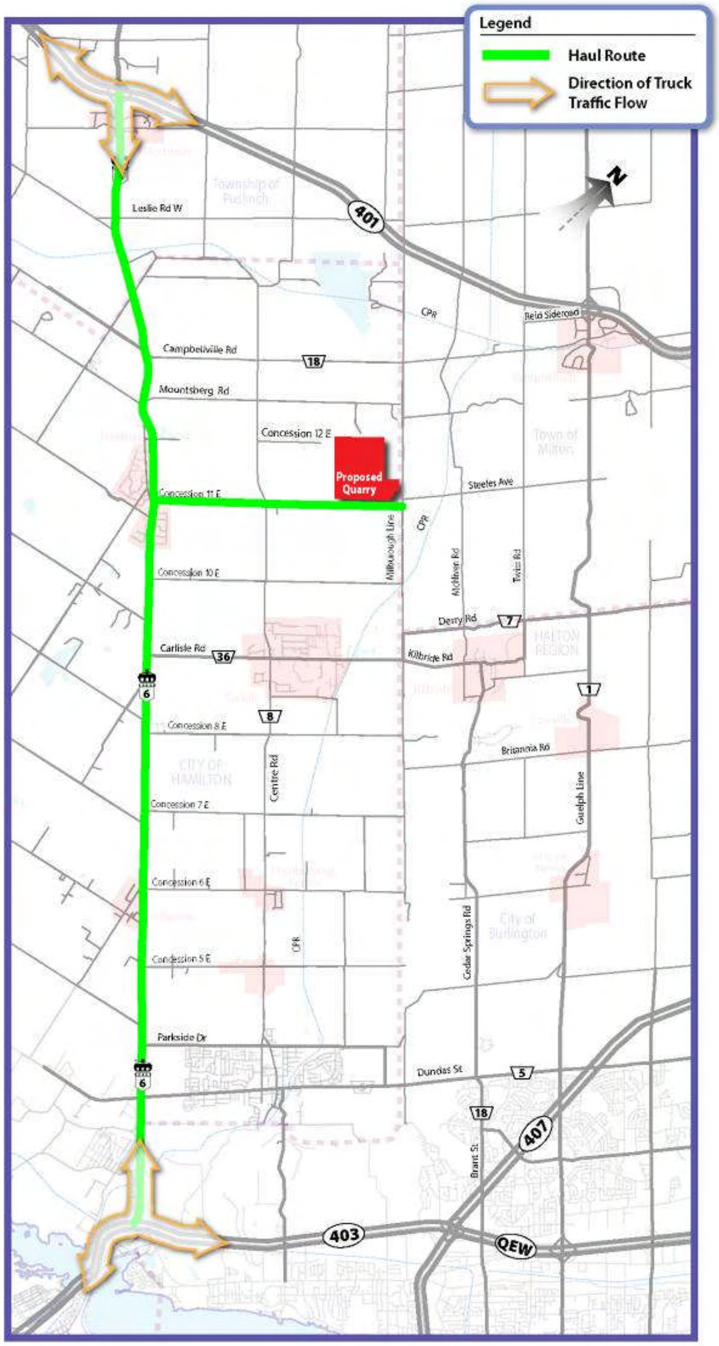


Exhibit 8-11: Potential Alternative Haul Route 1

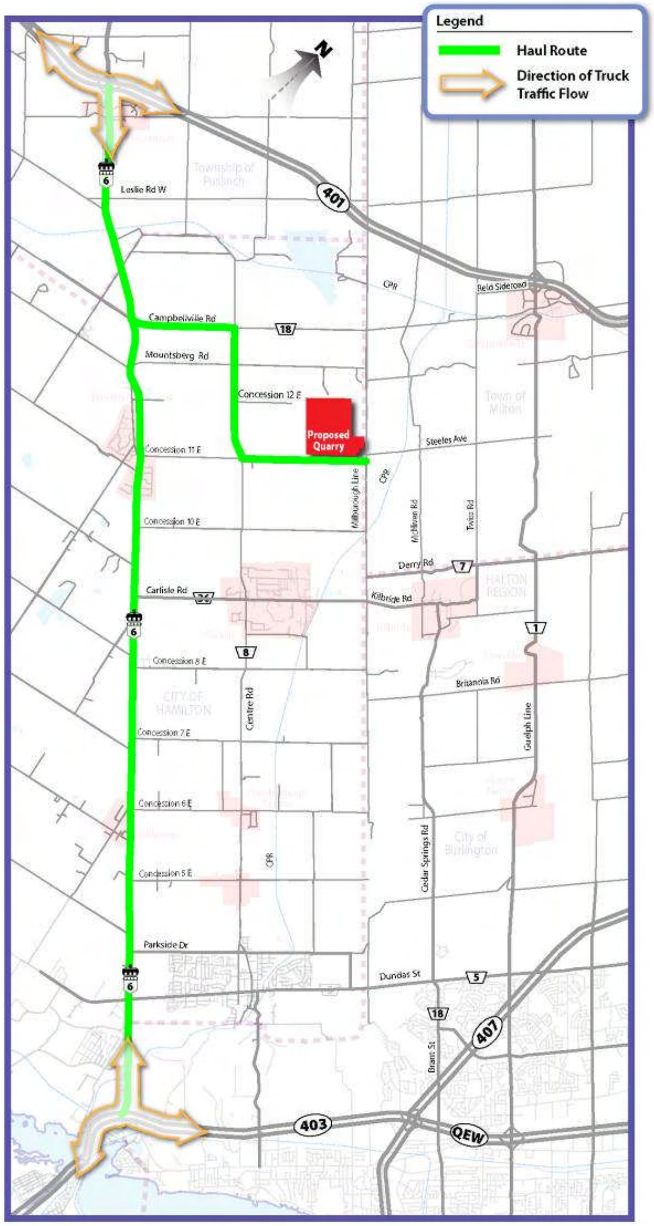
In the case of Alternative Haul Route 1, truck traffic destined for Highway 401 east would travel west on Concession 11 E, and then north on Highway 6 to the Highway 401 eastbound on-ramp.

Truck traffic destined for Highway 401 west would travel west on Concession 11 E, and then north on Highway 6 to the Highway 401 westbound on-ramp.

Truck traffic destined for Highway 403 east would travel west on Concession 11 E, and then south on Highway 6 to the Highway 403/QEW eastbound on-ramp.

Finally, truck traffic destined for Highway 403 west would travel west on Concession 11 E, and then south on Highway 6 to the Highway 403/QEW westbound on-ramp.

8.6.2 Alternative Haul Route 2



In the case of Alternative Haul Route 2 truck traffic destined for Highway 401 east would travel west on Concession 11 E, then north on Centre Road, west on Campbellville, and north on Highway 6 to the Highway 401 eastbound on-ramp.

Truck traffic destined for Highway 401 west would travel west on Concession 11 E, then north on Centre Road, west on Campbellville, and north on Highway 6 to the Highway 401 westbound on-ramp.

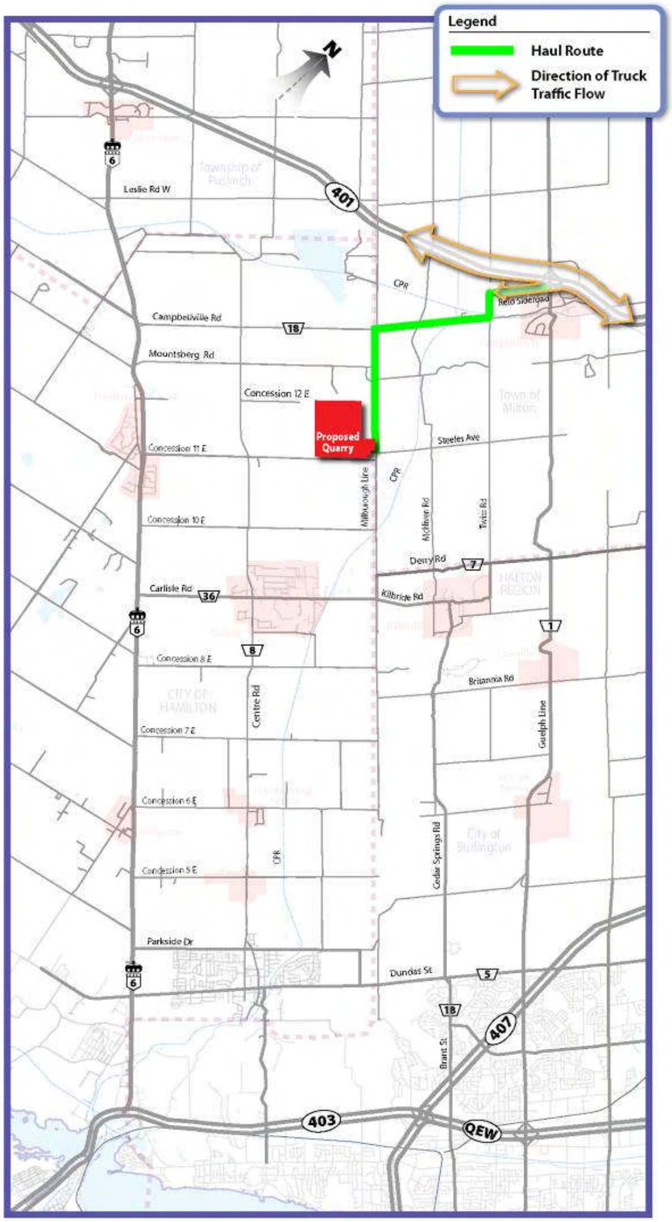
Truck traffic destined for Highway 403 east would travel west on Concession 11 E, then north on Centre Road, west on Campbellville, and south on Highway 6 to the Highway 403/QEW eastbound on-ramp.

Finally, truck traffic destined for Highway 403 west would travel west on Concession 11 E, north on Centre Road, west on Campbellville, and south on Highway 6 to the Highway 403 /QEW westbound on-ramp.

Exhibit 8-12: Potential Alternative Haul Route 2

8.6.3 Alternative Haul Route 3

In the case of Alternative Haul Route 3, truck traffic destined for Highway 401 east would travel north on Milburough Line, then east on Campbellville Road, north on Twiss Road, and east on Reid Sideroad to the Highway 401 eastbound on-ramp.



Truck traffic destined for Highway 401 west would travel north on Milburough Line, then east on Campbellville Road, north on Twiss Road, east on Reid Sideroad and north on Guelph Line to the Highway 401 westbound on-ramp

Truck traffic destined for Highway 403/QEW east would travel north on Milburough Line, then east on Campbellville Road, north on Twiss Road, and east on Reid Sideroad to the Highway 401 eastbound on-ramp. From here, there are several alternatives to reach the destination including taking the 407 ETR south to Highway 403.

Finally, truck traffic destined for Highway 403 west would travel north on Milburough Line, east on Campbellville Road, north on Twiss Road, and east on Reid Sideroad to the Highway 401. From here, there are several alternatives to reach the destination including taking the 407 ETR southwest or Highway 6 south to the 403/QEW.

Exhibit 8-13: Potential Alternative Haul Route 3

8.6.4 Alternative Haul Route 4

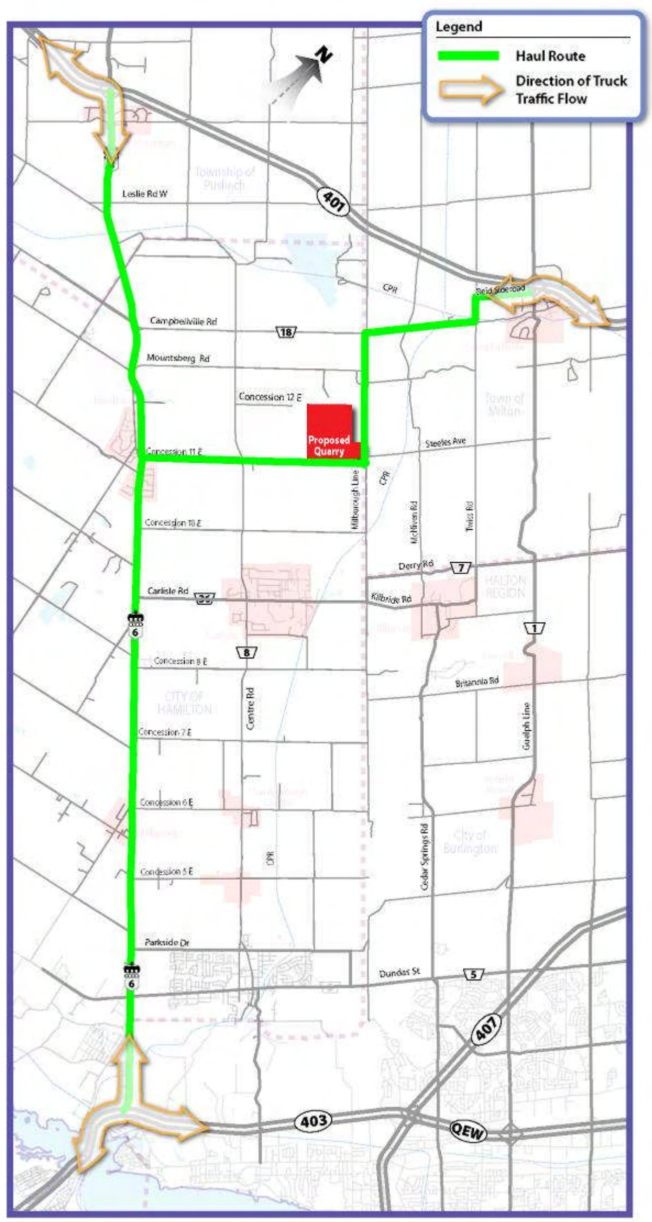


Exhibit 8-14: Potential Alternative Haul Route 4

In the case of Alternative Haul Route 4, truck traffic destined for Highway 401 east would travel north on Milburough Line, then east on Campbellville Road, north on Twiss Road, and east on Reid Sideroad to the Highway 401 eastbound on-ramp.

Truck traffic destined for Highway 401 west would travel west on Concession 11 E, and then north on Highway 6 to the Highway 401 westbound on-ramp.

Truck traffic destined for Highway 403 east would travel west on Concession 11 E, and then south on Highway 6 to the Highway 403 eastbound on-ramp.

Finally, truck traffic destined for Highway 403 west would travel west on Concession 11 E, and then south on Highway 6 to the Highway 403 westbound on-ramp.

8.6.5 Alternative Haul Route 5

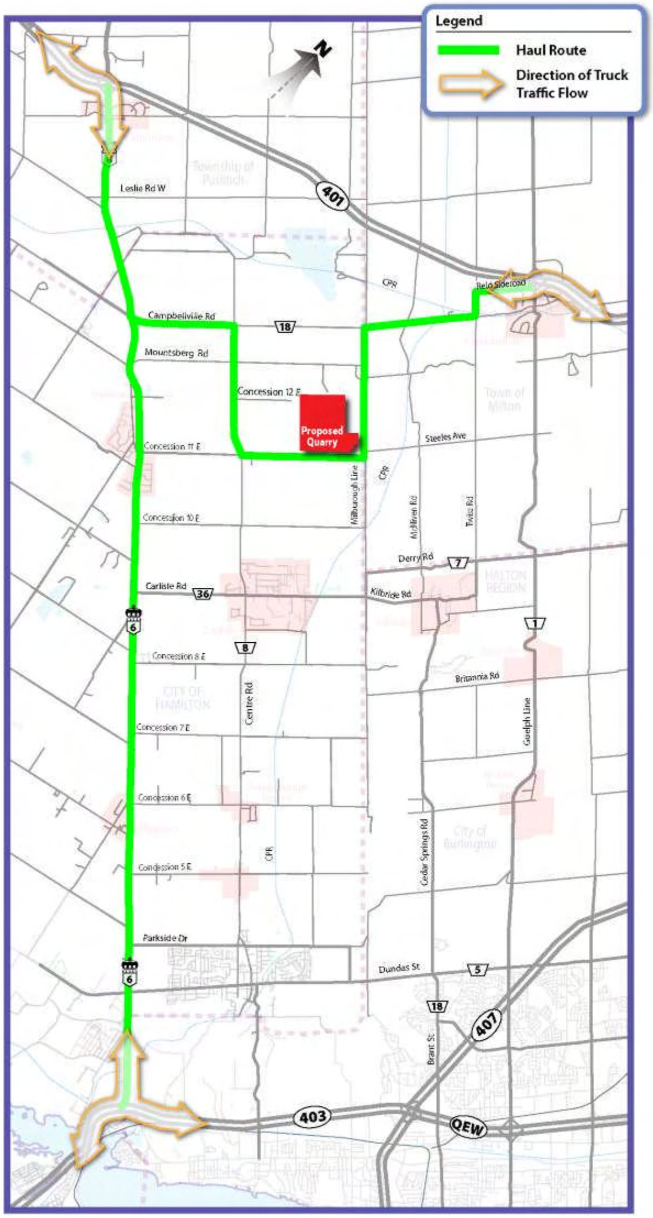


Exhibit 8-15: Potential Alternative Haul Route 5

In the case of Alternative Haul Route 5, truck traffic destined for Highway 401 east would travel north on Milburough Line, then east on Campbellville Road, north on Twiss Road, and east on Reid Sideroad to the Highway 401 eastbound on-ramp.

Truck traffic destined for Highway 401 west would travel west on Concession 11 E, then north on Centre Road, then west on Campbellville, and then north on Highway 6 to the Highway 401 westbound on-ramp.

Truck traffic destined for Highway 403 east would travel west on Concession 11 E, then north on Centre Road, west on Campbellville, and south on Highway 6 to the Highway 403/QEW eastbound on-ramp.

Finally, truck traffic destined for Highway 403 west would travel west on Concession 11 E, then north on Centre Road, west on Campbellville, and south on Highway 6 to the Highway 403 /QEW westbound on-ramp.

Exhibit 8-15: Potential Alternative Haul Route 5

9. DESCRIPTIONS OF THE 5 ALTERNATIVE HAUL ROUTES

The links that have been carried forward to the short list were combined in all reasonable combinations that would provide a direct and complete haul route between the proposed quarry and the 400 series highways. These combined short listed links have been developed into five potential haul routes. Three of the routes are distinct alternative haul routes, and two of the routes are combination haul routes. The five potential haul routes were carried forward for detailed analysis in the haul route study.

9.1 Location and Travel Directions of the 5 Alternative Haul Routes

This Section describes the route location and quarry truck travel directions for each alternative haul route in turn:

- Alternative Haul Route 1 – **Section 9.1.1, Exhibit 9-1**
- Alternative Haul Route 2 – **Section 9.1.2, Exhibit 9-2**
- Alternative Haul Route 3 – **Section 9.1.3, Exhibit 9-3**
- Alternative Haul Route 4 – **Section 9.1.4, Exhibit 9-4**
- Alternative Haul Route 5 – **Section 9.1.5, Exhibit 9-5**

9.1.1 Alternative Haul Route 1

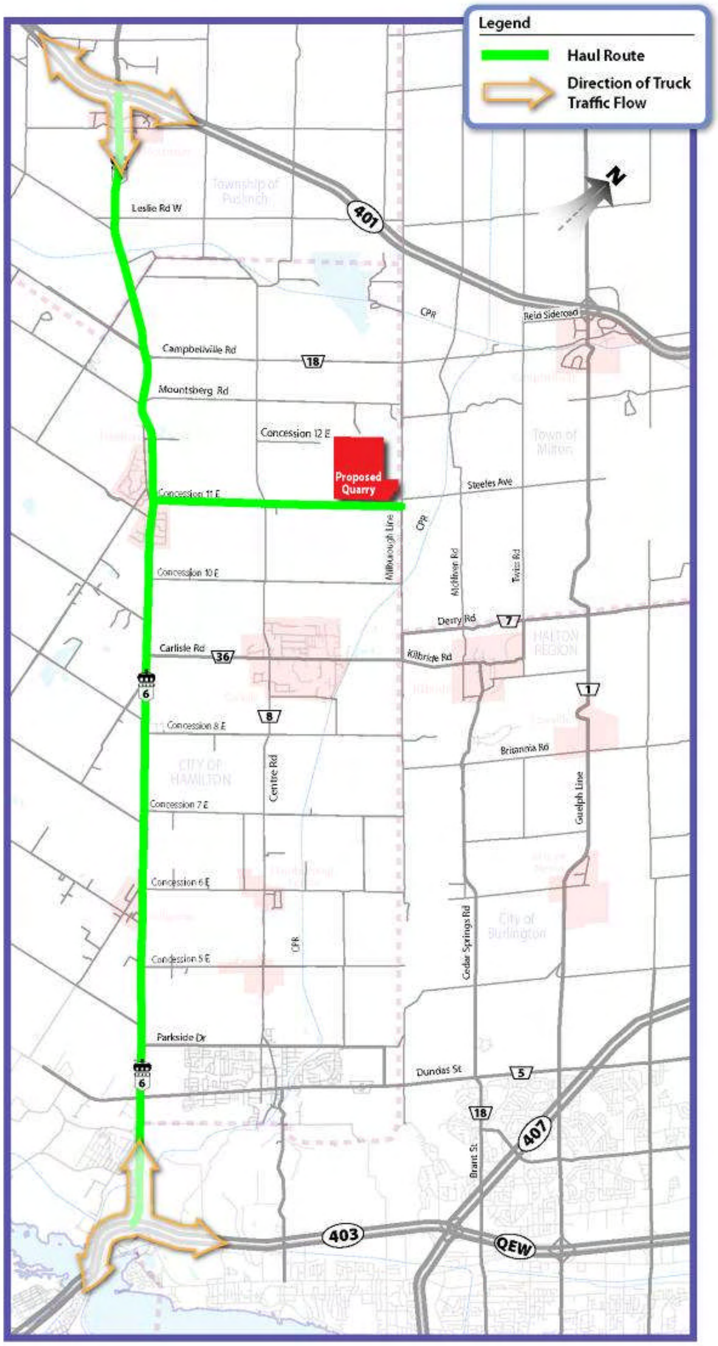


Exhibit 9-1: Potential Alternative Haul Route 1

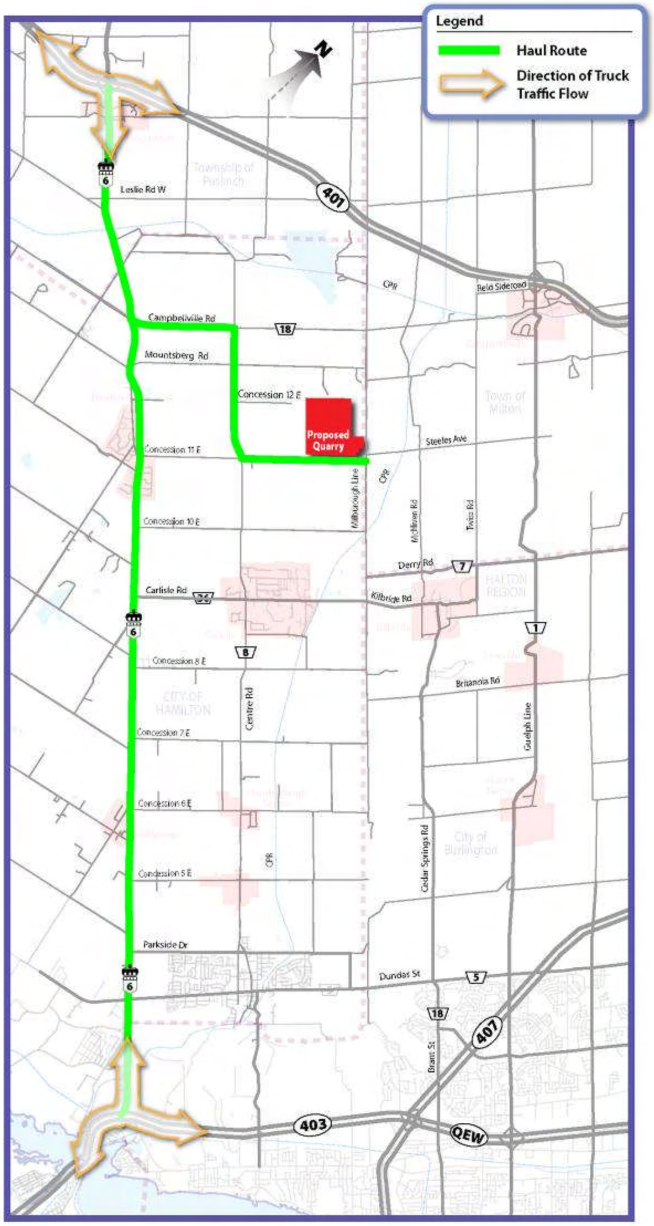
In the case of Alternative Haul Route 1, truck traffic destined for Highway 401 east would travel west on Concession 11 E, and then north on Highway 6 to the Highway 401 eastbound on-ramp.

Truck traffic destined for Highway 401 west would travel west on Concession 11 E, and then north on Highway 6 to the Highway 401 westbound on-ramp.

Truck traffic destined for Highway 403 east would travel west on Concession 11 E, and then south on Highway 6 to the Highway 403/QEW eastbound on-ramp.

Finally, truck traffic destined for Highway 403 west would travel west on Concession 11 E, and then south on Highway 6 to the Highway 403/QEW westbound on-ramp.

9.1.2 Alternative Haul Route 2



In the case of Alternative Haul Route 2 truck traffic destined for Highway 401 east would travel west on Concession 11 E, then north on Centre Road, west on Campbellville Road, and north on Highway 6 to the Highway 401 eastbound on-ramp.

Truck traffic destined for Highway 401 west would travel west on Concession 11 E, then north on Centre Road, west on Campbellville Road, and north on Highway 6 to the Highway 401 westbound on-ramp.

Truck traffic destined for Highway 403 east would travel west on Concession 11 E, then north on Centre Road, west on Campbellville Road, and south on Highway 6 to the Highway 403/QEW eastbound on-ramp.

Finally, truck traffic destined for Highway 403 west would travel west on Concession 11 E, north on Centre Road, west on Campbellville Road, and south on Highway 6 to the Highway 403 /QEW westbound on-ramp.

Exhibit 9-2: Potential Alternative Haul Route 2

9.1.3 Alternative Haul Route 3

In the case of Alternative Haul Route 3, truck traffic destined for Highway 401 east would travel north on Milburough Line, then east on Campbellville Road, north on Twiss Road, and east on Reid Sideroad to the Highway 401 eastbound on-ramp.

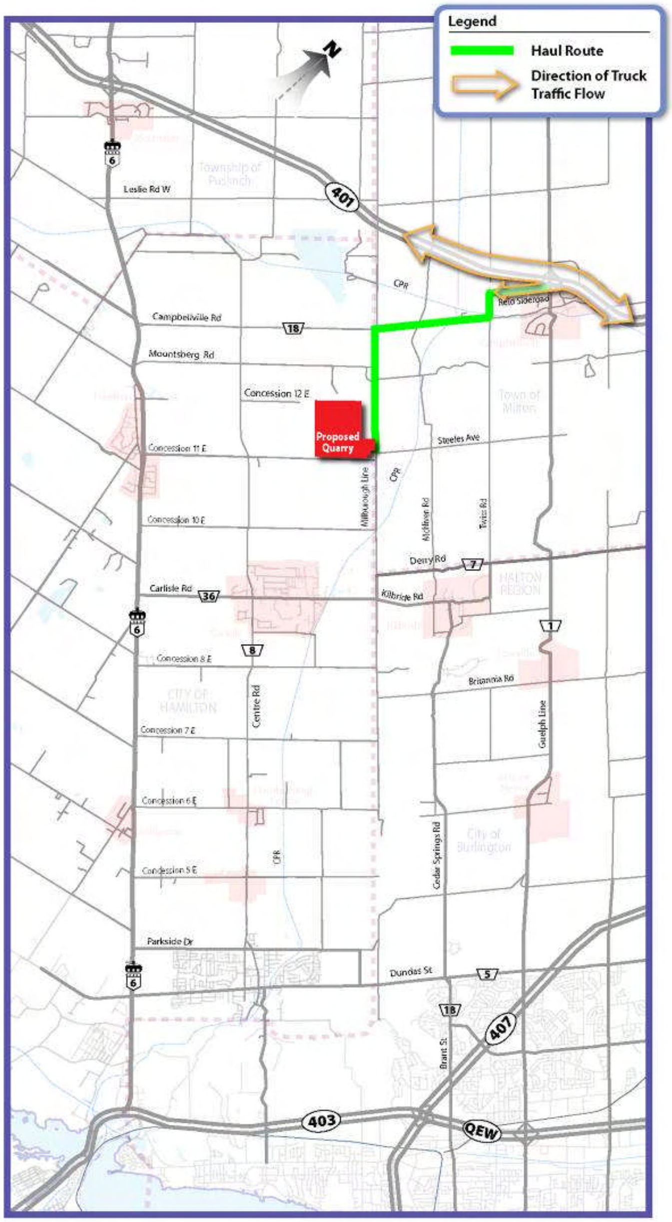


Exhibit 9-3: Potential Alternative Haul Route 3

Truck traffic destined for Highway 401 west would travel north on Milburough Line, then east on Campbellville Road, north on Twiss Road, east on Reid Sideroad and north on Guelph Line to the Highway 401 westbound on-ramp

Truck traffic destined for Highway 403/QEW east would travel north on Milburough Line, then east on Campbellville Road, north on Twiss Road, and east on Reid Sideroad to the Highway 401 eastbound on-ramp. From here, there are several alternatives to reach the destination including taking the 407 ETR south to Highway 403.

Finally, truck traffic destined for Highway 403 west would travel north on Milburough Line, east on Campbellville Road, north on Twiss Road, and east on Reid Sideroad to the Highway 401. From here, there are several alternatives to reach the destination including taking the 407 ETR southwest or Highway 6 south to the 403/QEW.

9.1.4 Alternative Haul Route 4

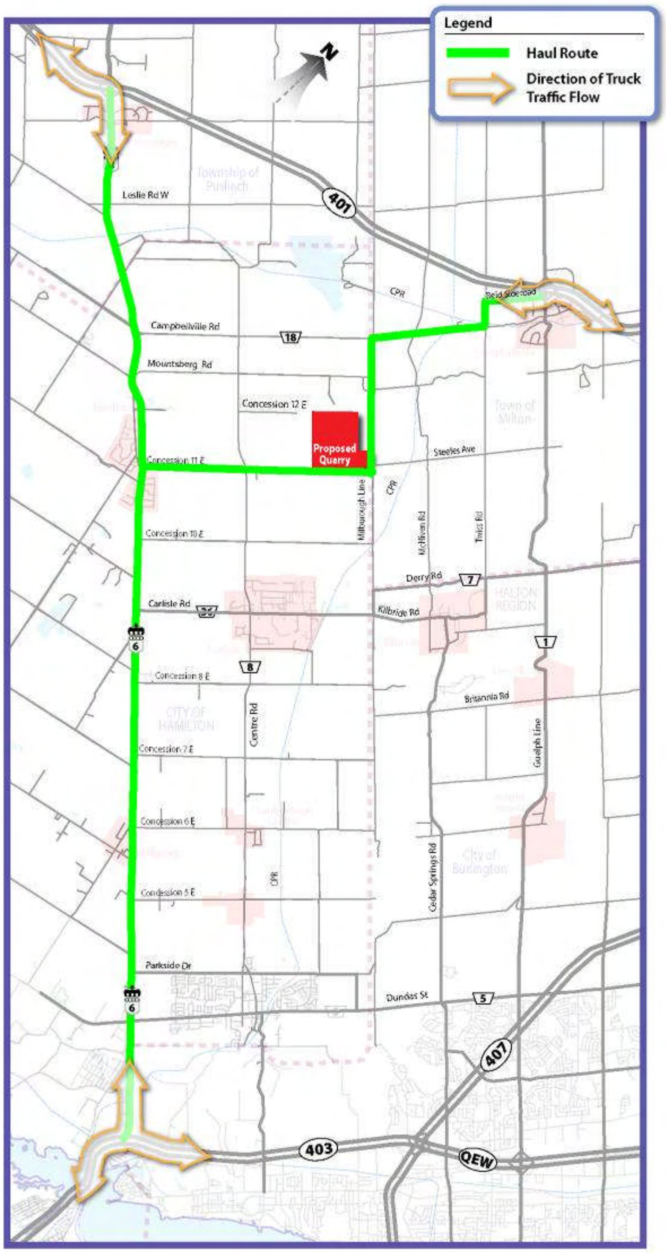


Exhibit 9-4: Potential Alternative Haul Route 4

In the case of Alternative Haul Route 4, truck traffic destined for Highway 401 east would travel north on Milburough Line, then east on Campbellville Road, north on Twiss Road, and east on Reid Sideroad to the Highway 401 eastbound on-ramp.

Truck traffic destined for Highway 401 west would travel west on Concession 11 E, and then north on Highway 6 to the Highway 401 westbound on-ramp.

Truck traffic destined for Highway 403 east would travel west on Concession 11 E, and then south on Highway 6 to the Highway 403 eastbound on-ramp.

Finally, truck traffic destined for Highway 403 west would travel west on Concession 11 E, and then south on Highway 6 to the Highway 403 westbound on-ramp.

9.1.5 Alternative Haul Route 5

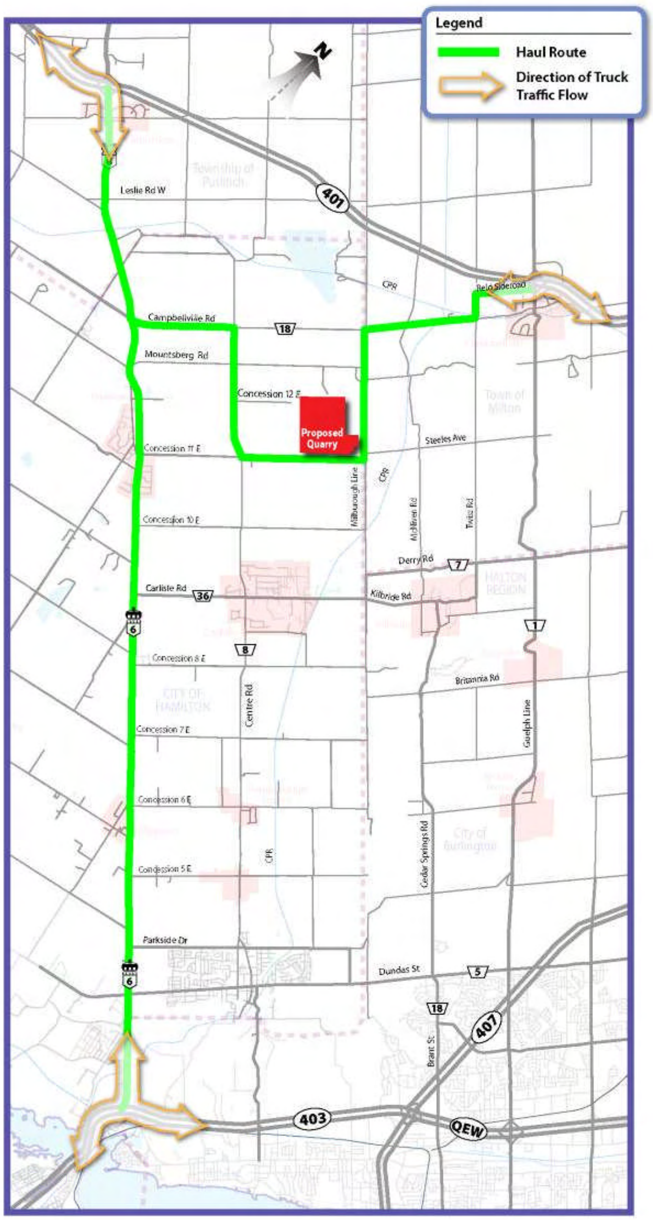


Exhibit 9-5: Potential Alternative Haul Route 5

In the case of Alternative Haul Route 5, truck traffic destined for Highway 401 east would travel north on Milburough Line, then east on Campbellville Road, north on Twiss Road, and east on Reid Sideroad to the Highway 401 eastbound on-ramp.

Truck traffic destined for Highway 401 west would travel west on Concession 11 E, then north on Centre Road, then west on Campbellville Road, and then north on Highway 6 to the Highway 401 westbound on-ramp.

Truck traffic destined for Highway 403 east would travel west on Concession 11 E, then north on Centre Road, west on Campbellville Road, and south on Highway 6 to the Highway 403/QEW eastbound on-ramp.

Finally, truck traffic destined for Highway 403 west would travel west on Concession 11 E, then north on Centre Road, west on Campbellville Road, and south on Highway 6 to the Highway 403 /QEW westbound on-ramp.

9.2 Recommended Site Access Location(s) for Each Alternative Haul Route

The proposed location of the site access or accesses for the five alternative haul routes are shown in **Table 9-1**.

Table 9-1: Site Access Location(s) for Each Alternative Haul Route

Alternative	Site Access Location(s)	Travel Directions
Alternative 1	Concession 11E	The truck traffic would exit from the south side of the proposed site on to Concession 11E and travel westbound to Highway 6.
Alternative 2	Concession 11E	The truck traffic would exit from the south side of the proposed site on to Concession 11E and travel westbound to Centre Road.
Alternative 3	Milburough Line	The truck traffic would exit from the east side of the proposed site onto Milburough Line and travel northbound to Campbellville Road.
Alternative 4	Concession 11E and Milburough Line	Truck traffic destined for Highway 401 east would exit from the east side of the proposed site onto Milburough Line and travel northbound to Campbellville Road. Truck traffic destined for Highway 403 or Highway 401 west would exit from the south side of the proposed site onto Concession 11E and travel westbound to Highway 6.
Alternative 5	Concession 11E and Milburough Line	Truck traffic destined for Highway 401 east would exit from the east side of the proposed site onto Milburough Line and travel northbound to Campbellville Road. Truck traffic destined for Highway 403 or Highway 401 west would exit from the south side of the proposed site onto Concession 11E and travel westbound to Centre Road.

9.2.1 Recommended Design for Site Access on Milburough Line

If Alternative Haul Route 3, 4 or 5 are carried forward as the preferred alternative, it is recommended that a new site access on Milburough Line be implemented. The recommended functional design of this access is illustrated in **Exhibit 9.6**. The proposed location of the access on the west side of Milburough Line is south of Steeles Avenue and approximately 530 m north of Concession 11 E. The access would be a stop controlled T-intersection consisting of two 4.5 m lanes. It is recommended that trucks be prohibited from entering the site from the south and from exiting the site and traveling southbound on Milburough Line. This prohibition would be integrated into the access design using geometric design, concrete curb and gutter on the south edge of the driveway, and raised medians strategically located on Milburough Line and the site access driveway.

The existing vertical profile for Milburough Line will support truck movements and the required sight lines near this access.

Please see the Transportation Report completed by iTRANS (October, 2008) for further details of the site driveway concerning truck queuing before the quarry opens and related acoustical protection along the long quarry entrance road.

Exhibit 9-6: Recommended Design of Site Access on Milburough Line

Given the type of traffic that will be generated by the proposed quarry, the site entrance design is intended to mitigate nuisances to the surrounding residents. It is acknowledged that, in the busy construction season, trucks can arrive very early in the morning to get loaded first. It can mean one extra load a day which can result in more money for the driver/owner. If facilities are not provided, the trucks will be parked on the road with their engines running and the drivers will sleep until the quarry opens, which is an obvious concern of the surrounding neighbours.

The Ministry requires that all licensed sites be fenced for security and that all gates be locked when the quarry is not in open. The hours of operation can state that the quarry may open early to admit trucks only, but if this is the case, someone must be there to open the gate and monitor the trucks and drivers.

To account for this scenario St. Marys is proposing a long entrance road which includes significant acoustical protection (**Exhibit 9-7:** Illustration of the proposed site driveway on Milburough Line**7**). At this time, it is proposed that the entrance gate be located at the western end of the haul road where the quarry property starts this way the gate can stay locked. The trucks can line up on the internal entrance road and the site will remain secure. The entrance road is approximately 777m long of which 650m would be well shielded visually or acoustically. This design can easily accommodate more than 40 trucks during the morning queuing scenario.

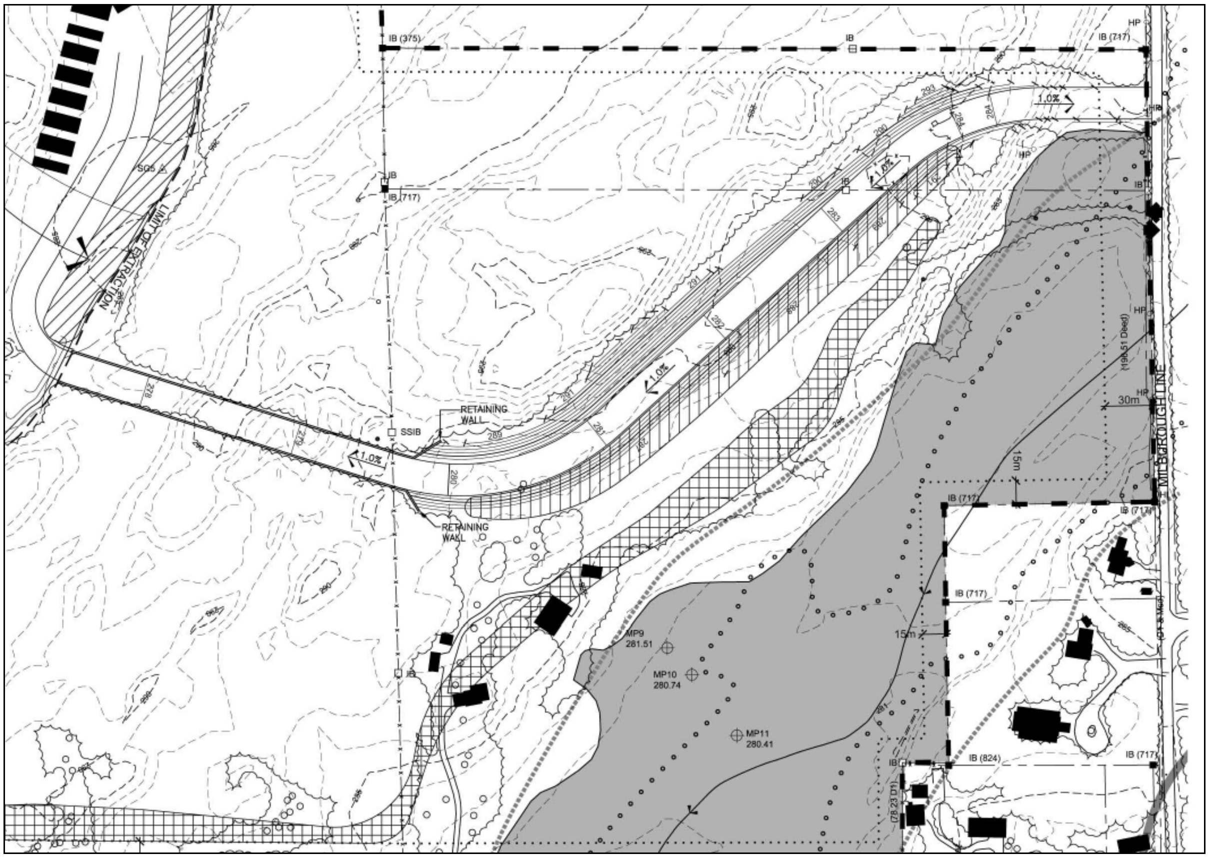


Exhibit 9-7: Illustration of the proposed site driveway on Milburough Line

9.2.2 Recommended Design for Site Access on Concession 11E

If Alternative Haul Routes1, 2, 4 or 5 are carried forward as the preferred alternative, it is recommended that the following road alterations be implemented for the site access on Concession 11 E. The recommended functional design of this access is illustrated in **Exhibit 9-8:** Recommended Design of Site Access on Concession 11 **8.** The proposed location for the site access on the west side of Concession 11E is approximately 810 m west of Milburough Line. The access would be a stop controlled T-intersection consisting of two 4.5 m lanes. It is recommended that trucks be prohibited from entering the site from the east and from exiting the site and traveling eastbound on Concession 11 E. This prohibition would be integrated into the access designed using geometric design, concrete curb and gutter on the east edge of the driveway, and raised medians strategically located on Conession 11 E and the site access driveway.

As illustrated in **Exhibit 9-8:** Recommended Design of Site Access on Concession 11 **8,** vertical profile alterations for Concession 11 E are recommended in order to obtain the required sight distances for trucks. This recommended alterations includes lowering the elevation of Concession 11 E by 0.6m slightly east of the proposed site access.

The recommended site access design and vertical profile alterations would not impede access to the two private driveways near the access on the south side of Concession 11 E.

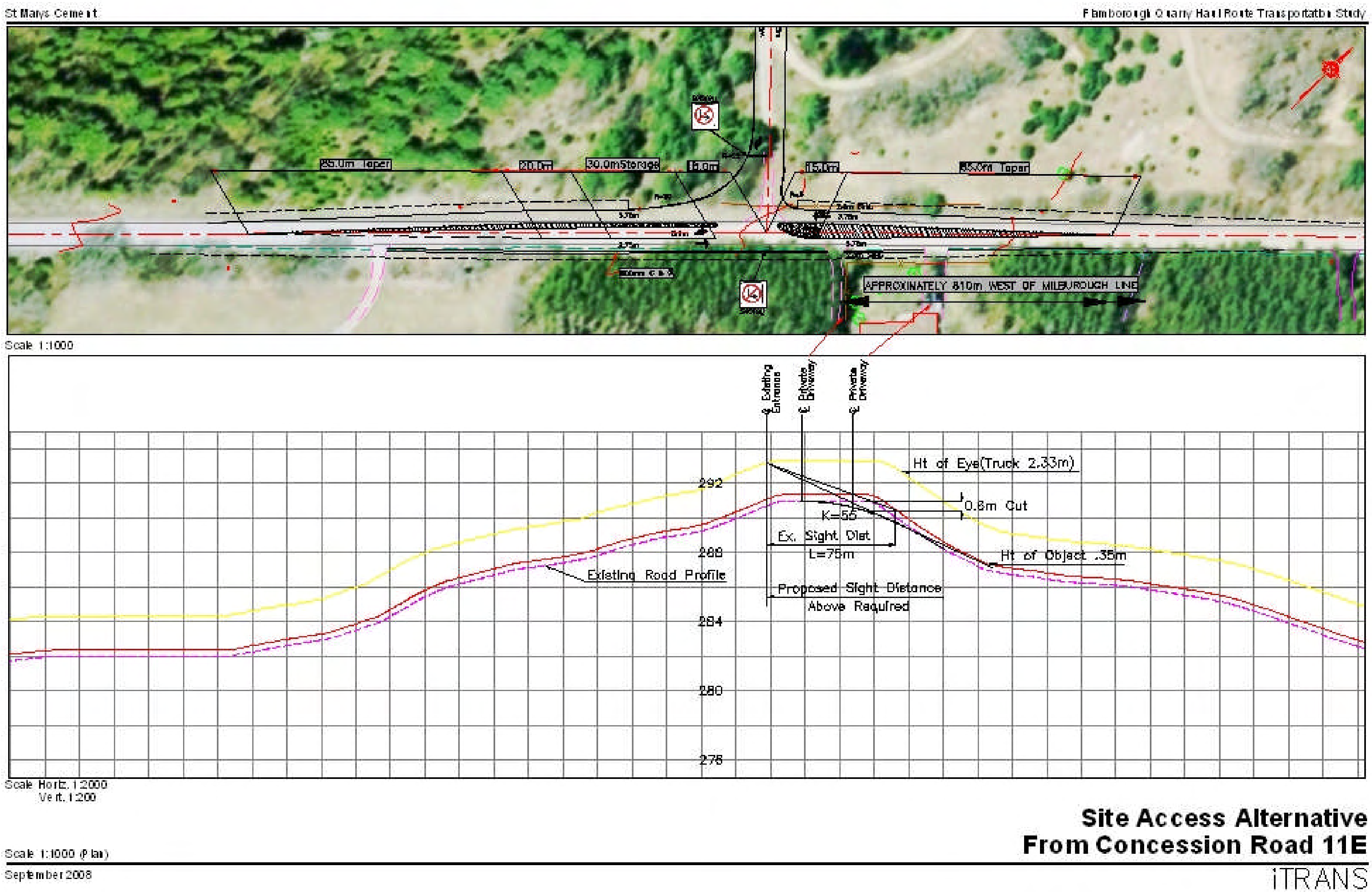


Exhibit 9-8: Recommended Design of Site Access on Concession 11

9.3 Assumed Road Network Alterations

The following road network improvements were assumed to have been implemented for the traffic analysis of each alternative haul route. These assumed improvements enable the analysis to be conducted under more reasonable conditions under which each alternative haul route would operate.

9.3.1 Alternative 1 - Assumed Road Network Alterations

Alternative Haul Route 1 was analyzed with the assumption that the changes shown in **Table 9-2** are implemented.

Table 9-2: Alternative 1 Assumed Road Network Alterations

Intersection	Assumed Alterations
Highway 6 & Concession 11 E	▪ Exclusive westbound left-turn lane ▪ Exclusive westbound right-turn lane ▪ New signal, 80 second cycle length, 100 second cycle length for 2031 AM Peak hour
Highway 6 & Highway 401 Eastbound	▪ New phase, Northbound left-turn advance ▪ New phase, Eastbound right-turn overlap
Highway 6 & Carlisle Road	▪ New phase, Southbound left-turn advance
Highway 6 & Concession 6	▪ Cycle length changed, 2031 AM peak hour increased to 100 seconds
Highway 6 & Dundas	▪ Cycle length changed, AM peak hour increased to 120 seconds
Guelph Line & Reid Sideroad	▪ New signal, 90 second cycle length

9.3.2 Alternative 2 - Assumed Road Network Alterations

Alternative Haul Route 2 was analyzed with the assumption that the alterations described in **Table 9-3** are implemented.

Table 9-3: Alternative 2 Assumed Road Network Alterations

Intersection	Assumed Alterations
Highway 6 & Campbellville Road	▪ Exclusive westbound right-turn lane ▪ Signalization ▪ New signal, 90 second cycle length
Campbellville Road & Centre Road	▪ Exclusive eastbound right-turn lane ▪ Exclusive northbound left-turn lane
Concession 11 E & Centre Road	▪ Exclusive southbound left-turn ▪ Exclusive westbound right-turn
Highway 6 & Concession 6	▪ Cycle length changed, 2031 AM peak hour increased to 100 seconds
Highway 6 & Dundas	▪ Cycle length changed, AM peak hour increased to 120 seconds
Guelph Line & Reid Sideroad	▪ New signal, 90 second cycle length
Highway 6 & Highway 401 Eastbound	▪ New phase, Northbound left-turn advance ▪ New phase, Eastbound right-turn overlap
Highway 6 & Carlisle Road	▪ New phase, Southbound left-turn advance

9.3.3 Alternative 3 - Assumed Road Network Alterations

Alternative Haul Route 3 was analyzed with the assumption that the alterations described in **Table 9-4** are implemented.

Table 9-4: Alternative 3 Assumed Road Network Alterations

Intersection	Assumed Alterations
Campbellville Road & Milburough Road	▪ Exclusive westbound left-turn lane ▪ Exclusive northbound right-turn lane
Campbellville Road & Twiss Road	▪ Exclusive eastbound left-turn lane ▪ Exclusive southbound right-turn lane
Highway 6 & Campbellville Road	▪ Exclusive westbound right-turn lane ▪ Signalization ▪ New signal, 90 second cycle length
Campbellville Road & Centre Road	▪ Exclusive eastbound right-turn lane ▪ Exclusive northbound left-turn lane
Concession 11 E & Centre Road	▪ Exclusive southbound left-turn ▪ Exclusive westbound right-turn
Highway 6 & Concession 6	▪ Cycle length changed, 2031 AM peak hour increased to 100 seconds
Highway 6 & Dundas	▪ Cycle length changed, AM peak hour increased to 120 seconds
Guelph Line & Reid Sideroad	▪ Exclusive southbound right-turn ▪ New signal, 90 second cycle length
Highway 6 & Highway 401 Eastbound	▪ New phase, Northbound left-turn advance ▪ New phase, Eastbound right-turn overlap
Highway 6 & Carlisle Road	▪ New phase, Southbound left-turn advance

9.3.4 Alternative 4 - Assumed Road Network Alterations

Alternative Haul Route 4 was analyzed with the assumption that the alterations described in **Table 9-5** are implemented.

Table 9-5: Alternative 4 Assumed Road Network Alterations

Intersection	Assumed Alterations
Highway 6 & Concession 11E	▪ Exclusive westbound left-turn lane ▪ Exclusive westbound right-turn lane ▪ New signal, 80 second cycle length
Campbellville Road & Milburough Road	▪ Exclusive westbound left-turn lane ▪ Exclusive northbound right-turn lane
Campbellville Road & Twiss Road	▪ Exclusive eastbound left-turn lane ▪ Exclusive southbound right-turn lane
Highway 6 & Concession 6	▪ Cycle length changed, 2031 AM peak hour increased to 100 seconds
Highway 6 & Dundas	▪ Cycle length changed, AM peak hour increased to 120 seconds
Guelph Line & Reid Sideroad	▪ Exclusive southbound right-turn ▪ New signal, 90 second cycle length
Highway 6 & Highway 401 Eastbound	▪ New phase, Northbound left-turn advance ▪ New phase, Eastbound right-turn overlap
Highway 6 & Carlisle Road	▪ New phase, Southbound left-turn advance

9.3.5 Alternative 5 - Assumed Road Network Alterations

Alternative Haul Route 5 was analyzed with the assumption that the alterations described in **Table 9-6** are implemented.

Table 9-6: Alternative 5 Assumed Road Network Alterations

Intersection	Assumed Alterations
Campbellville Road & Centre Road	▪ Exclusive eastbound right-turn lane ▪ Exclusive northbound left-turn lane
Concession 11 E & Centre Road	▪ Exclusive southbound left-turn ▪ Exclusive westbound right-turn
Campbellville Road & Milburough Road	▪ Exclusive westbound left-turn lane ▪ Exclusive northbound right-turn lane
Campbellville Road & Twiss Road	▪ Exclusive eastbound left-turn lane ▪ Exclusive southbound right-turn lane
Highway 6 & Campbellville Road	▪ Exclusive westbound right-turn lane ▪ New signal, 90 second cycle length
Highway 6 & Concession 6	▪ Cycle length changed, 2031 AM peak hour increased to 100 seconds
Highway 6 & Concession 6	▪ Cycle length changed, 2031 AM peak hour increased to 100 seconds
Guelph Line & Reid Sideroad	▪ Exclusive southbound right-turn ▪ New signal, 90 second cycle length
Highway 6 & Highway 401 Eastbound	▪ New phase, Northbound left-turn advance ▪ New phase, Eastbound right-turn overlap
Highway 6 & Carlisle Road	▪ New phase, Southbound left-turn advance

9.4 Road Cross-Section Upgrades

The alternative haul routes were each assessed on the basis that the preferred haul route would be upgraded to eliminate any load restrictions and the cross-sections shown in **Exhibit 9-9** would be constructed. The recommended cross section type for each road link for each alternative is shown in **Exhibits 9-10**, **9-11**, and **9-12**.

Applying the Rural Cross-Section that would require land acquisition is a conservative approach for haul route comparative evaluation purposes. The decision on which cross-section to move forward with would be decided at the detailed design stage of an Environmental Assessment when pavement recommendations are finalized. Typically, resolution of the design details would occur during the subsequent Municipal Class EA process.

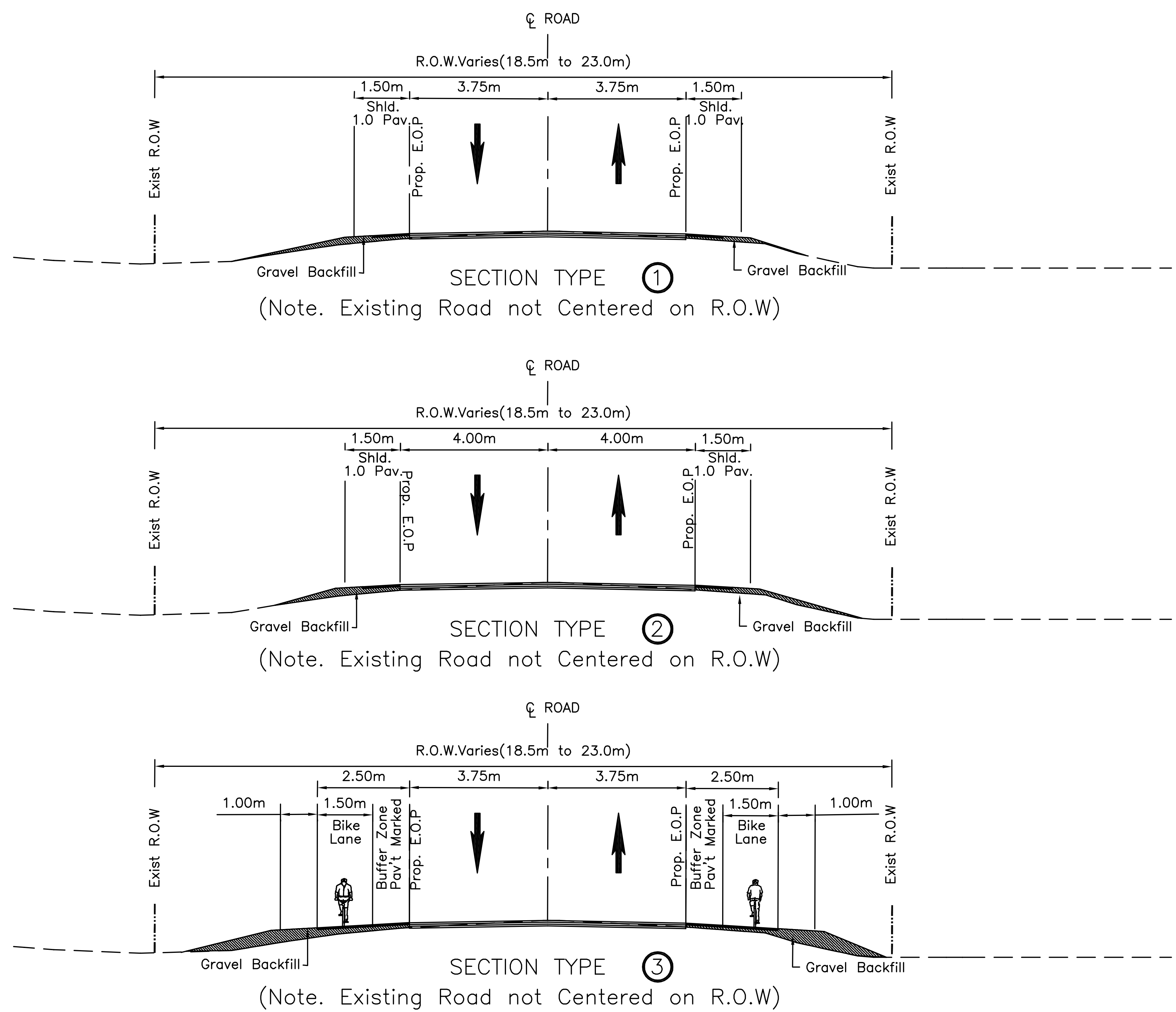
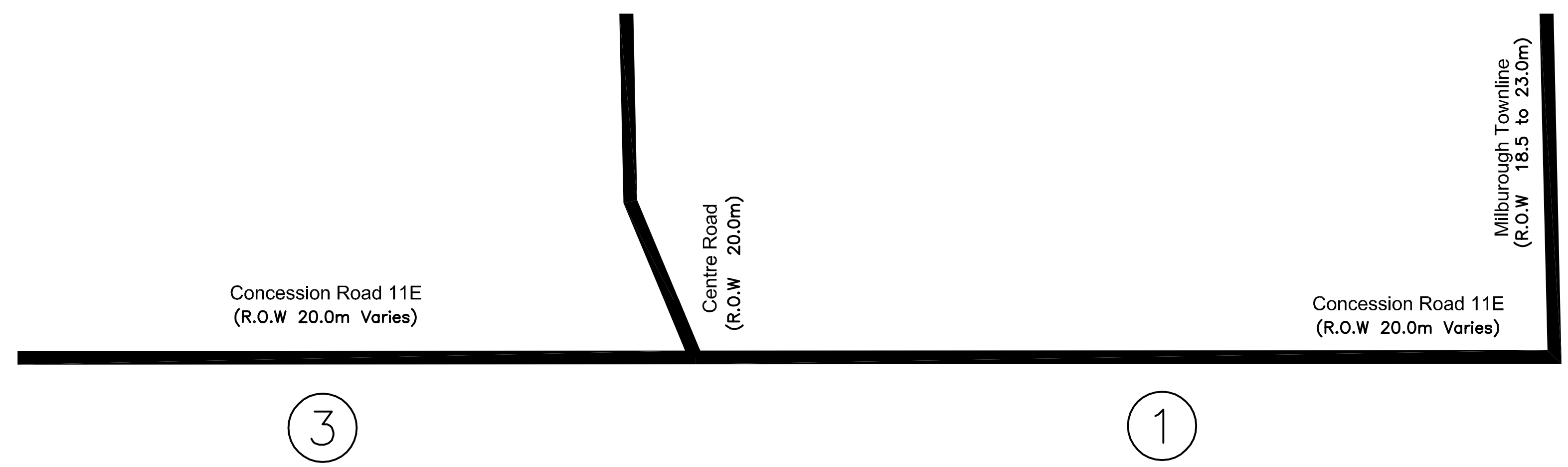
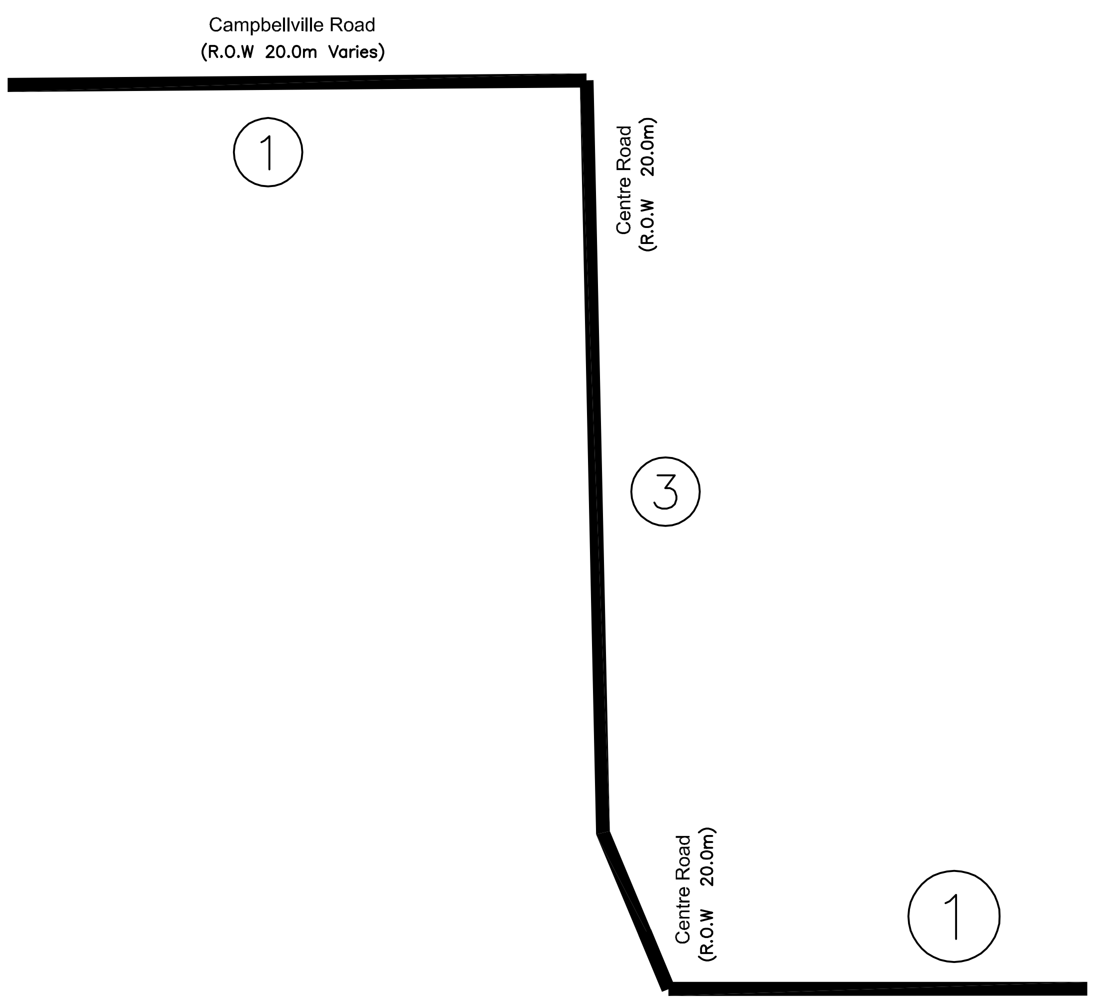


Exhibit 9-9
Representative Cross Section Alternatives
Flamborough Quarry

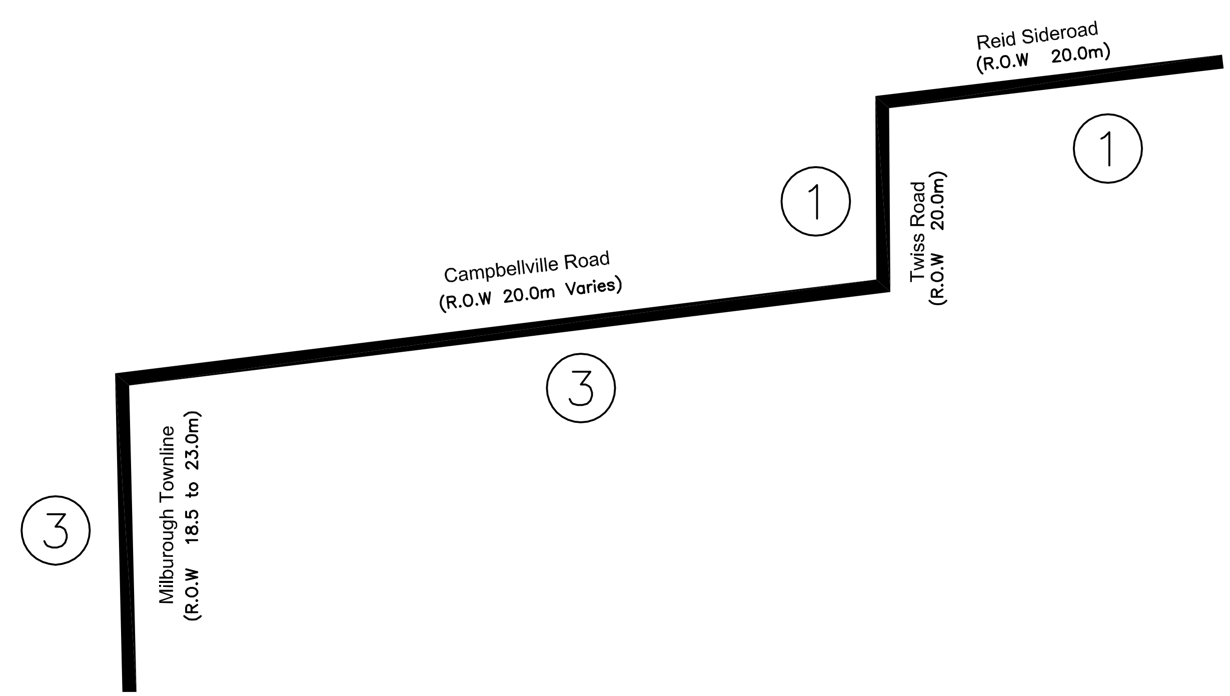
Scale 1:125



Alternative 1



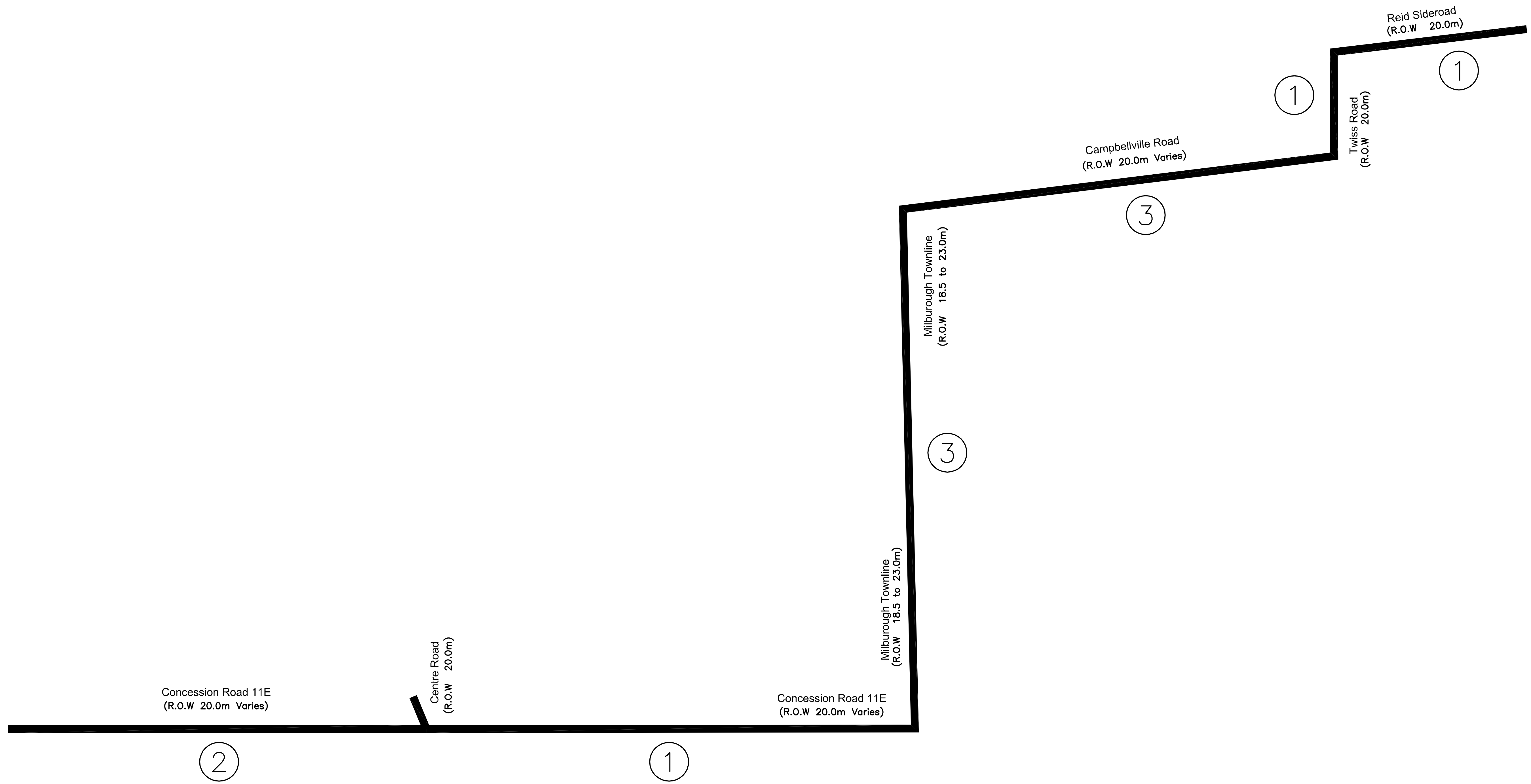
Alternative 2



Alternative 3

Exhibit 9-10
Representative Cross Section Alternatives
Flamborough Quarry

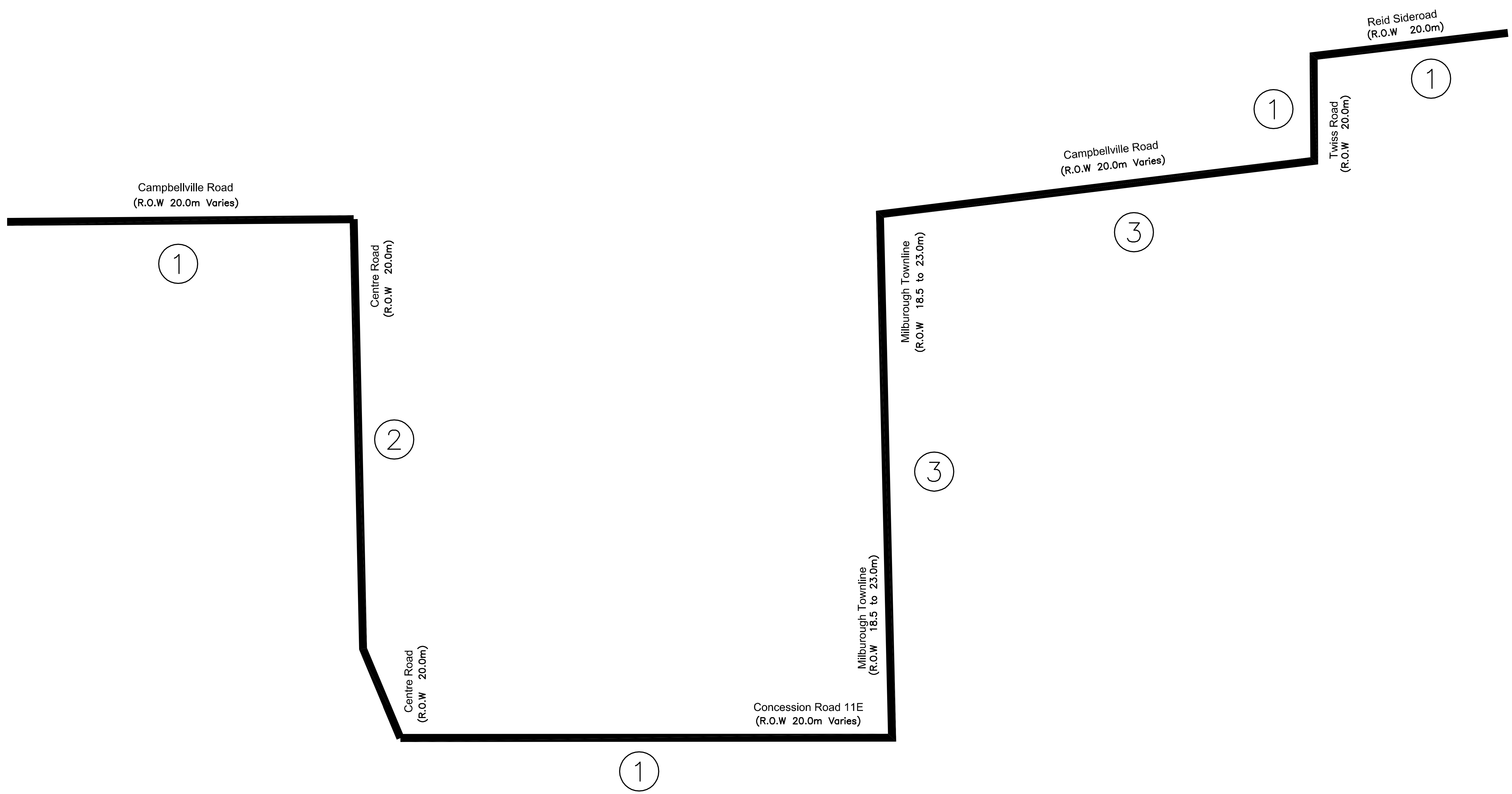
Not to Scale



Alternative 4

Exhibit 9-11
Representative Cross Section Alternatives
Flamborough Quarry

Not to Scale



Alternative 5

Exhibit 9-12
Representative Cross Section Alternatives
Flamborough Quarry

Not to Scale

10. ANALYSIS OF ALTERNATIVE HAUL ROUTES

10.1 Analysis Criteria and Indicators

As required by the Terms of Reference, a critical component of the Haul Route Study evaluation was the identification, analysis, and comparative evaluation of the criteria and indicators. The criteria were divided into the following categories:

- Aquatic and Terrestrial Environment
- Land Uses
- Social and Community Impacts
- Economic Environment and Business Impacts
- Cultural and Heritage Resources
- Transportation
- Cost

The following summarizes each of these criteria and their indicators which are described in detail in the supporting technical documents.

Please note that the analysis was completed for the most conservative scenario with an estimated truck traffic that corresponds to the proposed annual maximum tonnage limit for the quarry of three-million tonnes is applied.

10.1.1 Aquatic Environment and Terrestrial Environment

As discussed in the Natural Environment Report (Report C) completed by Savanta Inc. (September, 2008), the natural environment criteria and indicators are shown in **Table 10-1** and **Table 10-2**.

Table 10-1: Aquatic Environment Analysis Criteria and Indicators

Aquatic Environment	
Criteria	**Indicator**
Potential for disturbance to aquatic habitat.	Number, character and sensitivity of watercourses crossed.
	Likelihood of increased runoff effects on these watercourses.
	Potential for increased erosion and sediment loading to receiving streams during construction.
	Likelihood of water quality impacts to watercourses from runoff as a result of road improvements.
Potential for removal of aquatic habitat from road improvements (e.g. bridge or culvert extensions or replacements).	Number of watercourse culverts/structures that could require extension to accommodate road improvements.
	Magnitude of removal effects.
	Sensitivity of habitat affected.
	Type of structure (bridge or culvert) being widened to accommodate road improvements.

Table 10-2: Terrestrial Environment Analysis Criteria and Indicators

Terrestrial Environment	
Criteria	**Indicator**
Potential for disturbance to natural habitat.	Number and character of sensitive habitats that the haul routes pass by. (Distances of designated features)
	Effects on vegetation from increased run-off from new road works, dust, emissions, etc.
Potential for removal of natural habitat from road improvements.	Area, character and sensitivity of vegetation to be removed due to required road improvements.
	Potential effects on wildlife as a result of habitat removal.
Potential for increased wildlife kills.	Presence of wildlife corridors that the routes pass through.
	Likelihood of increased wildlife kills as a result of increased truck traffic volumes.
	Likelihood of increased wildlife kills as a result of the reluctance of wildlife to use longer/wider bridge or culvert structures.

10.1.2 Land Uses

As discussed in the Land Uses Report (Report D) completed by Glen Schnarr and Associates Inc. (September, 2008), there are three evaluation criteria and associated indicator(s) that have been identified for the assessment of land uses along the Alternative Haul Routes. A summary of these criteria and indicators is shown in **Table 10-3**.

Table 10-3: Land Uses Analysis Criteria and Indicators

Land Uses	
Criteria	**Indicator**
Potential for disruptive effects to sensitive planned land uses.	Number, character of planned development areas.
	Sensitivity of planned development to increased truck traffic.
Potential for removal of planned land uses from road improvements.	Area and sensitivity of planned land use eliminated by road improvements.
Conformity with applicable plans and polices.	Degree of conformity with Official Plans.
	Degree of conformity with the Greenbelt Plan.
	Degree of conformity with the Niagara Escarpment Plan.

Below is a discussion of the importance of each criterion to the haul route evaluation.

10.1.2.1 Potential for Removal of Existing Land Uses for Road Improvements

This criterion was analyzed with consideration to the area and sensitivity of existing land use eliminated by road improvements. Existing land uses are defined as the spatial arrangement of existing land uses resulting from previous development and land use planning.

In order to ensure optimum pavement and road design for safe and efficient truck traffic and general road user traffic (including pedestrian and cyclists), iTRANS proposes different cross-sections to improve the road design for each road link. The above noted criterion and indicator will examine the proportional mix of existing land use types along each alternative haul route, the relative importance of each land use type, and the potential road allowance widening along each alternative haul route associated with the proposed road alterations.

10.1.2.2 Potential for Disruptive Effects to Sensitive Planned Land Uses

This criterion was analyzed using the following indicators:

- Number, character of planned development areas
- Sensitivity of planned development to increased truck traffic

Planned Land Uses (Planned Development Areas) are defined as areas which are designated for development in long range comprehensive policy documents (i.e. Official Plan), but are not yet built. There are three Planned Development Areas identified along the five alternative haul routes.

The above noted criterion and indicators will examine the three known Planned Development Areas, their character, and their sensitivity to increased truck traffic to determine whether the potential for increased truck traffic will significantly affect the character of the Planned Development Areas along the alternative haul routes.

10.1.2.3 Conformity with Applicable Plans and Policies

This criterion was analyzed using the following indicators:

- Degree of conformity with Official Plans
- Degree of conformity with the Greenbelt Plan
- Degree of conformity with the Niagara Escarpment Plan

Traditional tools for land use planning and regulation include a combination of provincial, regional and local policy directives, legal instruments, administrative practices and means of promoting community participation in planning.

Applicable Provincial Plans do not identify the location of permitted haul routes / truck routes; however, Provincial policies related to infrastructure and aggregate resources have been examined. Further, information is available in Regional and local Official

Plans related to functional classifications and right-of-way widths of major highways and roads. This information is discussed in the analysis of the above noted criterion and associated indicators to illustrate the five Alternative Haul Routes' conformity with applicable plans and policies.

10.1.3 Social Environment and Community Impacts

The social environment and community impact criteria and indicators are shown in **Table 10-4**.

Table 10-4: Social and Community Analysis Criteria and Indicators

Social and Community Impacts	
Criteria	**Indicator**
Potential for disruption to residents' use and enjoyment of property.	Number of residences fronting and/or backing directly onto a potential truck route.
	Associated truck exposure index
	Quantity of ingress and egress interference at residential driveways
	Associated truck exposure index
	Number of defined neighbourhoods along a potential truck route.
	Associated truck exposure index
	Ingress and egress interference at roadways used to access neighbourhoods along a potential truck route
	Associated truck exposure index
Potential for effects on community character	Qualitative assessment of likely changes to the unique or distinctive qualities of the communities potentially affected (i.e., physical, economic and/or socio-cultural features of the communities)
	Change in the existing character of the road (excluding highway 6 since no impact)
Potential for effects on community cohesion	Qualitative assessment of likely changes to community cohesion due to disruption and/or displacement effects, potential for voluntary out-migration and creation of a barrier effects due to truck traffic.
Potential for disruption to users of operations at recreational and community features and/or institutions.	Number of recreational or community features and/or institutions located along a potential truck route.
	Associated truck exposure index
	Number of sensitive / vulnerable recreational or community features and/or institutions.
	Associated truck exposure index

	Ingress and egress interference at entrances to recreational or community features and/or institutions.
	Associated truck exposure index
Potential for displacement/removal of residents & residential property from road improvements.	Number and area of residences/residential property required (partial removals).
	Number and area of residences/residential properties required (full displacement)
	Number of vulnerable residents/households displaced
Potential for displacement/removal of recreational or community features and/or institutions.	Number and area of recreational or community features (including trails, bicycle routes, parks and open space) and/or institutional properties required (partial removals).
	Number and area of recreational or community features (including trails, bicycle routes, parks and open space) and/or institutional properties required (full displacement).
	Number of sensitive / vulnerable recreational or community features and institutions displaced.
Noise impacts on community	Number of residences expected to experience a 3, 5 and 10 dbA increase in noise levels over future baseline conditions for any given hour and a description of the magnitude of change.
Air quality impacts on community	Number of residences that would experience air quality impacts as a result of tail pipe emissions.
Dust impacts on community	Number of residences likely to experience dust impacts as a result of additional truck traffic.
Vibration impact on community	Number of residences likely to experience vibrational impacts as a result of increased truck traffic.
Potential for health impacts on community	Number of residences and other facilities along the haul routes, the traffic composition and proximity of facilities to the roadway whose that would experience potential health impacts based on tailpipe emission impacts determined from the modelling.

The following is a summary of the criteria and analysis discussion from each of the reports that contributed to the analysis of social and community impacts.

10.1.3.1 Description of the Socio-Economic Criteria

The examination and analysis of the criteria and indicators related to the social environment and community impacts are described in the Socio-Economic and Business Report (Report E) completed by Gartner Lee Ltd. (September, 2008). Below is a discussion of the importance of each criterion to the haul route evaluation.

10.1.3.1.1 Potential for Disruption to Residents' Use and Enjoyment of Property

Residents rely on their homes and property for a variety of indoor and outdoor social activities. The use of the haul route may create nuisances (i.e., noise, dust, odour or traffic), which may be considered by local residents as a hindrance to their use and enjoyment of property. This criterion is important to the study to ensure that the haul route causes minimal disruption and does not hinder members of the community from enjoying their property.

10.1.3.1.2 Potential for Effects on Community Character

The distinctive and unique qualities of a community determine its character. The use of the haul route may influence the attractiveness of the community as a place to live, work or conduct business. This criterion is important to the study to ensure that the new haul route does not alter these unique qualities.

10.1.3.1.3 Potential for Effects on Community Cohesion

Community cohesion refers to people's sense of belonging to a self-defined community. This criterion is important to the study to ensure that the preferred route avoids alternatives that would bisect defined neighbourhoods, thus creating a real or perceived barrier to their movement and interaction. It also addresses the potential for the displacement or out-migration of residents, which would directly affect one of a community's most important social assets that influences its cohesiveness – its people.

10.1.3.1.4 Potential for Disruption to Users of Operations at Recreational and Community Features and/or Institutions

People living in, working in or visiting the study area and areas rely on the availability and quality of recreational and other community facilities to conduct their activities and participate in community life. This criterion is important to the study to avoid alternative routes that would impede the use of public spaces and recreational activities.

10.1.3.1.5 Potential for Displacement/Removal of Residents and Residential Property from Road Improvements

This criterion is important to the study to ensure that the preferred route favours alternatives that would minimize residential property impacts from potential road alterations.

10.1.3.1.6 Potential for Displacement/Removal of Recreational or Community Features and/or Institutions

This criterion is important to the study to ensure that the preferred route favours alternatives that would minimize impacts from potential road alterations on recreational or community features.

10.1.3.2 Description of the Noise Criteria and Indicators

The examination and analysis of the criteria and indicators related to the social environment and community impacts are described in the Noise Report (Report H), completed by RWDI Air Inc. (September, 2008). Below is a summary of this discussion from the report.

The metric used to evaluate noise impacts in this study was the overall change in sound level (“build” minus “no-build”).

There are no specific Provincial guidelines which deal with noise from pit and quarry haul routes. However, the Ministry of the Environment (MOE) does require haul route noise impacts to be considered as part of environmental assessments for landfill sites. The MOE *Noise Guideline for Landfill Sites* are often used in assessing pit and quarry haul route noise, and have been adopted for this assessment. The MOE *Noise Guideline for Landfill Sites* states that the changes in road traffic noise levels can be ranked as follows:

Qualitative Ranking of Changes in Noise Level

Sound Level Increase (dBA)	Qualitative Rating
0 to 3 inclusive	Insignificant
> 3 to 5 inclusive	Noticeable
> 5 to 10 inclusive	Significant
> 10 and over	Very Significant

The MOE’s qualitative ranking scheme is based on the human perception of changes in sound levels. Changes in road traffic noise levels of 3 dB or less are generally imperceptible by people, and thus represent an insignificant impact. Greater changes in noise levels have greater degrees of perception, and therefore increasing significance.

Background traffic levels in the area will increase with time. This would make the change, due to haul route traffic, less as the years increase. To account for this, three design years were considered: Existing, Year 2021, and Year 2031. Haul route traffic levels represent full production, and therefore do not change with year.

For each scenario, link, and design year, road traffic noise levels were calculated at various distances from the roadway. This was used to establish the setback distances along each route where noise changes were predicted to range from $\leq$ 3 dB, 3 to 5 dB, 5 to 10 dB, or greater than 10 dB (i.e., the qualitative significance categories in the MOE Landfill guideline).

10.1.3.3 Description of the Air Quality and Health Criteria and Indicators

As described in the Air Quality Report (Report G), completed by RWDI Air Inc. (September, 2008), this section summarizes the analysis criteria and indicators that were used to evaluate air quality and potential health impacts. These indicators were adopted in order to evaluate and prioritize the various haul routes based on potential impacts to human health. They are not intended to represent a quantitative measure of impact per se, but rather to identify and rank potential health impacts associated with the haul routes alternatives.

10.1.3.3.1 Number of Receptors

The number of receptors that would be affected by air quality impacts as a result of tail pipe emissions was identified as a key indicator of potential health impacts. In general, a haul route with fewer residences, businesses and other receptors has a comparatively lower potential to cause adverse health impacts than other haul routes since it would tend to have fewer individuals potentially exposed to truck exhaust and dust.

10.1.3.3.2 Proximity of Receptors

Residences and other receptors located closer to the haul routes were given a higher weighting factor than receptors located farther away because they are more likely to have higher concentrations of traffic-related pollutants. Residences and other receptors located within 500m of the roadway was used as a cut-off since measurable air quality impacts attributable to the increased truck traffic would not likely be measurable beyond 500 m based on data collected along Highway 402 (MOE, 2005b).

Likewise, receptors located along road segments with higher predicted percentage increases in traffic volumes and higher speed postings were also given a higher weighting factor to account for potentially higher emission rates. The same is true for homes located along roadways with no paved shoulder, which increases the potential for fugitive dust generation.

10.1.3.3.3 Receptor Types

The type of receptor is an important consideration when evaluating potential health impacts. Children, the elderly, and individuals with pre-existing medical conditions (e.g., asthma) are more susceptible to poor air quality. Therefore, schools, daycares, nursing homes, etc. were given a higher weighting factor compared with other homes and businesses. Churches were also given a higher weighting factor because they can often be used for community events that involve children and other susceptible individuals.

10.1.3.4 Description of the Vibration Criteria and Indicators

Technical information regarding the vibration criteria and indicators is provided in the Vibration Report (Report I), completed by RWDI Air Inc. (August, 2008). Below is a summary from the report concerning these criteria and indicators.

Vibration may be measured using a number of different descriptors. One of the most commonly used descriptors in Ontario is *vibration velocity*, measured in mm/s, and this metric is used in this report to evaluate the vibration analysis criteria and indicators.

Based on international standards, the threshold of perception for vibration is approximately 0.10 mm/s. The US Federal Transit Administration (FTA) recommends the limits for vibration (FTA 2006) shown in **Table 10-5**.

Table 10-5: Recommended Transportation Vibration Levels

Location / Source	Criteria
Residential Daytime	0.14 mm/s
Residential Night-time	0.10 mm/s
Ground-Borne Noise	25 dB

With respect to ground-borne noise, vibration levels meeting the residential daytime criterion of 0.14 mm/s will produce ground-borne noise levels which meet or are below the 25 dB criteria. Thus, if the limits for perceptible vibration are met, then the limits for ground-borne noise will also be met.

10.1.4 Economic Environment and Business Impacts

The economic environment and business impacts criteria and indicators are shown in **Table 10-6**.

Table 10-6: Analyses Criteria and Indicators for Economic Environment and Business Impacts

Economic Environment and Business Impacts	
Criteria	**Indicator**
Potential for disruption to business enterprises.	Number of business enterprises fronting and/or backing along a potential truck route.
	Number of sensitive / vulnerable business enterprises fronting and/or backing along a potential truck route.
	Ingress and egress interference at entrances to business enterprises.

Criteria	Indicator
Potential for removal of business enterprises and/ or property.	Number and area of business enterprise and/or other commercial or industrial property required (partial removals).
	Number and area of business enterprise and/or other commercial/industrial property required (full displacement)
	Number of sensitive / vulnerable business enterprises displaced.
Potential magnitude of effects on property values.	Qualitative assessment of the potential magnitude of effects on property values due to changes in traffic, traffic noise and roadway visibility at residential properties.
Noise impacts on businesses	Number of businesses expected to experience a 3, 5 and 10 dbA increase in noise levels over future baseline conditions for any given hour and a description of the magnitude of change.
Air quality impacts on businesses	Number of businesses along the proposed haul route(s) expected to be affected by a change in air quality as a result of tail pipe emissions from additional truck traffic.
Dust impacts on businesses	Number of businesses along the proposed haul route(s) affected dust as a result of additional truck traffic.
Potential for effect on agricultural operations.	Number and type of farms along the haul route potentially disrupted by truck traffic.
	Area and productivity/value of cropland removed for road improvements.
	Number and area of farm properties required for road improvements.

The following is a summary of the criteria and analysis discussion from each of the reports that contributed to the analysis of economic environment and business impacts.

10.1.4.1 Description of the Economic Environment and Business Criteria and Indicators Analyzed by Gartner Lee

A detailed description of the economic environment and business analysis criteria and indicators is provided in the Socio-Economic and Business Impacts Report (Report E) completed by Gartner Lee Ltd. (September, 2008). The following is a summary of the background and assessment methods used to analyze each criteria and indicator.

10.1.4.1.1 Potential for Disruption to Business Enterprises
The local economic base, including tourism-related businesses may be vulnerable to changes in community image and nuisances associated with the use of the haul route. This criterion is important to the study to ensure that the haul route causes minimal interruption to the productivity of businesses with the community.

10.1.4.1.2 Potential for Removal of Business Enterprises and/ or Property
This criterion is important to the study to ensure that the preferred haul route favours alternatives that would minimize property impacts from potential road alterations on local businesses.

10.1.4.1.3 Potential Magnitude of Effects on Property Values
The value of property will directly affect existing and prospective property owners, the economic base and stability of the community. This criterion is important to the study to ensure that the preferred haul route has negligible effects to the property values.

10.1.4.2 Description of the Noise Criteria and Indicators

The examination and analysis of the criteria and indicators related to noise impacts on economic environment and businesses are described in the Noise Report (Report H), completed by RWDI Air Inc. (August, 2008). The analysis of these criteria regarding businesses is as discussed in **Section 10.1.3.2** above.

10.1.4.3 Description of the Air Quality Analysis Criteria and Indicators

The examination and analysis of the criteria and indicators related to the impacts of noise on the economic environment and businesses are described in the Noise Report (Report H), completed by RWDI Air Inc. (September, 2008). The analysis of the criteria used to evaluate the air quality and dust impacts on businesses is as discussed in **Section 10.1.3.3**.

10.1.4.4 Description of the Agriculture Analysis Criteria and Indicators

A detailed a description of the agricultural analysis criteria and indicators is provided in the Agricultural Report (Report F) completed by Conna Consulting Inc. (August, 2008). The following is a summary of the background and assessment methods used to analyze each criteria and indicator.

This criterion is contained within the Economic Environment and Business Impact component of the evaluation framework and is defined as follows:

> *Potential for haul route traffic to restrict or compromise crop or livestock production, agricultural field or facility access, farm linkages among operationally related or associated land parcels or the safety of farm machinery movement along the proposed route.*

Each of the three indicators for this criterion is defined and discussed below:

10.1.4.4.1 Number and Type of Farms along the Haul Route Potentially Disrupted by Truck Traffic

This indicator is defined as follows:

> *Number of individual farm properties involved in livestock, cash crop or specialty crop operations located along the proposed route alternatives.*

This indicator involves a characterization of the type of different agricultural operations occurring along the proposed haul routes. It provides for the identification of the potential for farm operational linkages involving livestock or machinery movement between or among properties located across or along proposed routes. These linkages are normally limited, due to the existing levels of traffic, along major high-volume highways like Highway 6. They can occur, however, along lesser travelled, rural roadways.

The higher the concentration of active farm operations, the higher will be the probability of occurrence of potential farm operational interference. Linkages between and among cash crop operations are common and often dynamic, varying from year-to-year in the type and frequency of machinery movement. These linkages are not generally tied to land ownership since they are often based on land rental or lease arrangements that can change from year to year.

10.1.4.4.2 Area and Productivity/Value of Cropland Removed for Road Improvements

This indicator is defined as follows:

> *The area and relative productivity of cropland removed from production due to road improvements. The relative productivity of affected lands is determined through the application of the Canada Land Inventory7-Class system of classification of soil capability for agriculture.*

This indicator addresses the relative potential impacts on agricultural property associated with possible roadway alterations occurring along the haul route. This impact will vary according to the amount of annually cropped land occurring along the haul route alternatives and according to the soil capability of those lands.

10.1.4.4.3 Number and Area of Farm Properties Required for Road Improvements

This indicator is defined as follows:

> *The number and area of farm properties required for proposed road alterations including the identification of specific farm facilities or land/operational improvements and related agricultural investment potentially retired as a consequence of the alterations.*

This indicator addresses the potential for farm operational impacts associated with the impacts on farm properties, facilities or alterations such as land drainage that might result from recommended road alterations along the haul route. Impacts will vary according to the number and area of farm properties and facilities affected by road alterations.

Areas requiring road alterations can be characterized in terms of the number and type of agricultural operations that are potentially affected and the potential for unmitigated removal or disruption of agricultural facilities, land improvements or other forms of agricultural investment.

10.1.5 Cultural and Heritage Resources

The cultural and heritage resource analysis criteria and indicators are shown in **Table 10-7**.

Table 10-7: Analysis Criteria and Indicators for Cultural and Archaeological Resources

Cultural Heritage and Archaeological Resources	
Criteria	**Indicator**
Potential for disturbance to built heritage/cultural features.	Number and character of built heritage features potentially affected by truck traffic.
	Built heritage truck exposure index
	Number of heritage properties removed from construction of road improvements (distinguish between partial and full removals).
Potential for effects on archaeological resources.	Potential for effects on archaeological resources as a result of road improvements (as reflected through archaeological potential).

A detailed a description of these criteria and indicators and the analysis is provided in the Cultural and Archaeological Report (Report K) completed by Archaeologix Inc. (August, 2008). The following is a summary of the background and assessment methods used to analyze each criteria and indicator.

10.1.5.1 Assessing Standing Cultural Heritage Resources

The *Provincial Policy Statement* defines "built heritage resources" as "*significant* buildings, structures, monuments, installations or remains associated with architectural, cultural, social, political, economic or military history and identified as being important to a community."

The concept of built heritage applies to individual buildings of either a private or public nature (e.g., houses, barns, city halls, churches), industrial and utilitarian artifacts (e.g., bridges, lime kilns, culverts), and landscapes that have been designed to serve a specifically human purpose (e.g., cemeteries, parks, promenades, streetscapes). The process of producing a thorough evaluation of their heritage significance involves the consideration and balancing of numerous factors such as the age of the resource, quality of design, mode of construction and the importance of architects, contractors and owners in its fabrication, etc.

The *Provincial Policy Statement* defines a “cultural heritage landscape” as “a defined geographical area of heritage significance which has been modified by human activities and is valued by a community.” This is abbreviated as “CLU” for “Cultural Landscape Unit” in **Section 10.2.6.4.**

The Ministry of Culture has defined three types of cultural landscapes: *defined landscapes*, “which have been intentionally designed”; *evolved landscapes*, “which have grown organically”; and *associative landscapes*, “those with powerful religious, artistic, or cultural associations of the natural element.” Such landscapes may comprise “built” heritage in the sense that they have elements of human design, construction, and manipulation, and they may affect the evaluation of the individual built structures they envelop.

10.1.5.2 Assessing Potential or Precontact Aboriginal Archaeological Sites

Archaeological potential is established by determining the likelihood that archaeological resources may be present on a subject property. Archaeologix Inc. applied archaeological potential criteria commonly used by the Ministry of Culture (Government of Ontario 1997) to determine areas of archaeological potential along the study corridor. These variables include: distance to various types of water sources, soil texture and drainage, glacial geomorphology, and the general topographic variability of the area.

Soil texture can be an important determinant of past settlement, usually in combination with other factors such as topography. The study area has a number of knolls on either side of various routes and in some cases contributing to the landscape over which the road runs. This topography increases archaeological potential for aboriginal sites since these knolls provide excellent visibility to survey the surrounding landscape and an easily defensible location. With respect to soil texture, aboriginal groups preferred well-drained lighter (sandy) soils to heavier soils. The soils of the study area are stony sands and clays; consequently, they decrease the archaeological potential for aboriginal sites.

10.1.5.3 Assessing Potential for Historic Archaeological Sites

The criteria used by the Ontario Ministry of Culture to determine potential for historic archaeological sites include the presence of:

7. Particular, resource-specific features that would have attracted past subsistence or extractive uses
8. Areas of initial, non-Aboriginal settlement
9. Early historic transportation routes
10. Properties designated under the Ontario Heritage Act (Government of Ontario 1997:14). The research outlined below will indicate that criterion 1 (the numerous water sources in the area) and criterion 3 (the nineteenth century road system still in existence and other historic routes) are important here.

10.1.6 Transportation

The transportation analysis criteria and indicators are shown in **Table 10-8**.

Table 10-8: Transportation Analysis Criteria and Indicators

Transportation	
Criteria	**Indicator**
Change in road service level	Change in road level of service/congestion (considers road section, length, change in level of service)
	Change in access levels for road users
	Effects on other roadways as a result of traffic diversion
	Potential for delay to quarry trucks at level rail crossings
Potential for change in road safety level	Potential for increase in collision frequency and severity. (Difference in safety index with and without the quarry in 2031)
	Number of access points along the haul route
	Number of intersections along the haul route
	Intersection truck exposure index
	Truck-rail exposure index at level rail crossings (daily number of quarry trucks x daily number trains)
	Driveway truck exposure index
	Number of sections with limited sight lines and/or steep grades
	School bus route lengths (km) along the haul route
	School bus truck exposure index
	Conflict with agricultural vehicles and equipment
Change in Road Function	Increase in Traffic (daily and %)
	Required change in road classification
	Road widening required
Potential for conflicts with cyclists	Length of route coinciding with designated bike routes
	Length of route without adequate shoulders for cyclists
Potential for conflicts with pedestrians	Number of schools along the route
	Number of parks and community centres
	Length of route without adequate shoulders/sidewalks for pedestrians

A detailed a description of these criteria and indicators and their technical analysis is provided in the Transportation Report (Report B) completed by iTRANS Consulting Inc. (October, 2008). The following is a summary of the methods used to analyze each criteria and indicator.

10.1.6.1 Change in Road Level of Service

Where appropriate, the findings of this traffic analysis have been applied to the Criteria and Indicators used to evaluate the alternative haul routes. The performance indicators include change in road level of service / congestion for both signalized and unsignalized intersections, change in access levels for road users, effects on other roadways as a result of traffic diversion, and potential for delay to quarry trucks at level rail crossings.

10.1.6.1.1 Change in Road Level of Service/Congestion

The performance indicator for level of service/congestion is conveyed by the delay associated with each alternative haul route. Synchro was used to estimate the average delay at each intersection.

The average delay for both the AM and PM peak is based on Synchro model results for each intersection. The data are further categorized by unsignalized and signalized intersections. The total average delay is an average of all the intersections identified on the respective alternative haul route.

The change in road level of service / congestion was also measured through the average change in the volume to capacity ratio. The unsignalized Synchro summary sheets do not contain an average volume to capacity ratio, therefore only the signalized intersections are included in this summary.

10.1.6.1.2 Change in Access Levels for Road Users

The change in access levels for road users considers the difference in average delay for side street traffic in future horizon years with and without quarry truck traffic. The delays are based on the Synchro model results. The table shows the increase in delay in seconds for side street traffic for each intersection by haul route alternative for the 2031 horizon year.

10.1.6.1.3 Effects on Other Roadways as a Result of Traffic Diversion

Another performance indicator considers the effects on other roadways as a result of traffic diverting away from the alternative haul route as a result of the increase in truck traffic. However, there is no appreciable traffic diversion anticipated as a result of quarry operations because of the low total traffic volumes with no significant increase in congestion levels expected.

10.1.6.1.4 Potential for Delay to Quarry Trucks at Level Rail Crossings
There are two level rail crossings that may cause delay to traffic; one is on Campbellville Road west of Twiss Road and the other is on Twiss Road just north of Campbellville Road. This performance indicator quantifies the rail truck exposure at each crossing based on the daily number of trains and the daily number of quarry trucks (i.e. the increase in traffic) in one direction.

10.1.6.2 Potential for Change in Road Safety Level

The following indicators when assessed collectively provide an impression of the potential for a change in the level of safety on the surrounding road network.

10.1.6.2.1 Potential for Increase in Collision Frequency and Severity
To quantify this potential indicator, a safety index was calculated. This index was derived from operational performance functions. Operational performance functions are mathematical models derived through statistical analysis that relate the number of collisions to the traffic volumes for different types of roads and intersections.

To obtain the potential for an increase in collision frequency, future traffic volumes for both horizon years (2021 and 2031) with and without the quarry were used in combination with the operational performance functions. The resulting values were then adjusted to account for the severity of collisions. The difference in adjusted values was then expressed as a percentage and used to quantitatively represent this performance indicator.

10.1.6.2.2 Number of Access Points along the Haul Route
An access point is any residential, business, or community driveway that connects to a haul route link. The quantities were provided in the Socio-Economic and Business Impact Report completed by Gartner Lee Ltd (2008). For the analysis and evaluation of this performance indicator, the number of access points along each haul route was summed together.

10.1.6.2.3 Number of Intersections along the Haul Route
An intersection is defined as any side street that intersects with a haul route link. The quantity of intersections for each Alternative was determined visually using Google Earth.

Each intersection along each haul route will be exposed to quarry truck traffic; however, the degree of the exposure varies by alternative. In order to account for this, a truck exposure index was calculated for comparative evaluation. For example, the number of trucks that would travel along Highway 6 in Alternative Haul Route 1 is much higher than the number of trucks that would re-enter the study area and travel Highway 6 via Highway 401 in Alternative Haul Route 3. **Table 10-9** shows the number of quarry trucks that are estimated to travel each link in one direction for each alternative haul route.

Table 10-9: Number of Quarry Trucks for One Direction by Link for each Alternative Haul Route

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Highway 6 (Campbellville to Hwy 401)	485	485	30	55	55
Highway 6 (Conc. 11E to Campbellville)	485	85	30	55	60
Highway 6 (Conc. 11E to Hwy 403)	85	85	30	60	60
Conc. 11E (Hwy 6 to Centre)	570	-	-	115	-
Conc. 11E (Centre to Milburough)	570	570	-	115	115
Centre Road	-	570	-	-	115
Campbellville (Hwy 6 to Centre)	-	570	-	-	115
Campbellville (Milburough to Twiss)	-	-	570	455	455
Milburough Line	-	-	570	455	455
Twiss Road	-	-	570	455	455
Reid Sideroad	-	-	570	455	455

To achieve a truck exposure index the following equation was applied:

$$\text{Truck Exposure Index} = \sum_{Link} \text{No. Intersections} * \text{No. Quarry Trucks}$$

10.1.6.2.4 Truck-Rail Exposure Index at Level Rail Crossings

There are two level rail crossings along the alternative haul routes; one on Campbellville Road west of Twiss Road and the other on Twiss Road just north of Campbellville Road.

The truck-rail exposure index quantifies the potential for a train to conflict with quarry trucks. Each rail crossing along the alternative haul routes will be exposed to quarry truck traffic; however, the degree of the exposure varies by alternative. In order to account for this, a truck exposure index was calculated for comparative evaluation. To achieve a truck-rail exposure index the following equation was applied:

Truck-Rail Exposure Index = Daily No. Quarry Trucks (in one direction) * Daily No. Trains

10.1.6.2.5 Driveway Exposure Index

A driveway is any residential, business, or community driveway that connects to a haul route link.

The driveway exposure index quantifies the potential for vehicles leaving or entering a driveway to conflict with a quarry truck. Each driveway along the haul routes will be exposed to quarry truck traffic; however, the degree of the exposure varies by alternative. In order to account for this, a truck exposure index was calculated for comparative evaluation. To achieve a driveway truck exposure index the following equation was applied.

$$\text{Driveway Exposure Index} = \sum_{Link} \text{No. Driveways} * \text{No. Quarry Trucks (in one direction)}$$

10.1.6.2.6 Number of Existing Sections and Number of Intersections with Limited Sight Lines and/or Steep Grades on Non-Provincial Highways

An assessment of the existing vertical profiles and sight distances was conducted for each alternative haul route link on non-provincial highways. The total number of locations with a limited stopping sight distance along each alternative was identified and compared.

Given that intersections are subject to specific design standards, the number of intersections on non-provincial roads along the alternative haul routes that exhibit limited sight lines and/or steep grades was also identified.

10.1.6.2.7 School Bus Route Lengths (km) Along the Haul Route

To calculate the total school bus route length in kilometres for each alternative haul route it was important to understand how many school bus kilometres were travelled on an average day. To calculate this value the following equation was applied.

School bus route length =

$$\sum_{Link} \text{Frequency of school daily bus trips in both directions} * \text{Length of the route link}$$

Since it is desirable to minimize the exposure of school buses and quarry trucks, a truck exposure index was calculated as part of the analysis.

Each of the school bus routes along the alternative haul routes will be exposed to quarry truck traffic; however, the degree of the exposure varies by alternative. In order to account for this, a truck exposure index was calculated for comparative evaluation. To achieve a truck exposure index the following equation was applied.

$$\text{Truck Exposure Index} = \sum_{Link} \text{No. school bus km} * \text{No. Quarry Trucks in one direction}$$

10.1.6.2.8 Conflict with Agricultural Vehicles and Equipment

The potential for conflict with agricultural vehicles and equipment will vary according to the concentration of cash crop, cattle and other livestock facilities identified as active along the route alternatives. A qualitative description of low, medium, or high was assigned to each alternative as deemed appropriate by the agrologist.

10.1.6.3 Change in Road Function

A change in road function refers to a change in the use of the roadway. Although sometimes it is necessary to change the function of the roadway to mitigate for traffic and safety impacts, it is often desirable to minimize the extent of the change. The following indicators, when assessed collectively, provide an impression of the potential for a change in the road function.

10.1.6.3.1 Increase in Traffic

The performance indicator entitled increase in traffic conveys the maximum traffic increase that would be experienced along a portion of the alternative haul route expressed as a daily volume. The increase in traffic is also presented as an average increase over the alternative haul route using the following equation.

$$AveragePercentIncrease = \frac{\sum_{Links}\left(\frac{\sum Link_{TotalTraffic} - \sum Link_{Background}}{\sum Link_{Background}}\right)}{\#ofLinks}$$

10.1.6.3.2 Required Change in Road Classification

The change in road classification was assessed qualitatively and assigned a rank between low and high. Based on the official plans of the respective municipalities, none of the roads for any of the alternatives require a change in classification. As a result, a base ranking of low was given to all of the haul route alternatives. However, along Concession 11 E between Centre and Highway 6 and Milburough Line between Concession 11 E and Campbellville Road it was acknowledged that there would be a more obvious shift in the environment from residential to mixed traffic. A low-medium rank was applied if these links were included in the respective alternative haul route configuration.

10.1.6.3.3 Road Widening Required

Road widening can impact the function of the road. In order to accommodate cyclists and bring the existing roads up to current standards, all of the haul route links will require widening of the pavement surface with the exception of Highway 6. The difference between existing and proposed pavement widths is used in the comparative analysis. To be conservative, the analysis is based on rural cross-sectional designs that do not, in all cases, fit in the existing right-of-way. (However, there are corresponding urban design options that would fit in the existing right-of-way between intersections because they require slightly less widening.)

The existing pavement widths vary from 6.2 m to 7.0 m, the proposed pavement widths vary from 10.5 to 12.5 m, and the required widening varies from 0.65 m to 3.15 m. To compare the quantity of road widening required for each alternative haul route, the following calculation was completed to estimate the total area of additional pavement:

$$\text{Area of Additional Pavement} = \sum_{Link} \text{Length} * \sum_{Link} (\text{Proposed} - \text{Existing Pavement Width})$$

10.1.6.4 Potential for Conflicts with Cyclists

10.1.6.4.1 Length of Route Coinciding With Designated or Suggested Bike Routes

The City of Hamilton and the Region of Halton have identified several of the roads that comprise the haul routes as designated or cautionary bike routes. Based on the Hamilton Bike Routes, Trails and Parks Map (March 2008) and the 2006 Cycling Halton Map the length of the bike routes was summed for each alternative haul route for the analysis.

10.1.6.4.2 Length of Route without Adequate Shoulders for Cyclists

The presence of the adequate shoulders provides a safety buffer for cyclists. Currently there are little to no shoulders on the existing roads; however, if the proposed cross-section changes are implemented, all of the designated cycling routes would have adequate shoulders.

10.1.6.5 Potential for Conflicts with Pedestrians

10.1.6.5.1 Number of Schools along the Route

The haul routes were selected to avoid routes that would pass by schools and therefore there are no schools along any of the proposed haul routes.

10.1.6.5.2 Number of Parks and Community Institutions Excluding Highway 6

There are several parks and community institutions within the study area as inventoried through various field visits. To quantify this performance indicator the number of features along each haul route was summed. The features along Highway 6 were excluded to recognize the more sensitive nature of the park facilities along the local routes in respect of the proposed quarry.

10.1.6.5.3 Length of route without adequate shoulders/sidewalks for pedestrians

The presence of the adequate shoulders provides a safety buffer for pedestrians when sidewalks are not present.

10.1.6.6 Travel Time Survey

In response to the peer review request for specific travel time information, iTRANS conducted travel time runs to compare and evaluate the Alternative Haul Routes. The travel time survey is described in **Appendix C**. The results of the survey were not incorporated into the analysis criteria and indicators nor considered in the comparative evaluation of alternatives. However, the travel time survey results were used to determine if the travel times support the identification of the preferred haul route and support the Synchro model.

10.1.7 Costs

The transportation analysis criteria and indicators are shown in **Table 10-10.**

Table 10-10: Cost Analysis Criteria and Indicators

Cost	
Criteria	**Indicator**
Estimated infrastructure costs.	Estimated cost for all required road and other infrastructure improvements.
	Potential for additional costs to the municipality(s) (e.g. impacts to municipal maintenance operations).
	Estimated property costs for all required road improvements.

The following is summary of the cost analysis criteria and indicators.

10.1.7.1 Description of the Estimated Cost for Road and Infrastructure Improvements

In order to estimate the total cost for road and infrastructure alterations for each alternative haul route, the following assumptions were made:

- Widening to be centered on existing road centreline
- No change in existing road grade
- Full width of road to be repaved
- Paved shoulder/buffer/bike path paved
- No allowance for extra cut or fill
- No allowance for additional property required.

Incorporated into the cost analysis was the geotechnical and pavement engineering information provided in the Pavement Engineering Report (Report L), completed by Golder Associates Inc. (August, 2008).

According to the "Flamborough Quarry Haul Route Study Municipal Structures and Drainage Report" (R.J. Burnside & Associates Ltd. 2008), the primary criteria and indicators applicable to the structure and drainage component of evaluating haul route alternatives are the number of sites, the type or structure, and the cost of any upgrades required.

10.1.7.1.1 Number of Sites

Each of the haul routes will cross at least one structure. These were previously outlined as follows:

Alternative Route 1 – Potential impacts on structures C02 and C03.
Alternative Route 2 – Potential impacts on structures C02 and C04.
Alternative Route 3 – Potential impacts on structure C01.
Alternative Route 4 – Potential impacts on structures C01, C02 and C03.
Alternative Route 5 – Potential impacts on structures C01, C02 and C04.

10.1.7.1.2 Cost of Improvement

The cost of any improvement required is a reasonable consideration in evaluating the haul route alternatives. For the purposes of this report, the evaluation of the cost components of the necessary structure improvements has been based on anticipated bench mark replacement costs at each site. The replacement costs are summarized in **Table 10-11**.

Table 10-11: Structure Location and Estimated Replacement Cost

Structure Location	Replacement Cost
C01 – Campbellville Road East of Nassagawaya 1st Line	$750,000
C02 – Concession 11 E. East of Centre Road	$550,000
C03 – Concession 11 E. East of Highway 6.	$575,000
C04 – Campbellville Road East of Highway 6	$550,000

10.1.7.2 Description of the potential additional costs to the municipality(s)

This indicator analyzed the potential for additional costs to the municipality by considering the impacts to municipal maintenance operations regarding structures and pavement requirements.

10.1.7.3 Description of the Estimated Property Costs

The estimated property costs were determined by iTRANS in two stages. First, an estimate was completed for the property area of each major land use type that would be required to accommodate the recommended rural cross-section upgrades where specified for each alternative haul route. Then, the value of these property requirements were estimated using land values based on Multiple Listing Service listings. These property values are as follows.

Table 10-12: Property Costs

Property Costs for Each Land Use Type (Dollars per Square Metre)				
Farmland	Woodlots	Business	Community	Residential or vacant
7.50	7.50	18.50	18.50	30.00

To ensure a fair comparative evaluation of the alternative haul routes, the estimated property costs only account for the right-of-way widening necessary to accommodate the grading requirements of the recommended rural cross-sections. Accordingly, these property acquisition estimates to not account for improvements to the intersections, rail crossings, vertical or horizontal profile, or site access.

The residential and vacant property requirements were not separated due to the process in which the estimates were determined. The total property area requirements were first estimated and then subtracted from this total was the amount of farmland, woodlots or conservation land, business property, and community property. Although vacant property is generally valued less than residential property, it was conservative to assume the same values for each land use type.

10.2 Analysis Results

Each criteria and indicator was fully analyzed by the respective disciplines to provide a comparative evaluation of the alternative haul routes and determine the preferred haul route. Provided in each of the supporting technical documents is the full analysis and supporting information including data sources, assumptions, description of methodology, and results.

The results from the analysis of criteria and indicators are shown in **Table 10-13** to **Table 10-20**.

10.2.1 Aquatic Environment

Table 10-13: Results of Aquatic Environment Analysis

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
Savanta						
Potential for disturbance to aquatic habitat.	Number, character and sensitivity of watercourses crossed where road works are expected, exclusive of crossings of Highway 6). *Ephemeral – water flows for a short period of time in response to local precipitation events.* *Intermittent – water flows for several months of the year, usually in the wetter periods.*	MEDIUM 3 Permanent, 4 Intermittent 1 ephemeral = 8 crossings	HIGH 4 permanent 6 intermittent 2 ephemeral = 12 crossings	MEDIUM 1 permanent 2 intermittent 2 ephemeral = 5 crossings	HIGH 4 permanent 6 intermittent 3 ephemeral = 13 crossings	HIGH 5 permanent 8 intermittent 4 ephemeral = 17 crossings
	Likelihood of increased runoff effects on these watercourses. These effects can be managed largely through proven impact mitigation measures. Riparian conditions of permanent water courses at proposed crossings	LOW - MEDIUM Extension of existing crossings will result in slight increase in runoff from wider road/impervious surface. In short-term, until vegetation becomes re-established, there will be a slight increase in runoff from adjacent banks disturbed during construction.	LOW - MEDIUM Extension of existing crossings will result in slight increase in runoff from wider road/impervious surface. In short-term, until vegetation becomes re-established, there will be a slight increase in runoff from adjacent banks disturbed during construction.	LOW - MEDIUM Extension of existing crossings will result in slight increase in runoff from wider road/impervious surface. In short-term, until vegetation becomes re-established, there will be a slight increase in runoff from adjacent banks disturbed during construction.	LOW - MEDIUM Extension of existing crossings will result in slight increase in runoff from wider road/impervious surface. In short-term, until vegetation becomes re-established, there will be a slight increase in runoff from adjacent banks disturbed during construction.	LOW - MEDIUM Extension of existing crossings will result in slight increase in runoff from wider road/impervious surface. In short-term, until vegetation becomes re-established, there will be a slight increase in runoff from adjacent banks disturbed during construction.

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
	Potential for increased erosion and sediment loading to receiving streams during construction. These effects can be largely mitigated through appropriate construction sedimentation mitigation measures.	LOW - MEDIUM Use of appropriate sediment and erosion control measures, work within appropriate construction timing guidelines and isolation of work area will be required.	LOW - MEDIUM Use of appropriate sediment and erosion control measures, work within appropriate construction timing guidelines and isolation of work area will be required.	LOW - MEDIUM Use of appropriate sediment and erosion control measures, work within appropriate construction timing guidelines and isolation of work area will be required.	LOW - MEDIUM Use of appropriate sediment and erosion control measures, work within appropriate construction timing guidelines and isolation of work area will be required.	LOW - MEDIUM Use of appropriate sediment and erosion control measures, work within appropriate construction timing guidelines and isolation of work area will be required.
	Likelihood of water quality impacts to watercourses from runoff as a result of road improvements.	LOW - MEDIUM Extension of existing crossings will result in slight increase in runoff from wider road/impervious surface. This may result in increased introduction of chlorides and/or sand, in addition to other pollutants such as grease/oil, etc.	LOW - MEDIUM Extension of existing crossings will result in slight increase in runoff from wider road/impervious surface. This may result in increased introduction of chlorides and/or sand, in addition to other pollutants such as grease/oil, etc.	LOW - MEDIUM Extension of existing crossings will result in slight increase in runoff from wider road/impervious surface. This may result in increased introduction of chlorides and/or sand, in addition to other pollutants such as grease/oil, etc.	LOW - MEDIUM Extension of existing crossings will result in slight increase in runoff from wider road/impervious surface. This may result in increased introduction of chlorides and/or sand, in addition to other pollutants such as grease/oil, etc.	LOW - MEDIUM Extension of existing crossings will result in slight increase in runoff from wider road/impervious surface. This may result in increased introduction of chlorides and/or sand, in addition to other pollutants such as grease/oil, etc.
Potential for removal of aquatic habitat from road improvements (e.g. bridge or culvert extensions or replacements).	Number of watercourse culverts/structures that could require extension to accommodate road improvements.	Potential for improvement in fish habitat/passage and/or groundwater upwellings by replacing corrugated plastic pipe (FCC11) (and possibly those associated with intermittent/ephemeral) with open foot structure. 3 permanent and 5 intermittent/ ephemeral watercourse crossings may require extensions.	Potential for improvement in fish habitat/passage and/or groundwater upwellings by replacing corrugated plastic pipe (FCC11) and CSP (BCEC), (and possibly those associated with intermittent/ephemeral) with open foot structure. 4 permanent and 8 intermittent/ephemeral watercourses may require extensions.	Potential for improvement in fish habitat/passage and/or groundwater upwellings by replacing CSP (KCCR), (and possibly those associated with intermittent/ephemeral) with open foot structure. 1 permanent and 4 intermittent/ephemeral watercourses may require extensions.	Potential for improvement in fish habitat/passage and/or groundwater upwellings by replacing corrugated plastic pipe (FCC11) and CSP (KCCR), (and possibly those associated with intermittent/ephemeral) with open foot structure. 4 permanent and 9 intermittent/ephemeral watercourses may require extensions.	Potential for improvement in fish habitat/passage and/or groundwater upwellings by replacing corrugated plastic pipe (FCC11) and CSP (BCEC and KCCR), (and possibly those associated with intermittent/ephemeral) with open foot structure. 5 permanent and 12 intermittent/ephemeral watercourses may require extensions.

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
	Magnitude of removal effects.	MEDIUM	MEDIUM	MEDIUM	HIGH	HIGH
	Sensitivity of habitat affected. Brook trout and / or redside dace habitat at multiple crossing locations	HIGH	HIGH	HIGH	HIGH	HIGH
	Type of structure (bridge or culvert) being widened to accommodate road improvements	HIGH Permanent watercourses: 5m wide open box culvert (BCC11-2); 7.3 m wide open box culvert (MCC11-1); 0.4 m corrugated plastic pipe (FCC11-1)	MEDIUM Permanent watercourses: 6m open box culvert (BCCR1); 5m open box culvert (BCCR11-2); 7.3 m wide open box culvert (MCC11-1); 0.4 m corrugated plastic pipe (FCC11-1).	MEDIUM Permanent watercourses: Three 1.8 m diameter corrugated steel pipes (KCCR-3).	HIGH Permanent watercourses: 5m wide open box culvert (BCC11-2); 7.3 m wide open box culvert (MCC11-1); 0.4 m corrugated plastic pipe (FCC11-1)	MEDIUM Permanent watercourses: 6m open box culvert (BCCR1); 5m open box culvert (BCCR11-2); 7.3 m wide open box culvert (MCC11-1); 0.4 m corrugated plastic pipe (FCC11-1).

10.2.2 Terrestrial Environment

Table 10-14: Results of Terrestrial Environment Analysis

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
Savanta						
Potential for disturbance to natural habitat.	Number and identification of sensitive features that the haul routes pass by. Distance of designated significant features traversed through (rural road segments where alterations/effects may occur)	6 1) Fletcher Creek Swamp Forest; 2) Puslinch Southeast Swamp; 3) Beverly Swamp; 4) Freelton Esker Wetland Complex; 5) Mountsberg East Wetlands; and, 6) Carlisle North Forest.	6 1) Fletcher Creek Swamp Forest; 2) Puslinch Southeast Swamp; 3) Beverly Swamp; 4) Freelton Esker Wetland Complex; 5) Mountsberg East Wetlands; and, 6) Carlisle North Forest.	3 1) Mountsberg East Wetlands; 2) Carlisle North Forest; and, 3) Guelph Junction Woods and Extensions.	4 1) Freelton Esker Wetland Complex; 2) Mountsberg East Wetlands; 3) Carlisle North Forest; and, 4) Guelph Junction Woods.	5 1) Fletcher Creek Swamp Forest; 2) Puslinch Southeast Swamp; 3) Mountsberg East Wetlands; 4) Carlisle North Forest; and, 5) Guelph Junction Woods and Extensions.
	Effects on vegetation from increased run-off from new road works, dust, emissions, etc.	HIGH	HIGH	HIGH	HIGH	HIGH
Potential for removal of natural habitat from road improvements.	Area, character and sensitivity of vegetation to be removed due to required road improvements.	MEDIUM 1.6 ha	MEDIUM 1.4 ha	HIGH 4.5 ha	HIGH 5.6 ha	HIGH 5.8 ha
	Potential effects on wildlife as a result of habitat removal.	LOW Loss of habitat Edge Effects Windthrow Sunscald/dessication Part loss of deer wintering yard	LOW Loss of habitat Edge Effects Windthrow Sunscald/dessication Part loss of deer wintering yard	MEDIUM Loss of habitat Edge Effects Windthrow Sunscald/dessication Part loss of deer wintering yard	HIGH Loss of habitat Edge Effects Windthrow Sunscald/dessication Part loss of deer wintering yard	HIGH Loss of habitat Edge Effects Windthrow Sunscald/dessication Part loss of deer wintering yard

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
Potential for increased wildlife kills.	Presence of wildlife corridors that the routes pass through.	HIGH Significant connectivity between Freelton Esker Wetland on both sides of Conc 11, and between Mountsberg East Wetland and Carlisle North Forest MNR significant deer wintering yard in Lower Mountsberg Creek	HIGH Significant connectivity between Puslinch SE Swamp on both sides of Campbellville Road, and with Mountsberg East Wetland and Carlisle North Forest MNR significant deer wintering yard in Lower Mountsberg Creek	HIGH Significant connectivity between Mountsberg East Wetland on both sides of Milburough Rd, and with Guelph Junction Woods (and Carlisle North Forest) MNR significant deer wintering yard in Lower Mountsberg Creek	HIGH Significant connectivity between Freelton Esker Wetland on both sides of Conc 11, and between Mountsberg East Wetland and Carlisle North Forest MNR significant deer wintering yard in Lower Mountsberg Creek	HIGH Significant connectivity between PSS on both sides of Campbellville Road, with MEW on both sides of MIllburough Road and with Guelph Junction Woods (and Carlisle North Forest), and with Mountsberg East Wetland and Carlisle North Forest MNR significant deer wintering yard in Lower Mountsberg Creek
	Likelihood of increased vehicle wildlife conflicts as a result of increased truck traffic volumes.	HIGH	HIGH	HIGH	HIGH	HIGH
	Likelihood of increased vehicle wildlife conflicts as a result of the reluctance of wildlife to use longer/wider bridge or culvert structures.	MEDIUM	MEDIUM	HIGH	HIGH	HIGH

10.2.3 Land Uses

Table 10-15: Results of Land Uses Analysis

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
Glen Schnarr and Associates						
Potential for disruptive effects to sensitive planned land uses.	Number, character of planned development areas.	1 -Urban (Big Box Retail)	2 -Urban (Big Box Retail) -Chestnut Grove Estates (13 Lot Estate Residential)	1 -Bridlewood Estates (29 Lot Estate Residential)	2 -Urban (Big Box Retail) -Bridlewood Estates (29 Lot Estate Residential)	3 -Urban (Big Box Retail) -Bridlewood Estates (29 Lot Estate Residential) -Chestnut Grove Estates (13 Lot Estate Residential)
	Sensitivity of planned development to increased truck traffic.	LOW Sensitivity	LOW-MEDIUMSensitivity Chestnut Grove has large lots, no direct access to Campbellville Road	LOW- MEDIUM Sensitivity Currently on Reid Sideroad, a well-travelled truck route Seclusion, natural buffers No direct access to Reid from lots	LOW- MEDIUM Sensitivity Currently on Reid Sideroad, a well-travelled truck route Seclusion, natural buffers No direct access to Reid from lots	LOW- MEDIUM Sensitivity Includes both estate residential developments
Potential for removal of existing land uses from road improvements.	Area and sensitivity of existing land use eliminated by road improvements. * TPR = Total Property Required	MEDIUM land use impacts • Agricultural (medium low sensitivity) 11,727 sq.m. (55% of TPR*) • Wood lots and Conservation Lands 1,830 sq m. (8% of TPR) • Business (medium low sensitivity) 1,648 sq.m. (8% of TPR) • Community/Recreational (medium sensitivity) 0 sq.m. (0% of TPR) • Residential/vacant (medium high sensitivity) 6,274 sq.m. (29% of TPR)	LOW -MEDIUM land use impacts • Agricultural (medium low sensitivity) 14,373 sq.m. (64% of TPR) • Wood lots and Conservation Lands 0 sq m. (0% of TPR) • Business (medium low sensitivity) 2,009 sq.m. (9% of TPR) • Community/Recreational (medium sensitivity) 332 sq.m. (1% of TPR) • Residential/vacant (medium high sensitivity) 5,914 sq.m. (26% of TPR)	MEDIUM -HIGH land use impacts • Agricultural (medium low sensitivity) 19,305 sq.m. (57% of TPR) • Wood lots and Conservation Lands 3,185 sq m. (9% of TPR) • Business (medium low sensitivity) 1,515 sq.m. (4% of TPR) • Community/Recreational (medium sensitivity) 0 sq.m. (0% of TPR) • Residential/vacant (medium high sensitivity) 10,105 sq.m. (30% of TPR)	MEDIUM -HIGH land use impacts • Agricultural (medium low sensitivity) 25,140 sq.m. (52% of TPR) • Wood lots and Conservation Lands 4,252 sq m. (9% of TPR) • Business (medium low sensitivity) 2,574 sq.m. (5% of TPR) • Community/Recreational (medium sensitivity) 0 sq.m. (0% of TPR) • Residential/vacant (medium high sensitivity) 16,404 sq.m. (34% of TPR)	MEDIUM -HIGH land use impacts • Agricultural (medium low sensitivity) 25,903 sq.m. (52% of TPR) • Wood lots and Conservation Lands 3,185 sq m. (6% of TPR) • Business (medium low sensitivity) 3,295 sq.m. (7% of TPR) • Community/Recreational (medium sensitivity) 207 sq.m. (0% of TPR) • Residential/vacant (medium high sensitivity) 17,234 sq.m. (35% of TPR)

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
Conformity with applicable plans and polices.	Degree of conformity with Official Plans.	MEDIUM ▪ Improvements to Hwy 6 complies with Official Plans ▪ Concession Rd 11E requires municipal permission through possible Official Plan Amendment regarding max. ROW and road type	MEDIUM-HIGH ▪ Improvements to Hwy 6, Campbellville Rd. and Centre Rd. comply with Official Plans ▪ Concession Rd. 11E requires municipal approval through possible Official Plan Amendment regarding max ROW and road type	MEDIUM-HIGH ▪ Improvements to Reid Sdrd, Milburough Ln, and Campbellville Rd. comply with Official Plans ▪ Twiss Road, may require municipal permission through possible Official Plan Amendment regarding max ROW and road type	MEDIUM ▪ Improvements to Hwy 6, Reid Sdrd, and Campbellville comply with Official Plans ▪ Concession Rd 11 and Twiss Rd. may require municipal permission through possible Official Plan Amendment regarding max. ROW and road type	MEDIUM ▪ Improvements to Hwy 6, Reid Sdrd., Campbellville Rd., and Centre Road comply with Official Plans ▪ Concession Rd 11 and Twiss Rd. may require municipal permission through possible Official Plan Amendment regarding max. ROW and road type
	Degree of conformity with the Greenbelt Plan.	MEDIUM ▪ Least amount of land required for road improvements (minimizes the amount of Greenbelt traversed, and minimizes disturbance to landscape)	MEDIUM ▪ Relatively small (2nd lowest) amount of land required for road improvements (minimizes the amount of the Greenbelt traversed, and minimizes disturbance to landscape)	MEDIUM-HIGH ▪ Relatively small (3rd lowest) amount of land required for road improvements (minimizes amount of Greenbelt traversed) ▪ Closest / most direct route to majority of market	LOW -MEDIUM ▪ Relatively large (2nd highest) amount of land required for road improvements ▪ Does not minimize amount of land traversed within Greenbelt ▪ Includes most direct route to majority of market	LOW -MEDIUM ▪ Relatively large (highest) amount of land required for road improvements ▪ Does not minimize amount of land traversed within Greenbelt ▪ Includes most direct route to majority of market
	Degree of conformity with the Niagara Escarpment Plan.	HIGH	HIGH	HIGH	HIGH	HIGH

10.2.4 Social Environment and Community Impacts

Table 10-16: Results of Social Environment and Community Impact Analysis

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
Gartner Lee Limited						
Potential for disruption to residents' use and enjoyment of property.	Number of residences fronting and/or backing directly onto a potential truck route. Consideration of truck exposure (No. residences x No. quarry trucks one direction)	940 Truck Exposure Index (258,830)	976 Truck Exposure Index (215,350)	992 Truck Exposure Index (89,160)	1050 Truck Exposure Index (107,755)	1086 Truck Exposure Index (112,685)
	Ingress and egress interference at residential driveways Consideration of truck exposure (No. ingress and egress interference x No. quarry trucks one direction)	349 Truck Exposure Index (101,555)	366 Truck Exposure Index (107,645)	318 Truck Exposure Index (32,760)	392 Truck Exposure Index (44,125)	409 Truck Exposure Index (46,125)
	Number of defined neighbourhoods along a potential truck route. * Neighbourhoods are defined as a subdivision, a more substantial grouping of houses then a cluster but not a defined community either such as Freelton Consideration of truck exposure (No. defined neighbourhoods x No. quarry trucks one direction)	15 Truck Exposure Index (3,275)	17 Truck Exposure Index (3,615)	18 Truck Exposure Index (2,160)	18 Truck Exposure Index (2,240)	20 Truck Exposure Index (2,480)

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
	Ingress and egress interference at roadways used to access neighbourhoods along a potential truck route	20	20	23	23	23
	Consideration of truck exposure (No. ingress and egress interference x No. quarry trucks one direction)	Truck Exposure Index (5,300)	Truck Exposure Index (4,500)	Truck Exposure Index (2,310)	Truck Exposure Index (2,310)	Truck Exposure Index (2,310)
Potential for effects on community character	Qualitative assessment of likely changes to the unique or distinctive qualities of the communities potentially affected (i.e., physical, economic and/or socio-cultural features of the communities)	LOW This route affects the community of Morriston, and to a lesser extent the communities of Freelton and Milgrove because they are located off the main highway. 31 businesses or institutions that support the rural character of this community are located along this route. 15 defined neighbourhoods along this route.	MEDIUM This route affects the communities of Morriston, Mountsberg and to a lesser extent the communities of Freelton and Milgrove because they are located off the main highway. 37 businesses or institutions that support the rural character of this community are located along this route. 17 defined neighbourhoods along this route.	LOW This route affects the community of Morriston, and to a lesser extent the communities of Freelton and Milgrove because they are located off the main highway. 30 businesses or institutions that support the rural character of this community are located along this route. 18 defined neighbourhoods along route.	LOW-MEDIUM This route affects the community of Morriston and to a lesser extent the communities of Freelton and Milgrove because they are located off the main highway. 37 businesses or institutions that support the rural character of this community are located along this route. 18 defined neighbourhoods along this route.	HIGH This route affects the community of Mountsberg, Morriston and to a lesser extent the communities of Freelton and Milgrove because they are located off the main highway. 43 businesses or institutions that support the rural character of this community are located along this route. 20 number of defined neighbourhoods along this route.
	Change in the existing character of the road					
	Highway 6 (Hwy 401 to Hwy 403)	LOW Impact	LOW Impact		LOW Impact	LOW Impact
	Concession 11 (Hwy 6 to Centre)	HIGH Impact			MEDIUM Impact	
	Concession 11 (Centre to Milburough)	LOW Impact	LOW Impact		LOW Impact	LOW Impact

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
	Centre (Concession 11 to Campbellville)		HIGH Impact			MEDIUM Impact
	Campbellville (Hwy 6 to Centre)		LOW Impact			LOW Impact
	Milburough (Concession 11 to Campbellville)			HIGH Impact	HIGH Impact	HIGH Impact
	Campbellville (Milburough to Twiss)			MEDIUM-HIGH Impact	MEDIUM -HIGH Impact	MEDIUM-HIGH Impact
	Twiss (Campbellville to Reid)			LOW Impact	LOW Impact	LOW Impact
	Reid Sideroad (Twiss to Guelph Line)			LOW Impact	LOW Impact	LOW Impact
Potential for effects on community cohesion	Qualitative assessment of likely changes to community cohesion due to disruption and/or displacement effects, potential for voluntary out-migration and creation of a barrier effects due to truck traffic.	MEDIUM: The haul route travels along Highway 6 through the main street/town centre of the Village of Morriston therefore bisecting the community. The community of Freelton and Milgrove is located along the route on Highway 6; however, this is a major road that already experiences heavy traffic. The Freelton and Milgrove town centres are located to the north of Highway 6; therefore, the effect on community cohesion in these communities is considered low. This route does not bisect any defined neighbourhoods or clusters.	HIGH: The haul route travels along Highway 6 through the main street/town centre of the Village of Morriston; and along Centre street; therefore bisecting the communities of Mountsberg and Morriston. The community of Freelton and Milgrove is located along the route on Highway 6; however, this is a major road that already experiences heavy traffic. The Freelton and Milgrove town centres are located to the north of Highway 6; therefore, the effect on community cohesion in these communities is considered low.	LOW: Some trucks may travel along Highway 6 through the main street/town centre of the Village of Morriston therefore bisecting the community. The community of Freelton and Milgrove is located along the route on Highway 6; however, this is a major road that already experiences heavy traffic. The Freelton and Milgrove town centres are located to the north of Highway 6; therefore, the effect on community cohesion in these communities is considered low. This route does not bisect any defined neighbourhoods or clusters.	MEDIUM: The haul route travels along Highway 6 through the main street/town centre of the Village of Morriston therefore bisecting the community. The community of Freelton and Milgrove is located along the route on Highway 6; however, this is a major road that already experiences heavy traffic. The Freelton and Milgrove town centres are located to the north of Highway 6; therefore, the effect on community cohesion in these communities is considered low. This route does not bisect any defined neighbourhoods or clusters.	HIGH: The haul route travels along Highway 6 through the main street/town centre of the Village of Morriston; and along Centre street; therefore bisecting the communities of Mountsberg and Morriston. The community of Freelton and Milgrove is located along the route on Highway 6; however, this is a major road that already experiences heavy traffic. The Freelton and Milgrove town centres are located to the north of Highway 6; therefore, the effect on community cohesion in these communities is considered low.

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
			This route does not bisect any defined neighbourhoods or clusters.			This route does not bisect any defined neighbourhoods or clusters.
Potential for disruption to users of operations at recreational and community features and/or institutions.	Number of recreational or community features and/or institutions located along a potential truck route. Consideration of truck exposure (No. community features x No. quarry trucks one direction)	22 Truck Exposure Index (6,125)	24 Truck Exposure Index (6,465)	27 Truck Exposure Index (5,130)	30 Truck Exposure Index (5,090)	32 Truck Exposure Index (5,330)
	Number of sensitive / vulnerable recreational or community features and/or institutions. Consideration of truck exposure (No. vulnerable community features x No. quarry trucks one direction)	19 Truck Exposure Index (5,870)	21 Truck Exposure Index (6,210)	22 Truck Exposure Index (3,900)	25 Truck Exposure Index (4,000)	27 Truck Exposure Index (4,240)
	Ingress and egress interference at entrances to recreational or community features and/or institutions. Consideration of truck exposure (No. ingress and egress interference x No. quarry trucks one direction)	12 Truck Exposure Index (3,905)	16 Truck Exposure Index (5,785)	20 Truck Exposure Index (5,460)	21 Truck Exposure Index (4,840)	25 Truck Exposure Index (5,305)
Potential for displacement/ removal of residents & residential property from road improvements.	Number and area of residences/residential property required (partial removals).	58 6,274 sqm	123 5,914 sqm	79 10,105 sqm	137 16,404sqm	202 17,243 sqm
	Number and area of residences/residential properties required (full displacement)	None	None	None	None	None

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
	Number of vulnerable residents/households displaced	None	None	None	None	None
Potential for displacement/ removal of recreational or community features and/or institutions.	Number and area of recreational or community features (including trails, bicycle routes, parks and open space) and/or institutional properties required (partial removals).	None. There is potential for 0 sqm partial displacement. After the proposed cross-section changes are implemented there is 0 km of the route without adequate shoulders for pedestrians and cyclists.	There is 1 community feature along this route that may require partial property displacement (Mountsberg Community Centre). There is potential for 332 sqm partial displacement. After the proposed cross-section changes are implemented there is 0 km of the route without adequate shoulders for pedestrians and cyclists.	None There is potential for 0 sqm partial displacement. After the proposed cross-section changes are implemented there is 0 km of the route without adequate shoulders for pedestrians and cyclists.	None There is potential for 0 sqm partial displacement. After the proposed cross-section changes are implemented there is 0 km of the route without adequate shoulders for pedestrians and cyclists.	There is 1 community feature along this route that may require partial property displacement (Mountsberg Community Centre). There is potential for 207 sqm partial displacement. After the proposed cross-section changes are implemented there is 0 km of the route without adequate shoulders for pedestrians and cyclists.
	Number and area of recreational or community features (including trails, bicycle routes, parks and open space) and/or institutional properties required (full displacement).	None	None	None	None	None
	Number of sensitive / vulnerable recreational or community features and institutions displaced.	There are 19 sensitive / vulnerable recreational or community features and institutions that may be impacted by the route. The route will not displace any of these features.	There are 21 sensitive / vulnerable recreational or community features and institutions that may be impacted by the route. The route will not displace any of these features.	There are 22 sensitive / vulnerable recreational or community features and institutions that may be impacted by the route. The route will not displace any of these features.	There are 25 sensitive / vulnerable recreational or community features and institutions that may be impacted by the route. The route will not displace any of these features.	There are 27 sensitive / vulnerable recreational or community features and institutions that may be impacted by the route. The route will not displace any of these features.

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
RWDI Air Inc						
Noise impacts on community	No of residences experiencing changes in noise levels: • 0 to 3 dB • > 3 to 5 dB • > 5 to 10 dB • > 10 dB	• 1037 • 85 • 30 • 57	• 998 • 85 • 48 • 75	• 12 • 0 • 83 • 42	• 809 • 85 • 107 • 99	• 1085 • 85 • 125 • 117
	No of Schools, Daycares, Senior Housing on route	• 0	• 1 • Mountsberg Community Centre	• 0	• 0	• 1 • Mountsberg Community Centrre
	No of Churches or Places of worship on route [N1]	• 1 • Seventh Day Adventist	• 2 • Seventh Day Adventist • Mountsberg Baptist	• 1 • St. David's Presbyterian	• 2 • St. David's Presbyterian • Seventh Day Adventist	• 3 • St. David's Presbyterian • Seventh Day Adventist • Mountsberg Baptist
	Relative Evaluation Score [N1]	• 567	• 879	• 551	• 1100	• 1412
	Note N1: Quantitative Noise Evaluation score is calculated as follows: Number of Residences in 3 to 5 dB category x 1 + Number of Residences in 5 to 10 dB category x 3 + Number of Residences in > 10 dB category x 6 + Number of Schools, Daycares, and Senior Housings x 100 + Number of Places of Worship x 50 Evaluation Score For Alternative 3, does not include 60 truck movements per day along Highway 6, as this represents an negligible increase over existing conditions For Alternatives 1, 2, 4 and 5, does not include the United Church of Hamilton (1552 Hwy 6) as changes are insignificant in this area					
Air quality impacts on community	Number of residences that would experience potential air quality impacts as a result of tail pipe emissions (<200m from roadway). [AQ1]	• 1209 receptors from 10m to 500m from the edge of the roadway • 834 Receptors less than 200 m from edge of roadway • • Quantitative Rating: 3863	• 1206 receptors from 10m to 500m from the edge of the roadway • 857 Receptors less than 200 m from roadway • Quantitative Rating: 3929	• 138 receptors from 10m to 500m from the edge of the roadway • 65 Receptors less than 200 m from roadway • Quantitative Rating: 386	• 1347 receptors from 10m to 500m from the edge of the roadway • 900 receptors less than 200 m from roadway • Quantitative Rating: 4249	• 1344 receptors from 10m to 500m from the edge of the roadway • 923 Receptors less than 200 m from roadway • Quantitative Rating: 4315

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
	Note AQ1: Quantitative Air Quality Evaluation score is calculated as follows (used for air quality, dust, and potential human health impacts): No of residences within 500 m of roadway x 1 + No of residences located on downwind side of roadway with respect to prevailing winds x 1 + No of residences located downwind side of roadway with respect to prevailing winds x 1 + No of residences located <10m from Roadway x 4 + No of residences located between 10 and 20m from roadway x 2 + No of residences located between 20 and 50m from roadway x 1 + No of residences where the speed limit is >80km/hour x 2 + No of residences where the shoulder is unpaved x 2 + No of residences where traffic increase due to hauling increases average traffic counts by >200% x 5 + No of residences where traffic increase due to hauling increases average traffic counts by >100% x 3 + No of residences where traffic increase due to hauling increases average traffic counts by >50% x 1 + No. of Schools, Daycares, and Senior Housings x 100 + No. Places of Worship x 50 Evaluation Score For Alternative 3, does not include 60 truck movements per day along Highway 6, as this represents an negligible increase over existing conditions For Alternatives 1, 2, 4 and 5, does not include the United Church of Hamilton (1552 Hwy 6) as changes are insignificant in this area					
Dust impacts on community	Number of residences likely to experience dust impacts as a result of additional truck traffic. [AQ1]	1209 receptors from 10m to 500m from the edge of the roadway 834 Receptors less than 200 m from edge of roadway Quantitative Rating: 3863	1206 receptors from 10m to 500m from the edge of the roadway 857 Receptors less than 200 m from roadway Quantitative Rating: 3929	137 receptors from 10m to 500m from the edge of the roadway 65 Receptors less than 200 m from roadway Quantitative Rating: 386	1350 receptors from 10m to 500m from the edge of the roadway 900 receptors less than 200 m from roadway Quantitative Rating: 4249	1347 receptors from 10m to 500m from the edge of the roadway 923 Receptors less than 200 m from roadway Quantitative Rating: 4315
	Note AQ1: See Notes portion of "Air quality impacts on community" section for note AQ1 and explanation of relative evaluation score					
Vibration impact on community	Number of residences likely to experience vibrational impacts as a result of increased truck traffic. [V1]	LOW	LOW	LOW	LOW	LOW
	Note V1: No residences are expected to be adversely impacted by road traffic related vibration. Alternatives are equally preferable.					

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
Potential for health impacts on community	Number of residences (receptors) within 200m of the haul routes that would potentially be exposed to substances resulting from tail pipe emissions due to air quality impacts related to increased truck traffic. [AQ1][HH1]	834 Receptors less than 200 m from edge of roadway Quantitative Rating: 3863	857 Receptors less than 200 m from roadway Quantitative Rating: 3929	66 Receptors less than 200 m from roadway Quantitative Rating: 386	900 receptors less than 200 m from roadway Quantitative Rating: 4249	923 Receptors less than 200 m from roadway Quantitative Rating: 4315
	Note AQ1: See Notes portion of "Air quality impacts on community" section for note AQ1 and explanation of relative evaluation score Note HH1: Potential health impacts due to additional haul route traffic are directly related to the emissions as a part of the air quality assessment. Alternative Route #3 has a relatively lower potential for air quality impacts and has less residences along the route. Therefore, from a human health perspective, this route represents the least predicted impact. Utilize the resident counts and rankings from the air quality section					

10.2.5 Economic Environment and Business Impacts

Table 10-17: Results of Economic Environments and Business Impact Analysis

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
Gartner Lee Limited						
Potential for disruption to business enterprises.	Number of business enterprises fronting and/or backing along a potential truck route. Consideration of truck exposure (No. businesses x No. quarry trucks one direction)	152 Truck Exposure Index (31,030)	152 Truck Exposure Index (29,030)	178 Truck Exposure Index (22,620)	184 Truck Exposure Index (23,820)	184 Truck Exposure Index (23,845)
	Number of sensitive / vulnerable business enterprises fronting and/or backing along a potential truck route Consideration of truck exposure (No. sensitive businesses x No. quarry trucks one direction)	38 Truck Exposure Index (10,455)	40 Truck Exposure Index (10,395)	46 Truck Exposure Index (8,400)	51 Truck Exposure Index (8,410)	53 Truck Exposure Index (8,865)
	Ingress and egress interference at entrances to business enterprises. Consideration of truck exposure (No. ingress and egress x No. quarry trucks one direction)	155 Truck Exposure Index (30,885)	154 Truck Exposure Index (28,315)	158 Truck Exposure Index (9,600)	164 Truck Exposure Index (13,540)	163 Truck Exposure Index (13,450)
Potential for removal of business enterprises and/ or property.	Number and area of business enterprise and/or other commercial or industrial property required (partial removals).	4 1,648 sqm	2 2,009 sqm	3 1,515 sqm	7 2,574 sqm	5 3,295 sqm

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
	Number and area of business enterprise and/or other commercial/industrial property required (full displacement)	None	None	None	None	None
	Number of sensitive / vulnerable business enterprises displaced.	None	None	None	None	None
Potential magnitude of effects on property values.	Qualitative assessment of the potential magnitude of effects on property values due to changes in traffic, traffic noise and roadway visibility at residential properties. Assessment is based on noise and air quality analysis, driveway exposure index, and number of residences fronting and/or backing directly onto a potential truck route	LOW - MEDIUM	MEDIUM - HIGH	LOW	MEDIUM	HIGH
RWDI Air Inc.						
Noise impacts on businesses	Number of businesses expected to experience increases in noise levels over future baseline [N1, N2]	3	22	8	11	30
	Note N1: Industrial and agricultural not included. Note N2: Does not include businesses along Highway 6. Due to existing background traffic, changes due to the proposal will be insignificant at all businesses along Highway 6 portions of the haul routes.					
Air quality impacts on businesses	Number of businesses along the proposed haul route(s) affected dust as a result of additional truck traffic [AQ1, AQ2]	3	22	8	11	30

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
	Note AQ1: Industrial and agricultural not included. Note AQ2: Does not include businesses along Highway 6. Due to existing background traffic, changes due to the proposal will be insignificant at all businesses along Highway 6 portions of the haul routes					
Dust impacts on businesses	Number of businesses along the proposed haul route(s) affected dust as a result of additional truck traffic [AQ1, AQ2]	3	22	8	11	30
	Note AQ1: Industrial and agricultural not included. Note AQ2: Does not include businesses along Highway 6. Due to existing background traffic, changes due to the proposal will be insignificant at all businesses along Highway 6 portions of the haul routes					
Conna Consulting Inc.						
Potential for effect on agricultural operations.	Number and type of farms along the haul route potentially disrupted by truck traffic. Consideration of Truck Exposure (No. farms x No. quarry trucks one direction)	Equestrian (12) Other livestock (3) Cash crop (22) Agricultural Market/Nursery (5) **Total (42)** Truck Exposure Index (12,820)	Equestrian (12) Other livestock (5) Cash crop (27) Agricultural Market/Nursery (5) **Total (49)** Truck Exposure Index (16,010)	Equestrian (10) Other livestock (3) Cash crop (20) Agricultural Market/Nursery (4) **Total (37)** Truck Exposure Index (3,810)	Equestrian (15) Other livestock (3) Cash crop (24) Agricultural Market/Nursery (5) **Total (47)** Truck Exposure Index (5,290)	Equestrian (15) Other livestock (5) Cash crop (29) Agricultural Market/Nursery (5) **Total (54)** Truck Exposure Index (6,105)
	Area (sqm) and productivity/value of cropland removed for road improvements. Cropland is a subset of farm property	LOW 3,670 sq m	MEDIUM 8,105 sq m	MEDIUM 2,612 sq m	LOW-MEDIUM 5,175 sq m	MEDIUM 7,375 sq m

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
	Number and area (sqm) of farm properties required for road improvements. Considered a farm property if the lot is greater than 10 acres and can include cropland.	24 11,727 sq m	40 14,373 sq m	25 19,305 sq m	49 25,140 sq m	65 25,903 sq m

10.2.6 Cultural and Heritage Resources

Table 10-18: Results of Cultural and Heritage Resource Analysis

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
Archaeologix Inc.						
Potential for disturbance to built heritage/cultural features	Number and character of built heritage features potentially affected by truck traffic. Note: Highway 6 has heritage structures requiring further assessment in the villages of Freelton and Morriston (both treated as cultural landscape units) but their impact is already moderated by the heavier traffic of Highway 6 compared to the rest of the study area.	There were 6 built heritage features (including 2 subsumed under a cultural landscape unit) along this route: five houses and a barn dating from *c.*1840 to *c.*1900. The character of the built heritage is highly significant given some of the buildings have been listed in the City of Hamilton heritage inventory.	There were 20 built heritage features (including 6 subsumed under a cultural landscape unit) along this route: 15 houses, two barns, and a church with its associated cemetery and rectory dating from *c.*1835 to 1922. The character of the built heritage is highly significant given some of the buildings have been listed in the City of Hamilton heritage inventory or designated under Part IV of the *Ontario Heritage Act*.	There were 2 built heritage features along this route excluding Highway 6: two houses dating from *c.*1860 to *c.*1890. Given the presence of not many heritage properties, the character of the built heritage is moderately significant.	There were 8 built heritage features (including 2 subsumed under a cultural landscape unit) along this route: seven houses and a barn dating from *c.*1840 to *c.*1900. The character of the built heritage is highly significant given some of the buildings have been listed in the City of Hamilton heritage inventory.	There were 22 built heritage features (including 6 subsumed under a cultural landscape unit) along this route: 17 houses, two barns, and a church with its associated cemetery and rectory dating from *c.*1835 to 1922. The character of the built heritage is highly significant given some of the buildings have been listed in the City of Hamilton heritage inventory or designated under Part IV of the *Ontario Heritage Act*.
	Consideration of Truck Exposure (No. Built Heritage features x No. quarry trucks one direction)	Truck Exposure Index (3,420)	Truck Exposure Index (11,400)	Truck Exposure Index (1,140)	Truck Exposure Index (1,600)	Truck Exposure Index (3,210)
	Number of heritage properties removed from construction of road improvements (distinguish between partial and full removals). (Understanding is that heritage property refers to the building itself-Potential Land removals have been accounted for in other sections)	LOW No heritage properties would be removed since they are far enough back from the road, but any identified cultural landscape units could be impacted by the construction and would need further assessment to see what preservation measures need to be undertaken. Along this route, 2 cultural landscape units were identified.	LOW No heritage properties would be removed since they are far enough back from the road, but any identified cultural landscape units could be impacted by the construction and would need further assessment to see what preservation measures need to be undertaken. Along this route, 5 cultural landscape units were identified.	LOW No heritage properties would be removed since they are far enough back from the road, but any identified cultural landscape units could be impacted by the construction and would need further assessment to see what preservation measures need to be undertaken. Along this route, 0 cultural landscape units were identified.	LOW No heritage properties would be removed since they are far enough back from the road, but any identified cultural landscape units could be impacted by the construction and would need further assessment to see what preservation measures need to be undertaken. Along this route, 2 cultural landscape units were identified.	LOW No heritage properties would be removed since they are far enough back from the road, but any identified cultural landscape units could be impacted by the construction and would need further assessment to see what preservation measures need to be undertaken. Along this route, 5 cultural landscape units were identified.

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
Potential for effects on archaeological resources	Potential for effects on archaeological resources as a result of road improvements (as reflected through archaeological potential). Note: Highway 6 currently has no standing archaeological issues that will be affected by increased traffic, *assuming that no road expansion will be made along Highway 6*.	Approximately 5.3 km of the roadside (measuring the two sides of the road separately) or 44.91% of this route exhibits moderate to HIGH archaeological potential that would need Stage 2 archaeological assessment to determine if any archaeological remains would be impacted.	Approximately 11.2 km of the roadside (measuring the two sides of the road separately) or 61.54% of this route exhibits moderate to HIGH archaeological potential that would need Stage 2 archaeological assessment to determine if any archaeological remains would be impacted.	Approximately 5.7 km of the roadside (measuring the two sides of the road separately) or 34.76% of this route exhibits moderate to HIGH archaeological potential that would need Stage 2 archaeological assessment to determine if any archaeological remains would be impacted.	Approximately 11.0 km of the roadside (measuring the two sides of the road separately) or 39.01% of this route exhibits moderate to HIGH archaeological potential that would need Stage 2 archaeological assessment to determine if any archaeological remains would be impacted.	Approximately 16.9 km of the roadside (measuring the two sides of the road separately) or 48.84% of this route exhibits moderate to HIGH archaeological potential that would need Stage 2 archaeological assessment to determine if any archaeological remains would be impacted.

10.2.7 Transportation

Table 10-19: Results of Transportation Analysis

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
iTRANS Consulting Inc.						
Change in road service level	Change in road level of service/congestion (considers road section, length, change in level of service) Total average delay increase per route per vehicle	75 seconds	76 seconds	48 seconds	50 seconds	47 seconds
	Unsignalized (Total average delay increase per route per vehicle)	4 seconds	4 seconds	35 seconds	32 seconds	32 seconds
	Signalized (Total average delay increase per route per vehicle)	71 seconds	82 seconds	11 seconds	19 seconds	15 seconds
	Signalized (Total average change in v/c per route per vehicle)	0.04	0.05	0.01	0.02	0.01
	Change in access levels for road users (Change in delay to side street traffic in 2031 with and without quarry truck traffic)	0 seconds	2 seconds	3 seconds	2 seconds	1 second

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
	Effects on other roadways as a result of traffic diversion	LOW Impact No traffic diversion as a result of quarry operations	LOW Impact No traffic diversion as a result of quarry operations	LOW Impact No traffic diversion as a result of quarry operations	LOW Impact No traffic diversion as a result of quarry operations	LOW Impact No traffic diversion as a result of quarry operations
	Potential for delay to quarry trucks at level rail crossings. (Percent chance of being delayed)	0%	0%	5.2% at Twiss Crossing 2.9% at Campbellville Crossing	5.2% at Twiss Crossing 2.9% at Campbellville Crossing	5.2% at Twiss Crossing 2.9% at Campbellville Crossing
Potential for change in road safety level	Potential for increase in collision frequency and severity. (Difference in safety index with and without the quarry in 2031) Note: The percentage change in collisions (expressed as equivalent property damage collisions) that are expected as a result in the increase in volumes due to the quarry traffic	1.4%	1.4%	0.8%	0.9%	0.9%
	Number of access points along the haul route.	516	536	496	577	597
	Number of intersections along the haul route. Consideration of Truck Exposure (No. intersections x No. quarry trucks one direction)	41 Truck Exposure Index (10,710)	44 Truck Exposure Index (11,220)	47 Truck Exposure Index (6,540)	52 Truck Exposure Index (7,680)	55 Truck Exposure Index (7,925)
	Truck-rail exposure index at level rail crossings (daily # trains x daily # quarry trucks in one direction)	0 No level rail crossings	0 No level rail crossings	12,540 at Twiss crossing 2,280 at Campbellville crossing	10,010 at Twiss crossing 1,820 at Campbellville Crossing	10,010 at Twiss crossing 1,820 at Campbellville Crossing

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
	Driveway exposure index (# driveways x quarry truck traffic)	136,345	141,745	47,820	62,505	64,880
	Number of sections with limited sight lines and/or steep grades on non-provincial highways (by direction) Number of intersections with limited sight lines and/or steep grades on non-provincial highways	9 1	21 3	15 3	24 4	36 6
	School bus route lengths (km) along the haul route (Frequency of school bus trips x segment length). Consideration of Truck Exposure (bus km x No. quarry trucks one direction)	196 km Truck Exposure Index (46,467)	228 km Truck Exposure Index (57,067)	206 km Truck Exposure Index (32,052)	244 km Truck Exposure Index (35,558)	276 km Truck Exposure Index (39,302)
	Conflict with agricultural vehicles and equipment.	MEDIUM	HIGH	LOW	MEDIUM	HIGH
Change in Road Function	Increase in Traffic: ▪ daily expressed as the maximum traffic increase that would be experienced along a portion of the alternative haul route ▪ average increase experienced on a haul route link expressed as a percentage	1308 vehicles 50%	1308 vehicles 34%	1150 vehicles 46%	920 vehicles 47%	920 vehicles 31%

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
	Required change in road classification	LOW-MEDIUM no change in road classification	LOW no change in road classification	LOW-MEDIUM no change in road classification but there will be a change in the environment from residential to mixed traffic	LOW-MEDIUM no change in road classification but there will be a change in the environment from residential to mixed traffic	LOW-MEDIUM no change in road classification but there will be a change in the environment from residential to mixed traffic
	Road widening required					
	Highway 6 (Hwy 401 to Hwy 403)	No widening	No widening	No widening	No widening	No widening
	Concession 11 (Hwy 6 to Centre)	Widen paved surface from approximately 6.17 m to 12.50 m			Widen paved surface from approximately 6.17 m to 11.00 m	
	Concession 11 (Centre to Milburough)	Widen paved surface from 6.46 m to 10.50 m	Widen paved surface from 6.46 m to 10.50 m		Widen paved surface from 6.46 m to 10.50 m	Widen paved surface from 6.46 m to 10.50 m
	Centre (Concession 11 to Campbellville)		Widen paved surface from approximately 6.70 m to 12.50 m			Widen paved surface from approximately 6.70 m to 11.00 m
	Campbellville (Hwy 6 to Centre)		Widen paved surface from approximately 6.41 m to 10.50 m			Widen paved surface from approximately 6.41 m to 10.50 m
	Milburough (Concession 11 to Campbellville)			Widen paved surface from 6.70 m to 12.50 m	Widen paved surface from 6.70 m to 12.50 m	Widen paved surface from 6.70 m to 12.50 m
	Campbellville (Milburough to Twiss)			Widen paved surface from 6.51 m to 12.50 m	Widen paved surface from 6.51 m to 12.50 m	Widen paved surface from 6.51 m to 12.50 m
	Twiss (Campbellville to Reid)			Widen paved surface from 7.00 m to 10.50 m	Widen paved surface from 7.00 m to 10.50 m	Widen paved surface from 7.00 m to 10.50 m
	Reid Sideroad (Twiss to Guelph Line)			Widen paved surface from 6.50 m to 10.50 m	Widen paved surface from 6.50 m to 10.50 m	Widen paved surface from 6.50 m to 10.50 m

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
Potential for conflicts with cyclists	Length of route coinciding with designated or cautionary, unsigned bike routes	2.5 km	3.3 km	6.1 km	8.6 km	9.4 km
	Length of route without adequate shoulders for cyclists	LOW After the proposed cross-section changes are implemented there is 0 km of designated cycling routes without adequate shoulders.	LOW After the proposed cross-section changes are implemented there is 0 km of designated cycling routes without adequate shoulders.	LOW After the proposed cross-section changes are implemented there is 0 km of designated cycling routes without adequate shoulders.	LOW After the proposed cross-section changes are implemented there is 0 km of designated cycling routes without adequate shoulders.	LOW After the proposed cross-section changes are implemented there is 0 km of designated cycling routes without adequate shoulders.
Potential for conflicts with pedestrians	Number of schools along the route	No schools along this route	No schools along this route	No schools along this route	No schools along this route	No schools along this route
	Number of parks and community centres excluding Highway 6	1 parks and community institutions ▪ Lawson Park	4 parks and community institutions ▪ Lawson Park ▪ Memorial Park ▪ Mountsberg Community Centre (Historic School House) ▪ Mountsberg Baptist Church and Cemetery	2 parks and community institutions ▪ Campbellville New Ball Park ▪ Campbellville Emergency Response Centre (Firehall#2)	3 parks and community institutions ▪ Lawson Park ▪ Campbellville New Ball Park ▪ Campbellville Emergency Response Centre (Firehall#2)	6 parks and community institutions ▪ Lawson Park ▪ Memorial Park ▪ Mountsberg Community Centre (Historic School House) ▪ Mountsberg Baptist Church and Cemetery ▪ Campbellville New Ball Park ▪ Campbellville Emergency Response Centre (Firehall#2)
	Length of route without adequate shoulders/sidewalks for pedestrians	LOW After the proposed cross-section changes are implemented there is 0 km of the route without adequate shoulders for pedestrians. There are no sidewalks along the route.	LOW After the proposed cross-section changes are implemented there is 0 km of the route without adequate shoulders for pedestrians. There are no sidewalks along the route.	LOW After the proposed cross-section changes are implemented there is 0 km of the route without adequate shoulders for pedestrians. There are no sidewalks along the route.	LOW After the proposed cross-section changes are implemented there is 0 km of the route without adequate shoulders for pedestrians. There are no sidewalks along the route.	LOW After the proposed cross-section changes are implemented there is 0 km of the route without adequate shoulders for pedestrians. There are no sidewalks along the route.

10.2.8 Cost

Table 10-20: Results of Cost Analysis

Criteria	Indicators	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
iTRANS Consulting Inc., RJ. Burnside, and Golder						
Estimated infrastructure costs	Estimated cost for all required road and other infrastructure improvements.	Least expensive	2nd least expensive	3rd most expensive	2nd most expensive	Most expensive
	Potential for additional costs to the municipality(s) (e.g. impacts to municipal maintenance operations).	MEDIUM	MEDIUM	MEDIUM	MEDIUM	MEDIUM
	Estimated property costs for all required road improvements. This estimate is based on the cost to implement the rural cross-section road alterations.	Least expensive	2nd least expensive	3rd most expensive	2nd most expensive	Most expensive
	Approximate property area potentially impacted.	22,000sq m	23,000sq m	34,000 sq m	48,000 sq m	50,000 sq m

11. EVALUATION OF THE ALTERNATIVE HAUL ROUTES

11.1 Evaluation Approach

The evaluation of the five alternative haul routes has been conducted in a systematic manner and is consistent with the Ontario Environmental Assessment Act. It addresses all requirements as listed in the Terms of Reference for this study. The evaluation is based on the results that are summarized in the analysis tables and centred on the evaluation criteria and indicators as approved by CART.

A comparative evaluation was carried out of the alternative haul routes for a proposed quarry in the area of Concession 11 E and Milburough Line. The evaluation process involved two separate evaluations – a qualitative evaluation and a quantitative evaluation. The use of two different evaluation methods was intended to identify the sensitivity of the evaluation criteria to a particular route, and to test if the two methods arrive at the same preliminary preferred haul route. They are regarded as complementary approaches.

11.2 Qualitative Evaluation

The qualitative evaluation involved a non-quantitative assessment of the alternative haul routes with respect to the eight major evaluation factors: Aquatic Environment, Terrestrial Environment, Land Uses, Social Environment, Economic Environment, Cultural Heritage, Transportation, and Cost. A select group of specialists reviewed the analysis table and discussed the key advantages and disadvantages of each of the alternatives for each of the criteria and indicators. After documenting the rationale for each factor, each participant qualitatively assessed each alternative using professional judgment in terms of "most preferred" alternative haul route to the "least preferred" alternative haul route (**Table 11-1**). After reviewing the assessment of each participant, the group came to a consensus on the qualitative assessment for each factor.

Table 11-1: Consensus on Qualitative Evaluation Summary of Alternative Haul Routes

	Qualitative Evaluation				
Category	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
Aquatic Environment (more important)	◕	◑	●	◔	○
Terrestrial Environment (more important)	●	●	◑	◑	◑
Land Uses (important)	●	◕	◑	◔	○
Social & Community Impacts (most important)	●	◕	●	◔	○
Economic Environment & Business Impacts (more important)	◕	◑	●	◔	○
Cultural & Heritage Resources (important)	◕	◔	●	◑	○
Transportation (most important)	◑	◔	●	◑	◕
Cost (more important)	●	◕	◕	◔	◔
Overall	◕	◑	●	◔	○

Legend

● ◕ ◑ ◔ ○

most preferred ← → least preferred

One of the main advantages of this approach is that it considers only the main trade-offs among the alternatives, and therefore highlights the major advantages, and disadvantages for each alternative.

11.2.1 Aquatic Environment / Surface Water

According to the consensus of specialists, Alternative Haul Route 3 is the most preferred alternative with respect to the aquatic environment. This route has the lowest potential for disturbance to aquatic habitat and the fewest number of watercourses crossed. With Alternative Haul Route 3, only 1 permanent watercourse may require an extension, minimizing the potential for removal of aquatic habitat.

According to the consensus of specialists, the least preferred alternatives are Alternative Haul Routes 4 and 5, because they impact the greatest number of aquatic habitats and the magnitude of removal effects is anticipated to be relatively high.

11.2.2 Terrestrial Environment

According to the consensus of specialists, Alternatives 1 and 2 are the most preferred alternatives with respect to the Terrestrial Environment. These routes have the smallest distance of designated significant features traversed by truck and also have the least relative potential for removal of natural habitat from road improvements. Alternatives 1 and 2 also have a lower likelihood of increased vehicle wildlife conflicts given wildlife tend not to use longer or wider bridge or culvert structures.

Alternative Haul Routes 3, 4, and 5 are the least preferred alternatives because they have a relatively high potential for removal of natural habitat as a result of the proposed road alterations and a higher sensitivity of vegetation that may need to be removed.

11.2.3 Land Uses

According to the consensus of specialists, the most preferred alternative with respect to impacts on Land Uses is Alternative Haul Route 1 as there would not be significant impacts on the planned land use and there is good conformity with applicable plans and policies.

The least preferred alternatives would be Alternative Haul Routes 4 and 5 because there are more planned developments along the route and a higher potential impact to planned land use that may result from road allowance widening.

11.2.4 Social Environment and Community Impacts

According to the consensus of specialists, both Alternative Haul Routes 1 and 3 are the most preferred with respect to social and community impacts. These alternatives have the fewest number of residences fronting and / or backing directly onto a truck route and have been assessed to have a low impact on community character. While Alternative 1 requires the smallest area of residential property, Alternative Haul Route3 requires no community or recreational property to accommodate the proposed road improvements. Alternative Haul Routes 1 and 3 have the lowest relative noise impact and Alternative Haul Route 1 has a lower air quality impact as a result of minimal exposure of receptors along Highway 6 relative to the other alternatives.

Alternative Haul Routes 4 and 5 are the least preferred because they impact the greatest number of residences and community features and have the greatest property impact of potential road allowance widening.

11.2.5 Economic Environment and Business Impacts

According to the consensus of specialists, Alternative Haul Route 3 is considered the most preferred alternative with respect to economic and business environment. When consideration was given to exposure to quarry trucks Alternative Haul Route 3 had a lower impact on business enterprises and is anticipated to have a low effect on property values. Also, Alternative 3 has the fewest number of farms along the route and the smallest area of cropland removal relative to the other alternatives.

Similarly, Alternative Haul Routes 4 and 5 are the least preferred alternatives because they impact the greatest number of businesses and they are anticipated to have a relatively higher impact on agricultural operations.

11.2.6 Cultural and Heritage Resources

According to the consensus of specialists, Alternative 3 is considered the most preferred alternative with respect to cultural heritage. There are the least number of built heritage features along this route (2) and no cultural landscape units. Alternative 3 also exhibits the lowest percentage of moderate to high archaeological potential.

Alternatives 2 and 5 have the greatest number of built heritage features including 5 identified cultural landscape units. These alternatives also have relatively higher percentages of moderate to high archaeological potential.

11.2.7 Transportation

According to the consensus of specialists, Alternative Haul Route 3 is the most preferred haul route with respect to transportation and safety. It will experience the least change in road service levels taking into consideration total average delay per route and average volume to capacity ratios per route. This alternative is also the safest from a transportation perspective, and exhibits a relatively low driveway exposure index and a low potential for conflicts with agricultural vehicles and equipment. Any potential conflicts with cyclists or pedestrians will be mitigated by the proposed cross-sections that include a separated bike lane on Milburough Line and Campbellville Road.

Alternative Haul Route 2 is the least preferred because it will have a relatively high change in the road service level resulting in longer delays and it has a higher potential for a change in road safety as well as conflicts with agricultural vehicles and equipment. This is a direct result of all of the quarry truck traffic on Centre Road that services Memorial Park, Mountsberg Community Centre, and the Mountsberg Baptist Church.

11.2.8 Costs

According to the consensus of specialists, Alternative Haul Route 1 is the most preferred with respect to cost. It has the lowest estimated cost due to the shorter haul route length which requires fewer road alterations as well as the lowest property impacts from the potential road allowance widening.

Contrarily Alternative Haul Routes 4 and 5 are the least preferred alternatives because they have significantly higher costs associated with road and infrastructure alterations. These are the two longest routes and have the greatest potential property impacts from road allowance widening.

11.2.9 Qualitative Evaluation Results

Overall, Alternative Haul Route 3 was the most preferred haul route followed by Alternative 1 according to the consensus of specialists. This result can in part be attributed to the fact that it is the shortest route to access a 400 series highway and it has minimal impacts on Highway 6.

11.3 Quantitative Evaluation

A concurrent numerical evaluation was also used to complement the qualitative evaluation. The approach is an additive model in which each alternative was assigned a single score representing the overall value of the alternative relative to the other alternative.

11.3.1 Description of Methodology

The numerical evaluation methodology applied the following major steps:

1. A relative weight was assigned to each of the eight factors (Aquatic Environment, Terrestrial Environment, Land Uses, Social Environment, Economic Environment, Cultural Heritage, Transportation, and Cost) out of 100 points. This weighting was determined by a team of specialists taking into account environmental characteristics of the study area, the potential impacts of the alternatives, comment from the public, comments from municipal representatives, and comments from external agencies. The team of specialists had representatives present from transportation, planning, and environmental disciplines.

Public input on the importance of the evaluation criteria and indicators was collected via comment sheets, work books, and discussions during the public information centres held in November 2007 and January 2008.

2. Within each category, the individual criteria were assigned weights by the respective specialist, for a total of 100 points.

3. Within each criterion, individual indicators were also assigned a weight out of 100.

4. For each indicator, the alternative haul routes were assessed with respect to their performance, by assigning a rating between 1 and 10. The alternative haul route achieving the best performance for that indicator was assigned a rating of 10. The remaining alternatives were assigned ratings of less than 10, to be reflective of the relative performance of the alternatives with respect to the best alternative.

   For indicators with quantitative measures which reflected the relative performance of the alternatives, the following formulas were used:
   - Where a high value was less preferred (example, number of homes affected) the following formula was used:

     10-[10{(indicator value-minimum value)/maximum value}]

   - Where a high value was most preferred (example, degree of conformity with official plans) the following formula was used:

     10(indicator value/maximum value)

   The use of the above formulas for quantitative indicators enabled the team of specialists to systematically, objectively, and consistently determine the appropriate performance rating for the alternative haul routes. Where the indicators had qualitative measures they were translated into a numeric value using the following scale:
   - Low = 1
   - Low-Medium = 3
   - Medium = 5
   - Medium-High=7
   - High=10

5. The performance ratings were multiplied by the indicator weights, criteria weights, and factor weights, and then summed for each alternative to arrive at a total score for each alternative. The scores represent the relative value of the alternatives. The alternative with the highest score therefore theoretically represents the best alternative.

6. Sensitivity analyses were undertaken, using weights established by:
   - Team of Specialists
   - Individual members of the Team of Specialists
   - Specialists for each factor
   - Public input

11.3.2 Weights

The weights were established in different stages: Indicator, Criteria, and Category.

First, to establish the weight of the indicators each of the specialists were required to give a score out of 100 to each indicator within a criterion. For example, if there were four indicators within a criterion a score of 100 would be distributed amongst all four based on the specialists' professional judgement and knowledge of the study and surrounding area. Once the indicators were weight the Criteria were also given a score out of 100 within a category. For example there are two criteria within the Aquatic Environment category. This process was completed for each discipline for each category. The selected weights are summarized below:

Aquatic Environment			
Criteria	Weight	Indicator	Weight
Potential for disturbance to aquatic habitat.	50	Number, character and sensitivity of watercourses crossed.	70
		Likelihood of increased runoff effects on these watercourses.	10
		Potential for increased erosion and sediment loading to receiving streams during construction.	10
		Likelihood of water quality impacts to watercourses from runoff as a result of road improvements.	10
Potential for removal of aquatic habitat from road improvements (e.g. bridge or culvert extensions or replacements).	50	Number of watercourse culverts/structures that could require extension to accommodate road improvements.	40
		Magnitude of removal effects.	20
		Sensitivity of habitat affected	30
		Type of structure (bridge or culvert) being widened to accommodate road improvements	10

Terrestrial Environment			
Criteria	Weight	Indicator	Weight
Potential for disturbance to natural habitat.	40	Number and character of sensitive habitats that the haul routes pass by. (Distances of designated features)	90
		Effects on vegetation from increased run-off from new road works, dust, emissions, etc.	10
Potential for removal of natural habitat from road improvements.	40	Area, character and sensitivity of vegetation to be removed due to required road improvements.	50
		Potential effects on wildlife as a result of habitat removal.	50
Potential for increased wildlife kills.	20	Presence of wildlife corridors that the routes pass through.	70
		Likelihood of increased wildlife kills as a result of increased truck traffic volumes.	15
		Likelihood of increased wildlife kills as a result of the reluctance of wildlife to use longer/wider bridge or culvert structures.	15

Land Uses			
Criteria	Weight	Indicator	Weight
Potential for disruptive effects to sensitive planned land uses.	20	Number, character of planned development areas.	25
		Sensitivity of planned development to increased truck traffic.	75
Potential for removal of planned land uses from road improvements.	30	Area and importance of planned land use eliminated by road improvements.	100
Conformity with applicable plans and polices.	50	Degree of conformity with Official Plans.	45
		Degree of conformity with the Greenbelt Plan.	45
		Degree of conformity with the Niagara Escarpment Plan.	10

Social and Community Impacts			
Criteria	Weight	Indicator	Weight
Potential for disruption to residents' use and enjoyment of property.	40	Number of residences fronting and/or backing directly onto a potential truck route.	25
		Truck Exposure index	
		Ingress and egress interference at residential driveways	25
		Truck Exposure index	
		Number of defined neighbourhoods along a potential truck route.	25
		Truck Exposure index	
		Ingress and egress interference at roadways used to access neighbourhoods along a potential truck route	25

		Truck Exposure index	
Criteria	Weight	Indicator	Weight
Potential for effects on community character	10	Qualitative assessment of likely changes to the unique or distinctive qualities of the communities potentially affected (i.e., physical, economic and/or socio-cultural features of the communities)	50
		Change in the existing character of the road (excluding highway 6 since no impact)	50
Potential for effects on community cohesion	10	Qualitative assessment of likely changes to community cohesion due to disruption and/or displacement effects, potential for voluntary out-migration and creation of a barrier effects due to truck traffic.	100
Potential for disruption to users of operations at recreational and community features and/or institutions.	20	Number of recreational or community features and/or institutions located along a potential truck route.	30
		Truck Exposure index	
		Number of sensitive / vulnerable recreational or community features and/or institutions.	40
		Truck Exposure index	
		Ingress and egress interference at entrances to recreational or community features and/or institutions.	30
		Truck Exposure index	
Potential for displacement/removal of residents & residential property from road improvements.	10	Number and area of residences/residential property required (partial removals).	33.3
		Number and area of residences/residential properties required (full displacement)	33.3
		Number of vulnerable residents/households displaced	33.3
Potential for displacement/removal of recreational or community features and/or institutions.	10	Number and area of recreational or community features (including trails, bicycle routes, parks and open space) and/or institutional properties required (partial removals).	30
		Number and area of recreational or community features (including trails, bicycle routes, parks and open space) and/or institutional properties required (full displacement).	30
		Number of sensitive / vulnerable recreational or community features and institutions displaced.	40

Noise, Air, and Health Assessment			
Criteria	Weight	Indicator	Weight
Noise impacts on community	20	Number of residences expected to experience a 3, 5 and 10 dbA increase in noise levels over future baseline conditions for any given hour and a description of the magnitude of change.	100
Air quality impacts on community	20	Number of residences that would experience air quality impacts as a result of tail pipe emissions.	100
Dust impacts on community	20	Number of residences likely to experience dust impacts as a result of additional truck traffic.	100
Vibration impact on community	20	Number of residences likely to experience vibrational impacts as a result of increased truck traffic.	100
Potential for health impacts on community	20	Number of residences and other facilities along the haul routes, the traffic composition and proximity of facilities to the roadway whose that would experience potential health impacts based on tailpipe emission impacts determined from the modelling.	100

Economic Environment and Business Impacts			
Criteria	Weight	Indicator	Weight
Potential for disruption to business enterprises.	30	Number of business enterprises fronting and/or backing along a potential truck route.	30
		Truck Exposure index	
		Number of sensitive / vulnerable business enterprises fronting and/or backing along a potential truck route.	40
		Truck Exposure index	
		Ingress and egress interference at entrances to business enterprises.	30
		Truck Exposure index	
Potential for removal of business enterprises and/ or property.	30	Number and area of business enterprise and/or other commercial or industrial property required (partial removals).	30
		Number and area of business enterprise and/or other commercial/industrial property required (full displacement)	30
		Number of sensitive / vulnerable business enterprises displaced.	40

Potential magnitude of effects on property values.	40	Qualitative assessment of the potential magnitude of effects on property values due to changes in traffic, traffic noise and roadway visibility at residential properties.	100

Noise and Air Quality Assessment			
Criteria	Weight	Indicator	Weight
Noise impacts on businesses	10	Number of businesses expected to experience a 3, 5 and 10 dbA increase in noise levels over future baseline conditions for any given hour and a description of the magnitude of change.	100
Air quality impacts on businesses	45	Number of businesses along the proposed haul route(s) expected to be affected by a change in air quality as a result of tail pipe emissions from additional truck traffic.	100
Dust impacts on businesses	45	Number of businesses along the proposed haul route(s) affected dust as a result of additional truck traffic.	100

Agricultural			
Criteria	Weight	Indicator	Weight
Potential for effect on agricultural operations.	100	Number and type of farms along the haul route potentially disrupted by truck traffic.	40
		Truck Exposure index	
		Area and productivity/value of cropland removed for road improvements.	40
		Number and area of farm properties required for road improvements.	20

Cultural and Heritage Resources			
Criteria	Weight	Indicator	Weight
Potential for disturbance to built heritage/cultural features.	50	Number and character of built heritage features potentially affected by truck traffic.	40
		Truck Exposure	
		Number of heritage properties removed from construction of road improvements (distinguish between partial and full removals).	60
Potential for effects on archaeological resources.	50	Potential for effects on archaeological resources as a result of road improvements (as reflected through archaeological potential).	100

Transportation			
Criteria	Weight	Indicator	Weight
Change in road service level.	20	Change in road level of service/congestion (considers road section, length, change in level of service).	30
		(Signalized Avg. change in v/c per intersection)	
		Change in access levels for road users.	30
		Effects on other roadways as a result of traffic diversion.	20
		Potential for delay to quarry trucks at level rail crossings.	20
Potential for change in road safety level.	20	Potential for increase in collision frequency and severity. (Difference in safety index with and without the quarry in 2031)	15
		Number of access points along the haul route.	10
		Number of intersections along the haul route.	15
		Truck Exposure Index	
		Truck-rail exposure index at level rail crossings (daily # quarry trucks x daily # trains).	10
		Driveway exposure index (# driveways x daily traffic)	10
		Number of sections with limited sight lines and/or steep grades.	15
		School bus route lengths (km) along the haul route.	15
		Truck Exposure Index	
		Conflict with agricultural vehicles and equipment.	10
Change in Road Function	20	Increase in Traffic (daily and %)	60
		Required change in road classification	20
		Road widening required	20
Potential for conflicts with cyclists.	20	Length of route coinciding with designated bike routes	50
		Length of route without adequate shoulders for cyclists	50
Potential for conflicts with pedestrians.	20	Number of schools along the route	30
		Number of parks and community centres	40
		Length of route without adequate shoulders/sidewalks for pedestrians	30

Cost			
Criteria	Weight	Indicator	Weight
Estimated infrastructure costs.	100	Estimated cost for all required road and other infrastructure improvements.	55
		Potential for additional costs to the municipality(s) (e.g. impacts to municipal maintenance operations).	35
		Estimated property costs for all required road and other infrastructure improvements.	10

If there were two quantitative measures within an indicator or if a truck exposure index was calculated in addition to the indicator they were each given an equal weighting of 50/50.

To determine the appropriate weight that was representative of each category, a team of seven specialists from different backgrounds participated in a two day work shop that included reviewing in detail the entire analysis. Each attendee weighted the categories and the results were averaged to get the final weights (Table 11-2).

Table 11-2: Specialist Category Weightings and Average

	Member 1	Member 2	Member 3	Member 4	Member 5	Member 6	Member 7	Average
Aquatic Environment	15	10	10	10	12	15	15	12.43
Terrestrial Environment	15	10	10	10	12	15	15	12.43
Land Use	5	10	5	5	15	5	10	7.86
Social Environment	30	25	20	50	20	25	15	26.43
Business Environment	5	20	20	10	10	10	10	12.14
Cultural Heritage/Archaeology	5	5	10	5	8	5	5	6.14
Transportation and Safety	20	15	20	5	16	20	20	16.57
Cost	5	5	5	5	7	5	10	6.00

11.3.3 Quantitative Evaluation Results

Table 11-3 shows the weight given to each factor and the resultant score for each alternative haul route. The assigned weights reflect the relative significance of the factors, characteristics of the study area, significance of the potential impacts, and the differences in the impacts among alternatives.

Table 11-3: Summary of Quantitative Evaluation by Alternative Haul Route

	Weight	**Alternative Haul Route 1**	**Alternative Haul Route 2**	**Alternative Haul Route 3**	**Alternative Haul Route 4**	**Alternative Haul Route 5**
Aquatic Environment						
weighted score	*12*	*113*	*94*	*124*	*82*	*74*
Terrestrial Environment						
weighted score	*12*	*124*	*124*	*109*	*76*	*72*
Land Uses						
weighted score	*8*	*75*	*79*	*70*	*50*	*48*
Social and Community Impacts						
weighted score	*26*	*186*	*163*	*264*	*170*	*145*
Economic Environment and Business Impacts						
weighted score	*12*	*117*	*81*	*121*	*100*	*65*
Cultural and Heritage Resources						
weighted score	*6*	*54*	*38*	*61*	*57*	*48*
Transportation						
weighted score	*17*	*166*	*155*	*144*	*132*	*129*
Cost						
weighted score	6	60	56	53	40	36
Overall Score		895	789	947	709	617
Ranking of Preferred Alternatives		2	3	1	4	5

Social and community impact was assigned the highest weighting, reflecting the public concerns and the impact to the character of the community. Transportation was also given a high weighting, reflecting the changes to the level of service and safety for all road users.

The natural environment and business impacts were given a moderate weighting. Land uses, cultural heritage, and cost were given a lower weighting as the resulting impacts are anticipated to be minimal or non-existent.

11.3.4 Sensitivity Analysis

A sensitivity analysis was carried out for the Quantitative Evaluation to determine if different weights for the factors would change the evaluation results. These sensitivity tests provide insight on the robustness of the evaluation.

11.3.4.1 Sensitivity Analysis #1 – Public Input

In this sensitivity analysis the criteria weights were based on public input derived from public comment sheets and discussions at PIC #2 and PIC #3. Each of the major criteria was assigned a rating of 'most important,' 'more important,' or 'important.' Those ratings were then translated into a numeric format so they could be translated into a final weighting and plugged into the evaluation matrix. The scale used for the translation is as follows:

- 'most important' = 3
- 'more important' =2
- 'important' =1

Once all of the numbers were assigned and summed, they totalled 16. The final weighting was then calculated as the individual score expressed out of 100 (**Table 11-4**). For example, with 16 parts of 100, each part represent 6.25 so for Transportation and Safety with a numeric value of 3, the weighting is equal to 3 times 6.25 which results in a weighting of 18.75.

Table 11-4: Public Input Weighting Calculation

Criteria	Relative Weighting	Numeric Format	Final Weighting
Aquatic Environment / Surface Water	More Important	2	12.50
Terrestrial Environment	More Important	2	12.50
Land Uses	Important	1	6.25
Social Environment and Community Impacts	Most Important	3	18.75
Economic Environment and Business Impacts	More Important	2	12.50
Cultural and Heritage Resources	Important	1	6.25
Transportation	Most Important	3	18.75
Cost	More Important	2	12.50
	Total	16	100

The results of the sensitivity analysis are summarized in **Table 11-5**.

Table 11-5: Public Input Sensitivity Analysis Results

	Weighting	Alternative Haul Route 1	Alternative Haul Route 2	Alternative Haul Route 3	Alternative Haul Route 4	Alternative Haul Route 5
Aquatic Environment						
weighted score	*12.5*	*114*	*95*	*125*	*83*	*75*
Terrestrial Environment						
weighted score	*12.5*	*125*	*125*	*109*	*77*	*72*
Land Uses						
weighted score	*6.3*	*60*	*63*	*56*	*40*	*38*
Social and Community Impacts						
weighted score	*18.8*	*132*	*115*	*188*	*121*	*103*
Economic Environment and Business Impacts						
weighted score	*12.5*	*120*	*83*	*125*	*103*	*67*
Cultural and Heritage Resources						
weighted score	*6.3*	*55*	*38*	*63*	*58*	*49*
Transportation						
weighted score	*18.8*	*188*	*176*	*162*	*150*	*146*
Cost						
weighted score	*12.5*	*125*	*117*	*111*	*83*	*76*
Overall Score		918	812	938	715	625
Normalized Overall Score		**9.8**	**8.6**	**10.0**	**7.6**	**6.7**
Ranking of Preferred Alternatives		2	3	1	4	5

Using weights developed from public input, the sensitivity analysis identified that the preferred haul routes in order of preference are: Alternative Haul Route 3, Alternative Haul Route 1, Alternative Haul Route 2, Alternative Haul Route 4, and Alternative Haul Route 5.

11.3.4.2 Sensitivity Analysis #2 – Equal Weights

In this sensitivity analysis, equal weights were assigned to the major criteria, therefore each criteria was weighted 12.5. The results of this sensitivity analysis are summarized in **Table 11-6**.

Table 11-6: Equal Weights Sensitivity Analysis Results

	Weighting	**Alternative Haul Route 1**	**Alternative Haul Route 2**	**Alternative Haul Route 3**	**Alternative Haul Route 4**	**Alternative Haul Route 5**
Aquatic Environment						
weighted score	*12.5*	*114*	*95*	*125*	*83*	*75*
Terrestrial Environment						
weighted score	*12.5*	*125*	*125*	*109*	*77*	*72*
Land Uses						
weighted score	*12.5*	*120*	*125*	*111*	*79*	*77*
Social and Community Impacts						
weighted score	*12.5*	*88*	*77*	*125*	*81*	*69*
Economic Environment and Business Impacts						
weighted score	*12.5*	*120*	*83*	*125*	*103*	*67*
Cultural and Heritage Resources						
weighted score	*12.5*	*110*	*76*	*125*	*117*	*97*
Transportation						
weighted score	*12.5*	*125*	*117*	*108*	*100*	*97*
Cost						
weighted score	*12.5*	*125*	*117*	*111*	*83*	*76*
Overall Score		926	815	940	722	629
Normalized Overall Score		**9.9**	**8.7**	**10.0**	**7.7**	**6.7**
Ranking of Preferred Alternatives		2	3	1	4	5

This analysis identified that the preferred haul routes in order of preference are: Alternative Haul Route 3, Alternative Haul Route 1, Alternative Haul Route 2, Alternative Haul Route 4, and Alternative Haul Route 5.

11.3.4.3 Sensitivity Analysis Summary

The sensitivity analysis shows that using different weights does not change the order of preference of the alternative haul routes, however, it does reduce the difference in score between Alternative Haul Route 3 and Alternative Haul Route 1.

Summary of Evaluation Results

Both the qualitative evaluation and the quantitative evaluation independently arrived at the same conclusion, that Alternative Haul Route 3 is the preliminary preferred alternative. The next most preferred alternative is Alternative Haul Route 1, followed by Alternative Haul Routes 2 and 4, respectively. Alternative Haul Route 5 was the least preferred alternative for both evaluation methods.

The sensitivity analysis highlighted that while Alternative Haul Route 3 continues to remain the preferred option under different weighting scenarios, Alternative Haul Route 1 remains a reasonable option.

12. RECOMMENDATIONS

12.1 Description of the Preferred Haul Route

The haul route evaluation has considered a comprehensive list of evaluation criteria and indicators and shows that Alternative Haul Route 3 is the preferred haul route. However, the evaluation shows that Alternative Haul Route 1 is also a viable haul route.

As illustrated in **Exhibit 12-1** for the preferred alternative, all quarry truck traffic destined for Highway 401 would travel north on Milburough Line, then east on Campbellville Road, north on Twiss Road, and east on Reid Sideroad to the east or westbound Highway 401 on-ramp.

Truck traffic destined for Highway 403 or QEW east would first travel to the Highway 401 eastbound on-ramp and from here, take one of several alternatives to reach the destination including the 407 ETR south to Highway 403 or Highway 6 south to Highway 403.

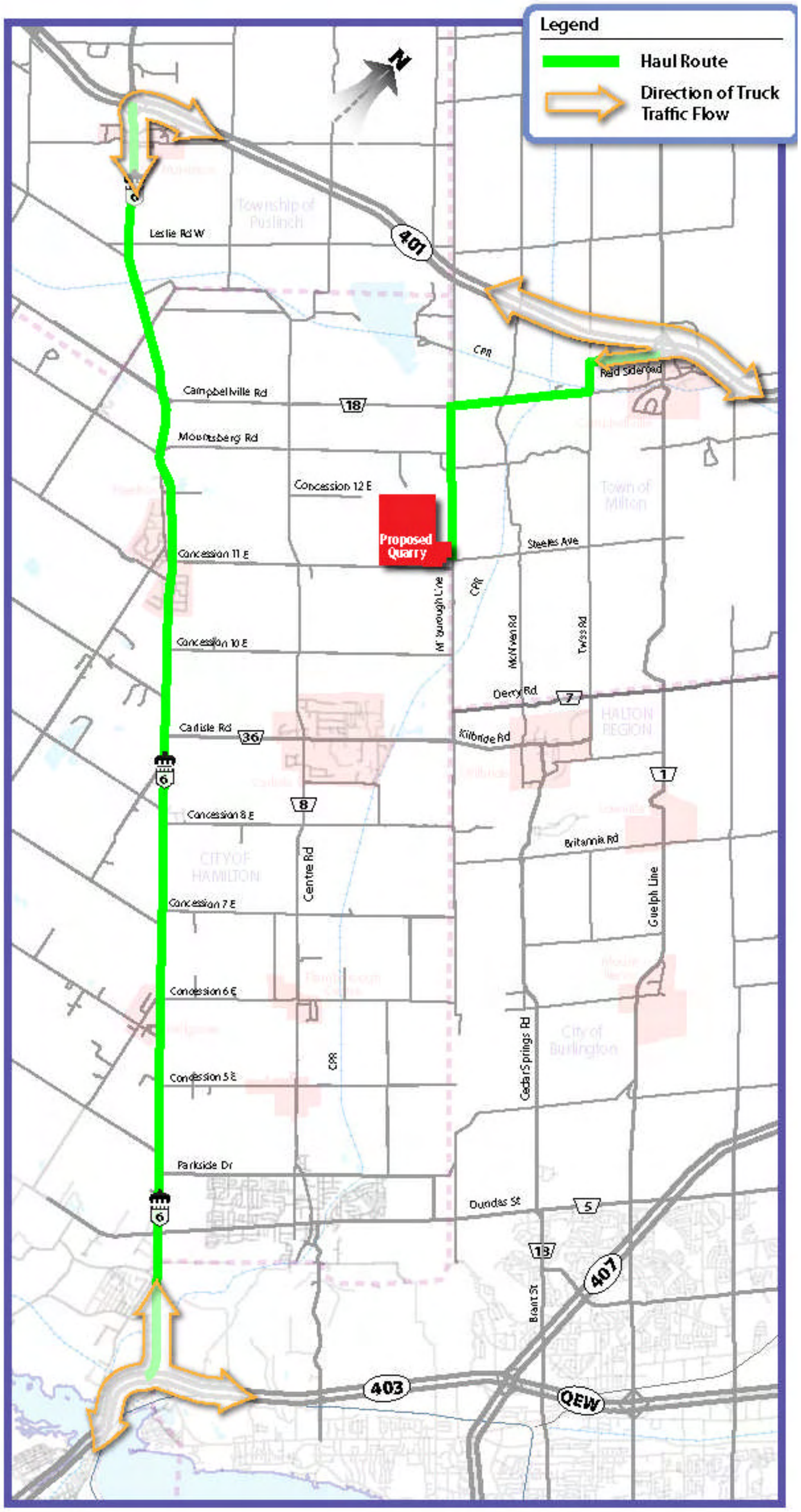


Exhibit 12-1: Preferred Alternative Haul Route

12.2 Site Access Location and Design

The proposed site access is a stop controlled T-intersection located on the west side of Milburough Line, approximately 530 m north of Concession 11 E. The access would consist of two 4.5 m lanes as shown in **Exhibit 12-2**. It is recommended that trucks be prohibited from entering the site from the south and from exiting the site and traveling southbound on Milburough Line. This prohibition would be incorporated into the access design using geometric design, concrete curb and gutter on the south edge of the driveway, and raised medians strategically located on Milburough Line and the site access driveway.

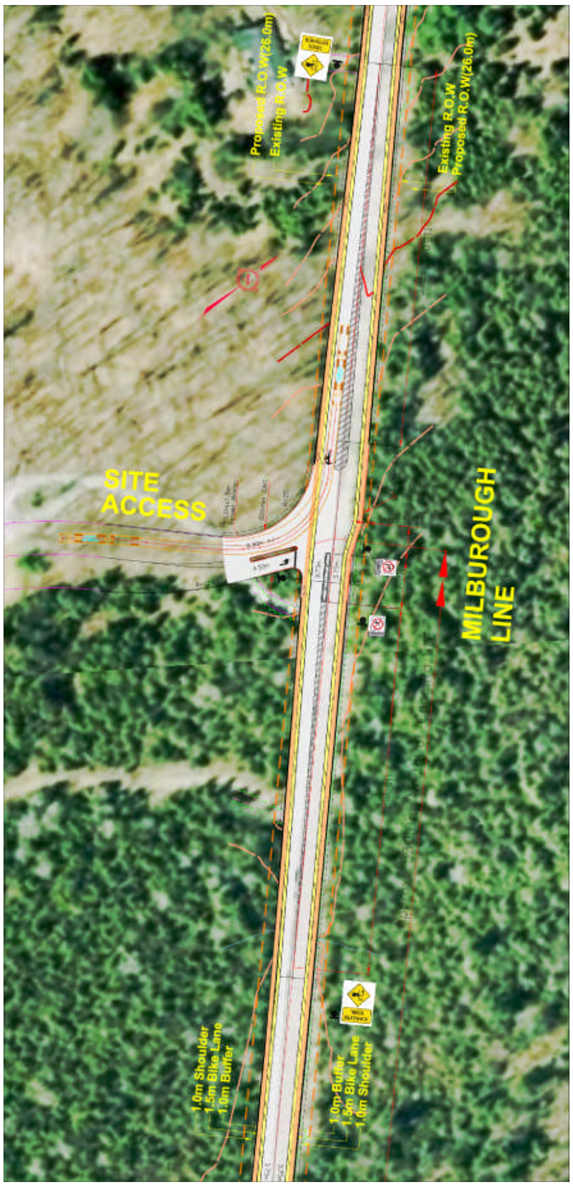


Exhibit 12-2: Recommended Design of Site Access on Milburough Line

12.3 Recommended Road Alterations

This section highlights the recommended road alterations and mitigation measures based on the results of the traffic operational and safety analysis for the preferred haul route alternative. It is recommended that the alterations are implemented for the start of quarry operations. The approximate locations of the recommended road alterations and road policies are illustrated in **Exhibit 12-3**.

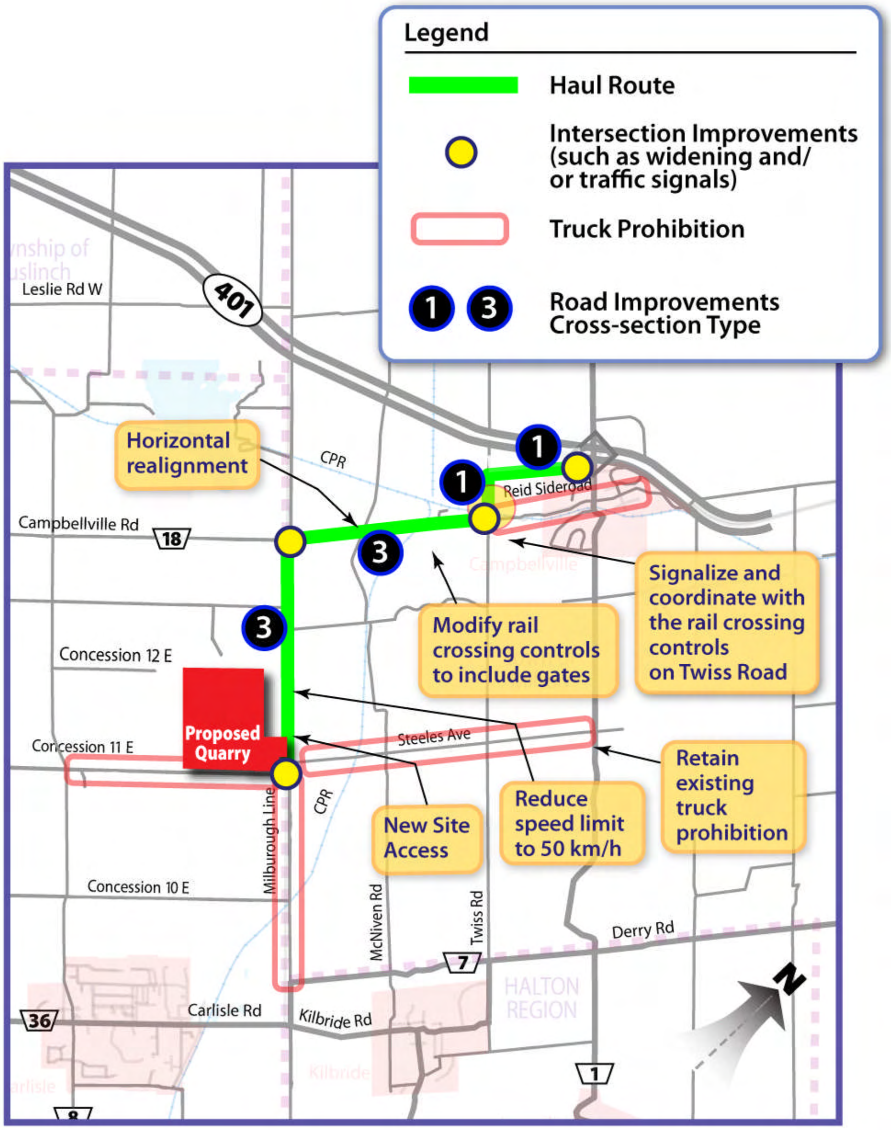


Exhibit 12-3: Summary of Recommend Road Alterations

12.3.1 Intersection Improvements

The following intersection alteraions are recommended to assist in maintaining smooth and safe traffic operations:

- Construction of eastbound and westbound exclusive left-turn lanes at Campbellville Road and Milburough Line.
- Construction of eastbound and westbound exclusive left-turn lanes at Campbellville Road and Twiss Sideroad.
- Construction of a northbound channelized right-turn lane at Campbellville Road and Milburough Line with a truck acceleration lane on the east leg.
- Construction of a southbound channelized right-turn lane at Campbellville Road and Twiss Sideroad with a truck acceleration lane on the west leg.

The recommended turning lane alterations at Campbelleville Road and Milburough Line and at Campbelleville Road and Twiss Sideroad are illustrated in Exhibit 12-4 and **Exhibit 12-5** respectively.

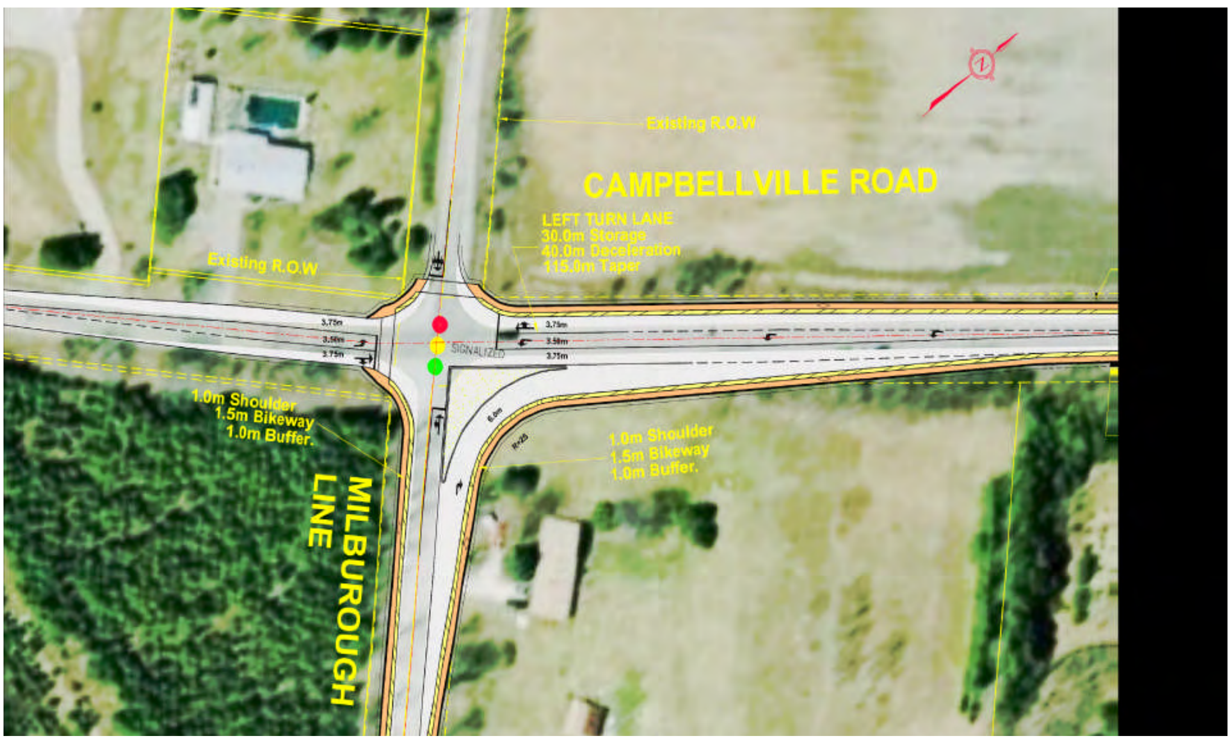


Exhibit 12-4: Intersection Alterations at Campbellville Road and Milburough Line

Exhibit 12-5: Intersection Alterations at Campbellville Road and Twiss Road

12.3.2 Profiles

It is recommended that the existing substandard curves on Campbellville Road be removed to improve the horizontal alignment, as shown in **Exhibit 12-6**.

Exhibit 12-6: Horizontal Alignment Alteration on Campbellville Road

12.3.3 Traffic Controls

The following traffic control alterations are recommended to assist in maintaining smooth and safe traffic operations:

- Signalization of the Campbellville Road and Milburough Intersection (**Exhibit 12-4**).
- Signalization of the Campbellville Road and Twiss Intersection (**Exhibit 12-5**).
- Signalization of the Reid Sideroad / Highway 401 EB Ramp Intersection.
- Coordinate the traffic signals at Campbellville Road and Twiss Road with the signal controls at the rail crossing on Twiss Road

All of the intersections where signals are recommended meet the signal warrant requirement. The analysis of the future total conditions with the above mitigation measures implemented determined that in 2021 and 2031 the proposed signalized intersections will all operate at an overall level of service of 'B' or better.

In addition to intersection alterations, it is recommended that the speed limit on Milburough Line be reduced to 50 km/h.

12.3.4 Railway Crossings

As illustrated in **Exhibit 12-7**, it is recommended that the Campbellville Road railway crossing be improved by modifying the rail crossing controls to include lights and gates.

Exhibit 12-7: Railway Crossing Improvement on Campbellville Road

12.3.5 Cross-Sections

In order to accommodate the high volume of quarry truck traffic it is recommended that the preferred haul route road be upgraded to the most current design standards. The road sections where the Type 1 and Type 3 cross-sections are recommended are shown in **Exhibit 12-3**. It is recommended that the sections along Twiss Road and Reid Sideroad be upgraded to Cross-section Type 1, shown in **Exhibit 12-8**.

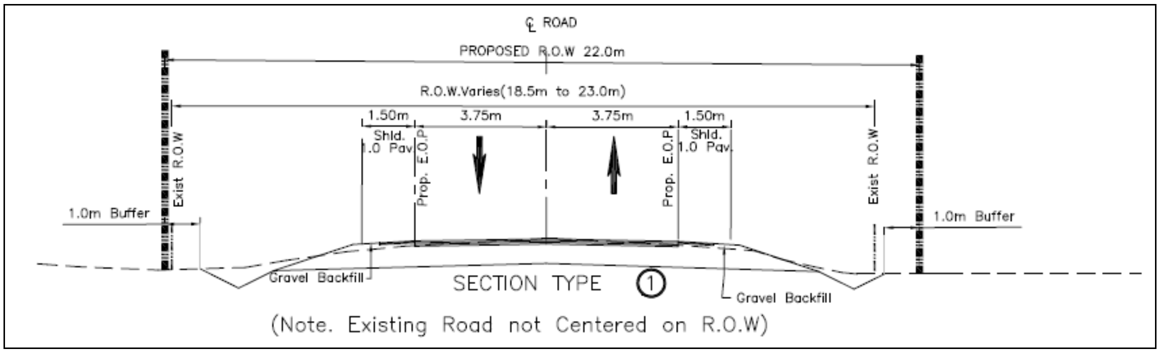


Exhibit 12-8: Type 1 (Rural) Cross-Section

The road along Milburough Line and Campbellville Road would be upgraded to Cross-section Type 3 to improve the safety of the roadway for cyclists by providing a separated bike lane (**Exhibit 12-9**).

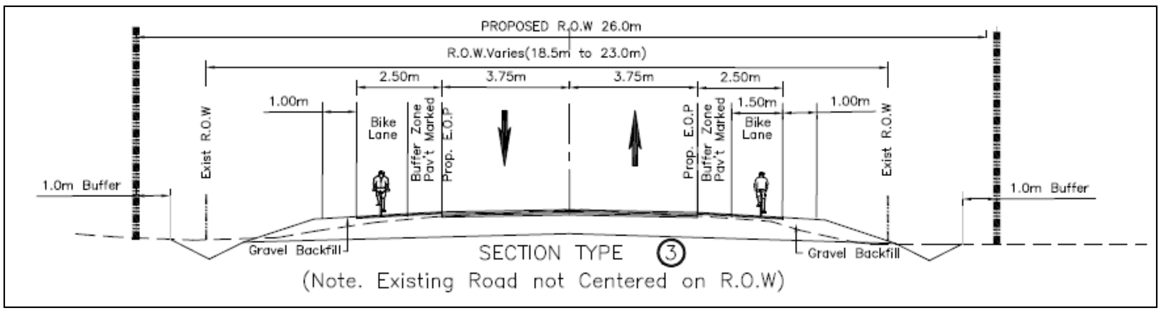


Exhibit 12-9: Type 3 (Rural) Cross-Section

For this study two types of cross-sections are proposed:

- Rural (requires property acquisition)
- Urban (within the existing right-of-way).

For the purpose of the analysis, the rural cross-section was applied as it has the most significant property impacts and was therefore deemed more conservative. However, given the challenges that can be associated with land acquisition, the urban design that fits the existing right-of-way was also given consideration. It was concluded that this design would not require land acquisition, however, it would have a more significant impact on the existing character of the road and has a higher associated cost of construction.

Rural Cross-Section Type 1, shown in **Exhibit 12-8**, has a proposed right-of-way 2.0m greater than the existing 20m right of way. This cross-section allows for 3.75m travel lanes, 1.0m paved shoulder, 0.5m gravel shoulder, 0.5m rounding, and a drainage ditch.

In contrast, illustrated in **Exhibit 12-10** is the Urban Cross-Section Type 1 with a proposed right-of-way that fits into the existing 20m right-of-way. The cross-section allows for 3.75m travel lanes, and a 1.5m paved shoulder with curb and gutter.

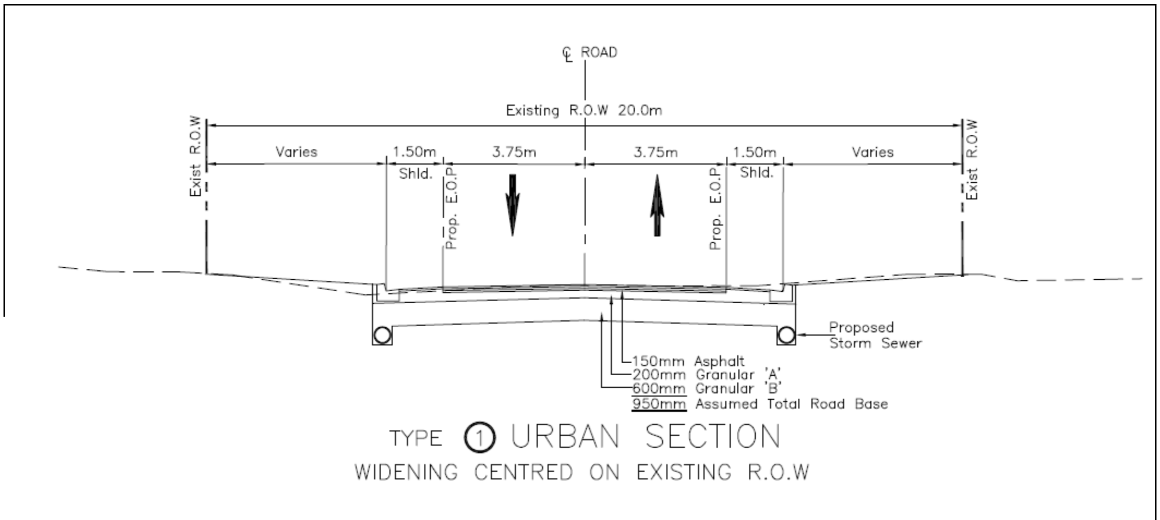


Exhibit 12-10: Type 1 Urban Cross-Section

Regarding the Type 3 cross-sections, **Exhibit 12-9** illustrates the Rural Type 3 Cross-Section with a proposed right-of-way 3m to 7.5m greater than the existing right-of-way depending on the varying existing cross-section. This cross-section allows for 3.75m travel lanes, 1.0m paved buffer, 1.5m paved bike lane, 1.0m gravel shoulder, 0.5m rounding, a drainage ditch and a 0.5m buffer.

Alternatively, the Urban Cross-Section Type 1 proposed right-of-way, illustrated in **Exhibit 12-11**, can be fit into the existing right-of-way that varies from 18.5m to 23m. The cross-section allows for 3.75m travel lanes, a 1.0m paved buffer, a 1.5m paved bike lake, and curb and gutter with a minimum boulevard of 3m.

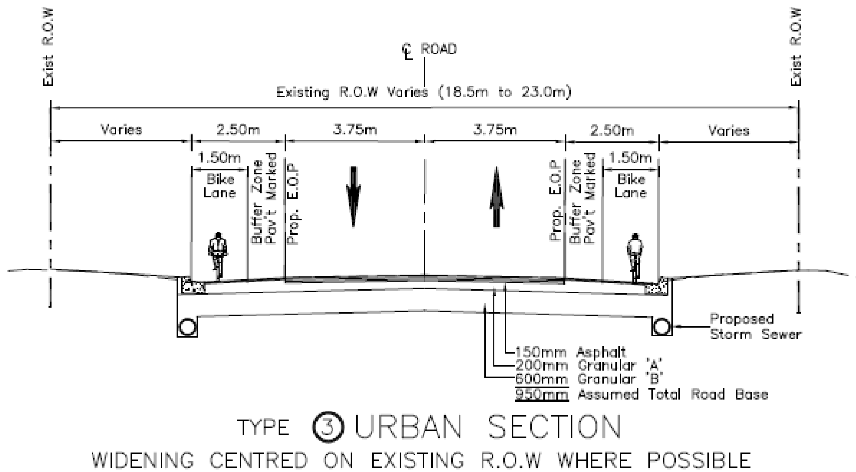


Exhibit 12-11: Type 3 Urban Cross-Section

It is important to note that both Type 1 and Type 3 section designs do not account for any changes in the existing profile and assume that widening is at existing profile grade.

While the urban cross-section fits into the existing right-of-ways between intersections, the storm sewer infrastructure and appurtenances increase the construction costs approximately 50 percent over the rural design. It is a trade off between the cost (and challenge) of purchasing land and constructing a more expensive infrastructure.

Applying the rural cross-section that would have greater property impacts is a conservative approach for haul route comparative evaluation purposes. The decision on which cross-section to move forward with would be decided at the detailed design stage of an Environmental Assessment when pavement recommendations are finalized. Typically, resolution of the design details would occur during the subsequent Municipal Class EA process.

12.4 Road Signs

It is recommended that truck route signs be installed along the preferred haul route to support the road design features and other truck control policies intended to ensure the quarry trucks travel only along the preferred haul route.

The approximate location and text of the recommended signs are shown in **Table 12-1** and **Exhibit 12-12**.

Table 12-1: Location and Text of the Recommended Truck Signs

Location	Sign Text
At site driveway and Milburough Line (outbound)	Trucks Use Milburough Line North
Milburough Line (northbound) at Campbellville Road	Trucks Use Campbellville Road East
Campbellville Road (eastbound) at Twiss Road	Trucks Use Twiss Road North
Reid Sideroad (eastbound) east of Twiss Road	Trucks Use Hwy 401 or Guelph Line North
Reid Sideroad (eastbound) at Guelph Line	Trucks Use Guelph Line North

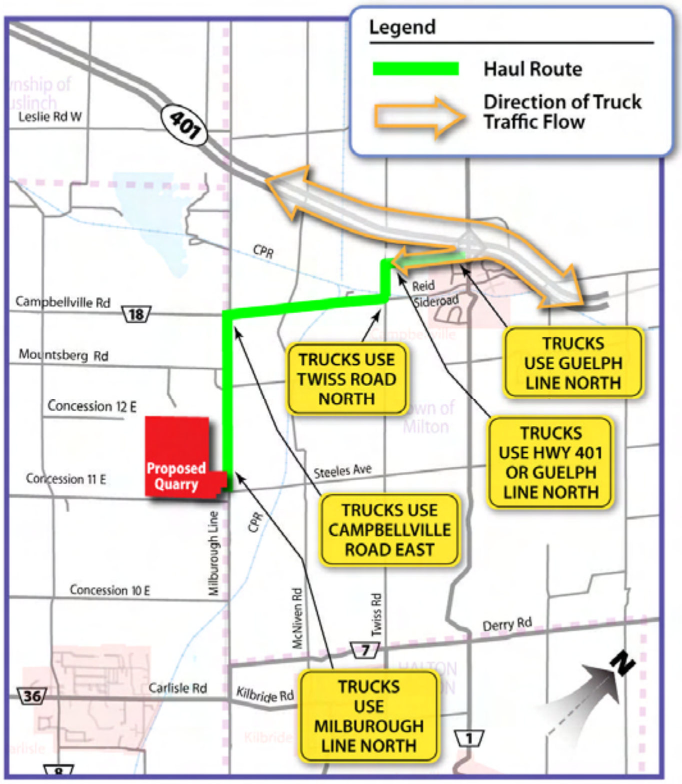


Exhibit 12-12: Recommended Road Signs along the Preferred Haul Route

12.5 Truck Prohibitions

As illustrated in **Exhibit 12-3,** it is recommended that truck prohibitions be implemented (or retain if existing) for the following road links:

- Concession 11 E from Centre Road to Milburough Line
- Milburough Line from Concession 11 E to Derry Road
- Steeles Avenue from Milburough Line to Guelph Line
- Reid Sideroad from Twiss Road to east of Guelph Line

These recommended truck prohibitions would improve the effectiveness of the other truck control measures along the haul route by providing regulatory and enforcement support.

The truck prohibitions along Milburough Line, Steeles Avenue, and Concession 11E would be in accordance with the site access design features. It is recommended that trucks be prohibited from entering the site from the south and from exiting the site and travelling southbound on Milburough Line. This prohibition would be incorporated into the access design using geometric design, concrete curb and gutter on the south edge of the driveway, and raised medians strategically located on Milburough Line and the site access driveway.

12.6 Pedestrians and Cyclists

The proposed cross sections include wider lanes are intended to promote the movement and safety of pedestrians and cyclists. Also, the recommended signalization of the three intersections discussed in **Section 12.3.3** will provide specific locations for protected pedestrian crossing.

The presence of the adequate shoulders provides a safety buffer for pedestrians when sidewalks are not present. Currently there are little to no shoulders on the existing roads, however, if the proposed cross-section changes are implemented all of the haul routes would have adequate shoulders.

Additionally, the recommended reduction in speed limits along Milburough Line is intended to reduce the traffic speeds and improve cycling and pedestrian safety.

12.7 Contingency Plans

There are road sections along the preferred haul route Alternative that coincide with one of two Emergency Detour Routes for Highway 401 between Guelph Line and Highway 6. In the event that this Emergency Detour Route is required due to an emergency, the contingency plan for the proposed quarry is to shut down shipping operations, if required, in order to eliminate any potential negative traffic congestion impacts related to the quarry truck traffic.

12.8 Additional Studies

As discussed in the Terms of Reference (**Appendix A**), if the recommended roadway improvements are carried forward (and application receives *Planning Act* and *Aggregate Resource Act* approvals), a Class Environmental Assessment (Class EA) for these improvements will likely need to be undertaken (the MEA Municipal Class EA and/or the MTO Class EA for Provincial Highways). This Haul Route Evaluation would serve to support the preferred alternative haul route as part of possible future EAs to fulfill Ontario EA Act requirements and possibly the *Canadian Environmental Assessment Act*.

12.9 Additional Recommended Mitigation Measures

Further to the transportation recommendations described above, a number of additional studies and further considerations have been recommended by the other specialists. The following is a summary of these recommendations which are discussed in greater detail in the respective technical supporting documents.

12.9.1 Natural Environment

As part of the detailed design of the preferred alternative, the natural environment related mitigation measures should be detailed for the preferred alternative, especially as it relates to:

- Detailed and focused floral and faunal inventories to identify any potentially locally rare to federally and/or provincially at risk species in order to ensure sound decision-making and the implementation of appropriate mitigation measures including but not limited to refinement of the alignment;
- Edge restoration plantings;
- Detailed watercourse crossing and culvert replacement/extension;
- Baseline inventories of wildlife crossings and associated habitat features to identify 'hotspot areas' under both existing and projected traffic scenarios;
- Management of roadside areas to reduce the concentration of potential forage or cover plants, basking areas, salt use, etc;
- Wildlife crossing planning (e.g., (seasonal) signage, road speed consideration, culvert suitability for passage, collector/funneling fencing, ecopassages, etc.); and, traffic adjustments to accommodate key wildlife movement periods.

12.9.2 Socio-Economic and Business

The following mitigation measures are recommended to address adverse effects identified above:

- Enhanced liaison with recreational user groups of the socio-economic features located along the haul route, including cycling, motoring or naturalist groups aimed at keeping them aware of the proposed trucking activities, peak traffic periods and any potential access restrictions;
- Incorporate contract clauses requiring all trucking contractors to demonstrate that vehicles are regularly maintained and drivers are licensed and trained to ensure safe operation of trucks;
- Implement contract clauses to ensure trucks adhere to designated transportation routes. Impose financial penalties for non-compliance to ensure safe operation of trucks on local roads;
- Truck drivers should undergo an orientation program focused on safety issues along the transportation routes;
- Design and deliver a complaints reporting and resolution procedure specifically related to truck traffic;
- Enhanced communications with local residents to address the enjoyment of property, including targeted communications with newcomers aimed at keeping them informed

of air quality and noise levels, environmental monitoring results, and where to call for answers to questions they may have; and

- Implement an information program for all affected communities to address the loss of use and enjoyment of property, including monitoring of noise, dust and traffic levels.

12.9.3 Land Use

Partial displacement of some property may be required along the Alternative Haul Routes to accommodate the proposed road alterations if a Rural Cross Section is preferred. It is recommended that property impacts be balanced to minimize impact on land use types considered to be more sensitive to road alterations (i.e. residential and institutional land uses), where possible.

12.9.4 Noise

This section describes the effectiveness of noise mitigation measures along the routes.

- The houses and other noise receptors along the haul routes have driveways connecting directly to the roadways; thus barrier or berm installation is not feasible due to the requirements for breaks/interruptions in any installed barriers or berms, as the breaks would make the barriers ineffective in blocking noise.
- Decreasing speed limits are not a feasible way of reducing noise.
- No significant alignment changes are feasible for any route, due to the tight roadway cross sections.
- Noise reducing asphalt can provide approximately 2 dB of noise reduction but this reduction of this magnitude is imperceptible.
- Therefore, combining noise reducing asphalt and a speed reduction is infeasible because it would result in only a 3dB reduction which is considered insignificant.
- Thus, there are no specific physical mitigation measures recommended.
- Noise mitigation measures will be further examined as part of the Environmental Assessment process, for any roadway improvements which are undertaken.

12.9.5 Air Quality

Based on the qualitative nature of this assessment, there are no mitigation measures that can be recommended at this time because there are no data to indicate that mitigation is required and if so, to what extent. However, any measures to reduce vehicle emission would be beneficial such as using trucks with properly maintained engines and emission control technologies.

12.9.6 Vibration

Vibration mitigation is not required. Perceptible vibration from heavy truck pass-bys on the proposed haul routes is not anticipated, and impacts from ground-borne noise are not predicted.

12.9.7 Agriculture

To minimize impacts on agricultural land and agricultural operations along the proposed alternatives, there are a number of recommended mitigation measures that should be considered in the design and operation of the haul route, as follows:

- The design of the haul route should maintain all existing farm field and facility laneway access to prevent impacts on efficiency of agricultural operations along the route; and
- At the time of construction of the haul route, any farm tile drainage or tile drainage outlet disruption or damage should be rectified immediately. Surface drainage following road construction should be designed to ensure that there is no flooding or deterioration in soil drainage that might affect crop productivity within neighboring farm land.

12.9.8 Cultural Heritage and Archaeological

The areas of moderate to high archaeological potential along the selected alternative haul route needs to be assessed by the standard shovel test pit method. In addition, a more detailed architectural and historical study of relevant heritage sites identified and pertaining to the preferred haul route should be undertaken. This means that two Built Heritage Features will need further evaluation.

12.9.9 Geotechnical

When/if a haul route has been selected, a programme of geotechnical field work should be undertaken along the selected route, and pavement design recommendations made regarding the most suitable strategy to upgrade the selected route.

12.9.10 Municipal Structures and Drainage

Regardless of the haul route ultimately selected for the Flamborough Quarry, improvements to the route will include work on one or more structures.

Improvements will be required in terms of roadway geometry (lane widths, side clearances and bike paths, or similar) roadside safety (barrier protections, approach guiderail and end treatments) and possibly to improve hydraulic performance to meet minimum municipal standards.

Long term planning considerations, such as remaining service life of the structures, the anticipated increase in loading and frequency of loading and potential differences in service life between old and new components of a widened structure have led to the conclusion and recommendation that any structure on the selected haul route should be replaced as part of the roadway improvements.

In the planning and design of any new structures the further recommendations would include:

- That consideration be given to providing an open bottom structure to maximize opportunities for fish habitat improvement and ease of construction.
- That the span should be selected to both improve hydraulic performance and minimize the finished footprint within the waterway and overbanks.
- That three sided, open footing, precast structures be considered as these do not require in-stream shoring during construction.

13. CONSULTATION PROCESS

The CART Terms of Reference require that there be several consultation opportunities with stakeholders throughout the evaluation process. At a minimum, the study is to involve the following consultation activities:

- Involve agencies through the CART agency advisory process. Applicable agencies that are not part of CART are also to be involved.
- Initial public notice in local newspapers announcing the initiation of the study and where more information can be obtained; Residents, business owners and property owners within 100 m of the alternative haul routes are to receive the notice directly through mail out/drop-off.
- A meeting with the Agency Review Group to review the study approach / process, evaluation criteria, level of study detail, etc.
- Public notifications in local newspapers announcing the PICs / workshops two weeks and one week in advance of the events. Stakeholders along the alternative haul routes are also to receive a drop-off notice of the events in advance.
- Four public consultation events (with presentations) are to be held:
    - Public Event #1 – to introduce the project, to identify how the public would like to be involved and to identify initial public concerns and issues.
    - Public Event #2 – to present the draft alternative routes and the evaluation approach
    - Public Event #3 – a public workshop that allows the opportunity to provide input on the evaluation criteria, the relative importance of the criteria and the evaluation approach
    - Public Event #4 – to present the draft results of the comparative evaluation effects assessment
- A meeting with the Agency Review Group to review the draft study findings
- Circulation of the draft report for public and agency review and comment.

The following section summarizes the public events, agency consultation, and provides a summary of the issues and how they have been addressed.

13.1 Public Consultation

A total of five public consultation events were hosted by St. Marys and details of each event and comments raised by the public are summarized in the following section.

13.1.1 Public Event #1

Public Event #1 was held on June 21st, 2007 at the Royal Botanical Gardens in the Auditorium. Advertisements were placed in the local papers as follows:

Flamborough Review
Friday June 15, 2007

Milton Canadian Champion
Friday June 8, 2007
Friday June 15, 2007

Wellington Advertiser
Friday June 15, 2007

Burlington Post
Sunday June 17, 2007
Wednesday June 20, 2007

The event was set up as an open house format and consisted of fifteen display boards that introduced the project and purpose of the event. The display boards also provided a map of the study area and introduced the concept of an exclusion zone that was later dropped. Some information was provided on operational characteristics and next steps were presented.

One hundred and nine members of the community signed in and 61 people provided the following comments and concerns through discussion and comment sheets:

Baseline Information:

- No traffic information was collected for 10th concession
- Traffic data inaccurate regarding peak traffic times

Alternatives:

- Inadequate review of rail transportation
- Various concerns over the Exclusion Zone
- No designated truck routes were shown
- Consider new 401 interchange at Milburough
- Consider Centre Road to the south
- To go south, use Highway 6 instead of Centre Road

Impacts of Truck Traffic:

- Increase in truck traffic
- Road safety related to trucks (especially for vulnerable road users)
- Roads dangerous because of hills and turns
- Cyclists' safety concerns
- Pedestrian safety concerns
- Centre Road / Campbellville intersection has many accidents
- Concern over pulling out of driveways especially driveways with poor visibility
- Noise related to trucks on haul routes
- Noise from trucks idling at the quarry

- Air quality and health effects
- What is greenhouse gas contribution by quarry trucks?
- Potential for traffic congestion
- Congestion near 401
- Roads are not in good shape; roads do not have adequate pavement structure; impact on the road structure integrity
- Roads are too narrow for trucks
- Train crossings will be a problem, e.g. trucks queuing
- Inclusion of 2 signalized intersections on Highway 6
- Trucks throw rocks and cause damage
- Impact on school bus operations
- Cost of road improvements
- Who pays for cost of road improvements?
- Maintenance costs of the haul routes will increase
- Impact on wildlife
- Impact on wetlands, woodlands, and habitat
- Slower emergency response times from the Reid Sideroad EMS
- Haul route enforcement and controlling where trucks go
- Truck routes near schools
- Impact on property values
- Negative impact on local businesses
- Emissions and air quality related to trucks

Public Consultation Process:

- Remote location of PIC#1
- Notification of PIC:
  - 1 week is insufficient
  - Use Canada Post Ad mail and community newspapers
  - Should include meaningful information
- All stakeholders with a legitimate interest in the haul route should be identified and contacted
- Meeting Format: desire for formal presentation and moderated question and answer session
- Map displays were too small to read
- Project Team members should wear name tags
- Written feedback should be accepted for a minimum of 4 weeks following a meeting

13.1.2 Public Event #2

Public Event #2 was held on November 29, 2007 at the Carlisle Golf and Country Club. Advertisements were placed in the local papers as follows:

Flamborough Review
Friday November 9, 2007
Friday November 16, 2007

Halton Compass
Thursday November 8, 2007 (Online Tuesday November 6)
Thursday November 15, 2007 (Online Tuesday November 13)

Milton Canadian Champion
Tuesday November 6, 2007
Friday November 9, 2007
Tuesday November 13, 2007
Friday November 16, 2007

Burlington Post
Sunday November 11, 2007
Sunday November 18 2007

In addition, flyers were placed with the newspaper in residents' personal mailboxes, or on their driveway in a plastic bag in rural areas. Flyers were sent to the entire Flamborough Review distribution area; a select area near Dundas St, and Kilbride with the Burlington Post; and, the Campbellville area with the Milton Canadian Champion. Flyer distribution totals were as follows**:**

Burlington Post
- Total distribution = 1,158

Flamborough Review
- Total distribution = 13,310

Milton Canadian Champion
- Total distribution = 1,654

The event was very well attended by the public with over 300 residents present and consisted of an open house format followed by a formal presentation with a question and answer period. The event consisted of forty display boards that provided information on:
- Project, proposed quarry, and the study process
- PIC #1 comments and how they are being addressed
- Existing road and traffic data
- Preliminary constraints
- Alternative modes of transport and potential destinations of aggregate
- Screening from the long list to the short list of 5 potential Alternative Haul Routes
- Controlling truck traffic
- Preliminary criteria and indicators
- Next steps

The theme throughout the event was for the public to share their knowledge and input as they are the ones who are most familiar with the study area. Attendees were provided with two forms a comment sheet to collect general comments on the venue, display boards, and format and an evaluation criteria form to understand the public's perception of the relative importance of the criteria and indicators. Fifty three residents completed comment sheets.

A summary of the comments and concerns brought forward at Public Event #2 is as follows:

Baseline Information:

- Outdated traffic statistics
- Missing information on the number of school buses

Alternatives:

- Alternative 3 seems most logical-keeps trucks off Hwy 6 and provides shortest distance to 401.
- Given 75% of trucks will be heading towards the GTA Alternative 3 is the best option because it will reduce travel time and avoid the current bottle neck in Morriston.
- Alternative 1 is the only route that makes sense, all others involve the 401 emergency route.
- Alternative 1 is the best choice but need to compensate residences for loss in property value and need to upgrade Hwy 6.
- Alternative 5 is too dangerous
- Consider new 401 interchange at Milburough
- Alternative 1 and 2 are unacceptable and go through the village of Morriston
- Alternative 3 has 2 sets of railroad tracks
- Corner at Concession 11 and Centre has poor visibility
- Traffic lights at Highway 6 for Alternative 1 will benefit residents west of Highway 6 trying to turn north
- All routes would impact residential, recreational, farms, natural areas, and wetlands and should not be used for truck routes.
- All routes will change the daily use of the roads and will have significant impact on the quality of life for the residents of this community.

Impacts of Truck Traffic:

- Trucks take any route they want
- Policing by public won't work, too hard to read license plates
- Trucker's receive bonuses so will always try for 1 extra run, speeding will be an issue.
- St. Marys only interested in money and not concerned about our homes
- Don't change our picturesque roads
- Hamilton taxes are already high and don't think they should increase to pay for road improvements
- School bus traffic on Campbellville is a concern

- Bad T-junction at Mountsberg and Milburough, concern for conflicts between school buses and trucks
- Area is in the Green Belt
- Don't use Milburough Line if it needs straightening or widening (Pollution and road widening will negatively impact the forest; deforestation is a major contributor to global warming)
- Guelph Line/401 interchange improvements are not being upgraded to a standard necessary for the proposed truck traffic.
- Traffic congestion is very important
- Campbellville is already losing business with excessive traffic
- Campbellville/1st Line has very poor sight lines
- Bus routes, cyclists, and peoples enjoyment of roads must have a very high priority
- Way of life is very important

Public Consultation Process:

- Location of PIC #2 was good but the venue was too small and did not have enough seating.
- Format was good
  - Excellent questions and comments
  - Typist did not capture emotions of the public
  - Answers were insufficient
  - Longer Q&A period
- Why are we discussing haul routes when we are more concerned with the impact on our water?
- Internet site needs improvement

Almost 40 participants completed the evaluation ranking of the criteria and indicators summary of the public's responses is found in **Table 13-1**.

Table 13-1: Summary of Public Evaluation of Relative Importance of Criteria and Indicators

		Number of Responses		
		Very Important	Somewhat important	Not important
Aquatic Environmental/ Surface Water	Potential for disturbance to aquatic habitat	33	2	1
	Potential for removal of aquatic habitat from road improvements (e.g. culvert extensions)	33	4	0
Terrestrial Environment	Potential for disturbance to natural habitat	32	3	0
	Potential for removal of natural habitat from road improvements	34	2	0
	Potential for increased wildlife kills	30	4	1
Land Uses	Potential for disruption effects to sensitive planned land uses	31	3	0
	Potential for removal of planned land uses from road improvements	28	5	0
	Conformity with applicable plans and policies	28	7	0
Social Environment and Community Impacts	Potential for Disruption to residents	34	1	0
	Human health	34	1	0
	Potential for disruption to users of recreation facilities, community features and institutions	30	5	0

	Potential for displacement/removal of residents & residential property from road improvements	30	5	0
	Potential for removal of recreation, community features & institutions	31	3	0
Economic Environment and Business Impacts	Potential for disruption to business enterprises	26	9	1
	Potential for removal of business enterprises and/or property	27	8	1
	Potential for affect on property values	31	4	0
	Potential for effect on agricultural operations	28	9	0
Cultural and Heritage Resources	Potential for Disturbance to built heritage	21	6	0
	Potential for effectors on archaeological resources	24	9	2
Transportation	Change in Road Service	30	4	1
	Potential for change in road safety level	34	0	0
	Potential for impact on alternative transportation modes	30	2	1
Cost	Estimated infrastructure costs	27	3	0

Overall, despite being opposed to the Quarry, majority of the attendees were pleased with the display materials and the formal presentation and question and answer period.

13.1.3 Public Event #3

Public Event #3 was held on January 9th, 2008 at the Carlisle Community Centre on the second floor. Advertisements were placed in the local papers as follows:

Flamborough Review
Friday December 21, 2007
Friday December 28, 2007

Wellington Advertiser
Thursday December 20, 2007
Thursday December 27, 2007

Milton Canadian Champion
Friday December 21, 2007
Friday December 28, 2007

Burlington Post
Sunday December 23, 2007
Sunday December 30, 2007

Halton Compass
Thursday, December 20, 2007 (Online Tuesday December 18)
Thursday, January 3, 2008 (Online Tuesday January 1)

The format of this event was a public workshop intended to give the public an opportunity to provide input on the evaluation criteria, the relative importance of the criteria and the evaluation approach. The room was set up with 15 tables that could each accommodate 10 residents. Each table was supplied with an independent facilitator whose role was to guide the group through the workbooks supplied.

Also in attendance were transportation, natural environment, air quality, noise, and health specialists in addition to a general facilitator that whose role was to mediate the entire session. It was planned that the evening would begin with introductions and a brief presentation to give the participants an overview of how the session would run.

More than 150 community residents showed up, most of whom refused to sign-in due to Councillor Margaret McCarthy requests not to participate. Councillor McCarthy asked to say a few words before initiating the session and went on to speak at length and discouraged residents from participating.

Despite attempts by the facilitator to try to get people to sit down and participate, the riled up audience elected to walk out at the urging of Councillor McCarthy. Councillor McCarthy set the stage for the walkout by saying, "It's not in anyone's interest to complete their workbook or subject themselves to two-and-a-half hours of behavioural engineering." She said breaking the audience into small groups was a divide-and-conquer tactic by a multinational, multibillion-dollar company that hires psychologists to tell it how "they can infiltrate, how to pit one against another."

After Councillor McCarthy finished speaking most of the residents walked out leaving only a handful that participated informally to varying degrees. The St. Marys team listened to the concerns of those residents that remained behind to provide their input and answered their questions.

Due to the high initial attendance there was a session held in the overflow/accessibility room in the basement of the Carlisle Community Centre. Approximately 10 community members participated. The session was conducted by an independent facilitator and was later joined by Chris Philp from iTRANS.

Community members were very upset at the start of the session. They were annoyed that the facility had reached capacity. This prompted a discussion on more suitable venues for PIC #4. Community members admitted that there are few venues close to the proposed quarry site with a large capacity. They suggest the local Catholic School – Our Lady of Mount Carmel Elementary School - as a possible venue for PIC #4.

It is important to note that none of these participants signed in or provided their names. Every participant was given a workbook and was walked through the process. The dialogue began by discussing how long the community members have lived in the area. One couple grew up in the area; another couple has lived there for more than 35 years. On average most people at the table have lived in the community for 10 – 12 years, with the exception of one woman who moved there two years ago – to escape urban sprawl. One of the most pervasive themes that emerged from this session was the fear that this project would be the trigger point for aggressive development in the area. Community members are concerned about losing the small-town feel that they believe characterizes and defines their community.

Following the basic introductions, the facilitator explained the CART process, how the PIC's were structured, an explanation about the workshop structure of this PIC and the format of the workbooks. An attempt was made to go through the workbook, but people were frustrated, so the decision was made to work through some of their overall questions and concerns. The facilitator's objective was to spark discussion, make people feel comfortable and engaged and then begin soliciting feedback. It was explained that while all factors and indicators were important, their feedback was an important part of the process and that when the application moves forward it is better to have provided some insight than to remain silent. This made an impact on eight of the community members present. One couple left immediately and the remaining eight participated to varying degrees.

In total three work books were completed and submitted and 57 workbooks were submitted with 'No Quarry' written on the cover. A summary of the comments and concerns brought forward at Public Event #3 is as follows:

General Comments:

- Concern this project will be a trigger point for more development in the area; community will lose the small town feel/quaintness
- Fear future residential and industrial development and satellite industries
- Trucks drive quickly because they are paid by the load-Is this how St. Marys will pay the drivers?
- Government needs aggregate supply so they don't have our best interests in mind; how are we going to get government support?
- Need to find a rare salamander or a Native burial ground to stop this project
- Water issues are more important
- No tabulated results of survey from last meeting – all my answers were in there.

Alternatives:

- Support Alternate Haul Route 1 - Best route as it minimizes exposure to cyclists on Milburough Line, Centre Road and Campbellville Road

- Alternative 1 is the most direct, least disruptive route, but how do you expect to enforce truck prohibitions.
- Alternative 2 is not a viable set up – hills, line of sight – low lands trucks prefer not to make turns every mile and a half.
- Alternative 3 is not good – Campbellville can never take the traffic that would be on Twiss and Reid Roads – Townline needs total rebuild – wet lands and low lands – potential problems at Campbellville and Townline Road.
- Alternative 5 is the worst option presented.

Impacts of Truck Traffic:

- Vehicle damage: chips out of windshields and flat tires on school buses
- Volume of truck traffic
- Increased traffic always has an effect on local business and activities
- Quarry hours of operation 7am-7pm affects rush hour and kids headed to school
- Property impacts: cracks in house foundations, vibration and dust, waste, home equity and property value
- Winter driving conditions
- Road condition: already torn up by school buses
- Road access
- Trucks won’t stick to the designated haul routes– suggest brightly numbering trucks
- Congestion on the 401: 401 is not productive to trucking
- Why not use rail line or a tunnel under Campbellville or Milburough?

By the end of the session participants had calmed down considerably and had provided open feedback. Chris Philp was able to answer some of the more technical questions, which the residents appreciated. Participants reiterated many times throughout the session that they were opposed to the quarry and wanted to be sure that we captured their opposition. But understood the rationale in participating and did provide some valuable feedback.

13.1.4 Public Event #4

Public Event # 4 was held on June 23rd, 2008 at the Carlisle Community Arena. Advertisements were placed in the local papers as follows:

Flamborough Review
Friday June 6, 2008
Friday June 13, 2008

Wellington Advertiser
Friday June 13, 2008
Friday June 20, 2008

Milton Canadian Champion
Friday June 6, 2008
Friday June 13, 2008

Burlington Post
Friday June 6, 2008
Friday June 13, 2008

Halton Compass
Tuesday June 10, 2008 (online); Thursday June 12, 2008 (print)
Tuesday June 17, 2008 (online); Thursday June 19, 2008 (print)

This event served as an interim Public Event designed to give the public an additional opportunity to provide feedback and to ask questions. Originally this PIC was intended to satisfy the CART Terms of Reference; however less than one week before the PIC, CART indicated that they could not support the submitted findings without having additional time to review the material.

Given that advertisements had already been published and with insufficient time to cancel, St. Marys decided to proceed with the meeting to give the public a chance to see what stage the evaluation was at and which potential haul routes were emerging as front runners.

The event was well attended by approximately 120 residents. It consisted of an open house format followed by a formal presentation with a question and answer period. The event consisted of 46 display boards that provided information on:

- Project, proposed quarry, and the study process
- PIC #2 and PIC#3 comments and how they are being addressed
- Existing road and traffic data
- Preliminary constraints
- Screening from the long list to the short list of 5 potential alternative haul routes
- Controlling truck traffic
- Detailed analysis of the alternative haul route in tabular format
- Evaluation approach and preliminary qualitative and quantitative evaluation results
- Sensitivity analysis
- Next steps

Eleven attendees completed the comment form to varying degrees and other public input was recorded during the question and answer session. A summary of the comments and concerns brought forward at Public Event #4 is as follows:

Baseline Information:

- Outdated traffic statistics

Alternatives:

- No haul routes are acceptable
- Alternative 4 would be the most balanced route, but instead of going east on Campbellville Rd, go on an angle to the north east and make a new interchange at 401 and McNiven
- Prefer Haul Route 4 to Campbellville Rd and then head in a north easterly direction to 401 instead of straight up Milburough Line which is a fairly low and sensitive area.
- Which route do you think a truck driver will take if your designated haul route is 20 minutes longer?
- You show the preferred haul routes for the trucks *leaving* the site. What about the trucks entering the site? Are they restricted to the same route? This should be added to the panel to make it clear.
- You are limited to choosing a haul route based on the existing number of roads that are surrounding the Quarry. So either have to use Milburough Line or Concession 11E. In the future if you need another haul route is another application needed for the trucks to use another road?
- How would you obtain all this extra property to fix the rest of the road to accommodate all the new requirements for the rest of the ROW? Will you expropriate the properties?
- Haul routes are shown to only go east and west. Do you not expect that trucks will be going to sites located in the south? Going south is not shown as a haul route, so how do they (trucks) get there?
- What happens if material patterns change? Is a new haul route required? Minimal attention is being paid to the south. If the mid-peninsula highway is approved, does this change the quarry haul route? What happens?

Impacts of Truck Traffic:

- “Fixing” = Destruction
- Safety first – No haul route
- Don’t agree with putting a stop light at Campbellville Rd and Milburough as it is at the bottom of a very steep hill when heading eastbound.
- Trucks will be running through the City at 2am to get to the Quarry for 3am. Residents won’t be able to sleep.
- Impacts with double-trailer trucks with cyclists should be (explicitly) stated. All of the routes presented are cycling routes, which could have impacts with trucks.
- Your idea of an upgrade is to flatten the grades. We like to cycle on the roads with a bigger hill. How is that an upgrade? What is your idea of an upgrade?
- What is the stopping distance at the bottom of the hill for heavy trucks? What is the stopping distance coming out of Lawson Park or other driveways? What is the stopping distance for a loaded truck?
- What is going to happen to the two rail road crossings? How will this be accommodated? Already we have to wait a few minutes when we are commuting to work.

- Diesel is expensive right now. Trucks are running the lights at Clappins Corners. They will go on any other side route to get the gravel around. Gravel haulers going to LaFarge don't conform. We need reassurance that the trucks will stay on the (designated) haul route.
- How many different people are driving these 1100 trucks? Their routes would require minimum 2 hours to Toronto, how many different vehicles would there be?

Evaluation:

- Presented no useful information today-"preferred" routes were determined from a sample of 50? Ridiculous
- These comments do not have enough validity to represent public input since so many people walked out. The community preferences were not documented (on the board) since they weren't provided (at the meetings).
- The character of the road makes the route a negative or disadvantage. But this doesn't stop if from being a haul route.
- What is the threshold to indicate that it is too disruptive to accommodate all these changes? When is it measured that it (alternative) is too detrimental to the community? What criterion evaluates the degree of change for an appropriate impact? It should be included.

Public Consultation Process:

- Quarry has not been approved, this is an exercise in futility to discuss the haul routes
- Information overload, too much to take in at once
- Contaminated soil has not yet been addressed.
- Application for safe test-pumping has not yet been approved.
- We are concerned that we will be poisoned by the water.
- Display graphics are good. The scientific findings presented are not good enough.
- Two motions will be passed by Town Council tonight in Milton.
    - Motion 1 - Notice of Motion to follow-up on site contamination in 1998
    - Motion 2 - Milton Council Motion, City of Hamilton, asking CART to seize review of our study until a hydrogeology study is completed. Also passed a motion to fund $30,000 for peer reviews.
- Are you going to provide this information (display panels) in soft copies for us to review?
- CART requires additional information, what is missing?

13.1.5 Public Event #5

Will be inserted following PIC #5 in the fall.

13.2 Agency Consultation

13.2.1 Combined Aggregate Review Team (CART)

The St. Marys team has worked with CART throughout the entire process and has respected and adhered to their Terms of Reference. Members of the original CART group included:

- Stan Holiday – City of Hamilton
- Alvin Chan – City of Hamilton
- Steven Rowe – Hamilton Consultant
- Mohan Philip – City of Hamilton
- Jill Stephen – City of Hamilton
- Tanya McKenna – City of Hamilton
- Paul Cripps – Town of Milton
- Lisa Zinkewich – Halton Region
- Anne Dawkins – Town of Milton

As the project progressed additional participants included:

- Robin van de Lande – City of Burlington
- Kathryn Pounder – Niagara Escarpment Commission (NEC)
- Jeffery Reid – Halton Region

More recently there have been significant changes including the departure of Stan Holiday and Alvin Chan and the addition of the following members:

- Raymond Lee – City of Hamilton
- Christopher Bell – City of Hamilton
- Stirling Todd – Halton Region
- Stephen Robichaud – City of Hamilton

The St. Marys project team has liaised with CART through their chair Stan Holiday (who was recently replaced by Raymond Lee) and Chris Bell and at times corresponded directly with CART members.

To date the St. Marys team has had five meetings with CART members to discuss the project progress, findings, and details about upcoming public events.

Although it was challenging to coordinate the schedules of so many members, meetings were held on the following dates:

- January 25th, 2007 – meeting
- November 15th, 2007 – meeting
- December 18th, 2007 – conference call
- January 16th, 2008 – meeting
- June 17th, 2008 – meeting

Table 13-2 summarizes the description of the submissions made to CART over the duration of the project and the format and date it was sent.

Table 13-2: Summary of Submissions made to CART

Description of Submission	Format	Date Submitted
PIC#2 Display Boards (Draft)	Electronic (FTP Site)	1-Nov-07
PIC#2 Display Boards (Draft)	Hardcopy + CD	2-Nov-07
Alternate Modes of Transport (update to board)	Electronic (email)	7-Nov-07
Alternative Haul Routes Identified (added 5th haul route)	Electronic (email)	7-Nov-07
Alternative Haul Route 5 (new board)	Electronic (email)	7-Nov-07
Advertising Schedule for PIC#2	Electronic (email)	7-Nov-07
Response to CART letter dated Sept. 17/07	Hardcopy	15-Nov-07
Comment Sheet for PIC#2	Hardcopy	15-Nov-07
Evaluation Criteria Ranking Sheet	Hardcopy	15-Nov-07
Comment Sheet for PIC#2 revised	Electronic (email)	20-Nov-07
Updated PIC #2 Display Boards	Electronic (FTP Site) + hardcopy	26-Nov-07
Ad Schedule PIC #3	Electronic (email)	18-Dec-07
Workshop (PIC#3) Workbook	Electronic (email)	18-Dec-07
PIC #2 Comment Sheet Summary	Electronic (email)	18-Dec-07
Participant Questions (PIC #2 Q+A)	Electronic (email)	18-Dec-07
Revised Existing Traffic and Truck Volumes board	Electronic (email)	18-Dec-07
Revised Existing Road and Rail Network board	Electronic (email)	18-Dec-07
Revised Preliminary Constraints Map board	Electronic (email)	18-Dec-07
Estimated Number of School Buses board	Electronic (email)	18-Dec-07
Minutes from December 18, 2007 Conference Call	Electronic (email)	1-Jan-08
CART Memo	Electronic (email)	20-May-08
Summary of Transportation Analysis	Electronic (email)	20-May-08
Analysis Document	Electronic (email)	20-May-08
Analysis Matrix	Electronic (email)	20-May-08
Evaluation Approach	Electronic (email)	20-May-08
Recommended Preferred Alternative and Potential Mitigation	Electronic (email)	20-May-08
PIC #4 Draft Display Boards	Electronic (email) + hardcopy	20-May-08

13.2.2 Ministry of Transportation (MTO)

The Ministry of Transportation was contacted on several occasions throughout this process. The first contact was on November 5th, 2007 when iTRANS contacted Tom Hewitt via email and phone message to request a meeting with MTO to discuss the Haul Route study. Mr. Hewitt referred iTRANS to Adrian Firmani and on November 13, 2007 a formal request was sent to MTO asking for data, their concerns, and what level of involvement they would prefer going forward. Mr. Firmani responded via letter on January 10th, 2008 and noted the following comments:

From a Traffic perspective:

- The interchange at Highway 401 and Highway 6 is in southwestern region's jurisdiction. Please contact (519) 873-4200 for comments regarding this interchange.
- The Traffic office requires detailed traffic impact studies for each of the alternative haul routes.

From a Highway Engineering Perspective:

- Review of the pavement structure of the ramps, Reid Sideroad and the Guelph Line structure to accommodate the increased weight and volume of trucks.
- Structural review of the Guelph Line Overpass to accommodate the increased volume of trucks
- What will be the noise impacts through the identified haul route areas?
- On sheet 13, the map shows that Reid Sideroad has a posted speed of 80km/hr, please verify as I believe it is posted at 60km/hr.
- As for the status of the Highway 6 study, MTO is currently going through EA approval for the route and is anticipating to have it in 2008 at which point Southwest Region will take over the project. As for the timing of the new re-aligned Highway, staff from Southwest will be determining this but not until approval is obtained. Currently Brian Goudeseune from the SW office is the Project Manager involved (or at least has knowledge of) the project.
- Maddaugh Road to Highway 401 - Highway 6 will be constructed on a new alignment to bypass the communities of Puslinch and Morriston. This new section of Highway will be a fully controlled access, 4 lane divided highway with median separator barrier and provide full Eastbound and Westbound access to Highway 401 via various ramp configurations.

On February 14th iTRANS sent a formal request for information to Mr. Goudeseune. Information was not quickly forthcoming so subsequent requests were made to Roger DeGannes for signal timings on March 6th, 2008, Graeme Price for data on March 19th, 2008, Connor Byrne for signal timings on March 20th, 2008, and Dan Leake for information on Highway 6 on April 4th, 2008.

All data provided by MTO was considered in the Haul Route Evaluation.

13.2.3 Ministry of Natural Resources (MNR)

On August 11th, 2008 Diane Schwier was contacted from the Ministry of Natural Resources via phone and email to inquire if and how MNR would like to be involved in the Haul Route Study. At this time a web link to the display boards from PIC #4 was also provided for their reference. On August 12th, 2008 Ms. Schwier responded by email thanking iTRANS for the information and explained that the information would be kept on file for future reference. She went on to explain that although they appreciate receiving the information, MNR will not be commenting on the study. Traffic assessments are not required under the Provincial Standards and are typically a mandate of the municipality. Should an application be received under the Aggregate Resources Act and there are objections to the application based on traffic concerns, MNR will need assurance that the applicant has made every effort to address objection / concerns. This must be demonstrated prior to referring the application to the OMB or to the Minister for issuance or refusal of the licence.

13.2.4 Halton Conservation

Halton Conservation was contacted as suggested by the CART members. On June 25th, 2008 a soft copy of the Baseline Conditions Report was mailed to Brenda Axon with the Halton Conservation for her review and comment. It was confirmed that Ms. Axon received her copy and comments are still forthcoming.

A web link to the PIC #4 display boards was emailed to Ms. Axon on July 17th, 2008 any comments are still forthcoming.

13.2.5 County of Wellington

Aldo Salis from the County of Wellington was contacted via phone and provided hard copies of the PIC #2 display boards on November 9th, 2007. The County of Wellington was invited to provide feedback on the content in the display boards and asked how they would like to be involved in the study going forward. Their only request was to continue to keep them updated throughout the study.

A web link to the PIC #4 display boards was emailed to Mr. Salis on July 17th, 2008 any comments are still forthcoming.

13.2.6 Township of Puslinch

Brenda Law from the Township of Puslinch was contacted via phone and provided hard copies of the PIC #2 display boards on November 9th, 2007. The County of Wellington was invited to provide feedback on the content in the display boards and asked how they would like to be involved in the study going forward. On January 28, 2008 Brenda provided a letter response to St. Mary's stating that the Township was very concerned with truck traffic along Highway 6 through Morriston. Ms. Law went on to state that Morriston is already very congested and it is their Council's opinion that additional trucks would only worsen an already dangerous section of the Highway. It was also shared that there have been many accidents some resulting in fatalities, and it would be insensible to add to an already poor situation. The Township of Puslinch was appreciative for the opportunity to provide their comments and the St. Marys team agreed to keep them updated throughout the study. A web link to the PIC #4 display boards was emailed to Ms. Law on July 17th, 2008 any comments are still forthcoming.

13.2.7 CP Rail

Canadian Pacific Rail is the only Rail Company operating within the study area. They were first contacted by Norma Moores from Stantec who was inquiring about the train frequency at the Guelph Junction. On August 4th, 2006 Orest Rojik of CP Rail responded with information on freight and passenger trains and cautioned that the information provided is based on existing traffic and approximately represents rail traffic for the average day. Variations may exist on a day to day basis adding that specific measurements may also vary significantly depending on customer demands.

On November 6th, 2007 iTRANS followed up with Mr. Rojik asking if CP Rail had any interests or concerns related to the study. A reply email was received from David Lukianow (CP Rail) asking what the total traffic count would be including existing vehicular traffic and anticipated truck traffic. On November 13th, 2007 iTRANS provided Mr. Lukianow with the traffic volumes he was seeking.

On December 20th, 2007, iTRANS provided Mr. Lukianow and Mr. Rojik with a web link to the display boards for PIC #2 requesting their comments and feedback. On January 18th, 2008, Mr Lukianow replied via email expressing concern because none of the display boards addressed grade crossing improvements to address the significant increase in heavy truck traffic over the Twiss Road grade crossing, among others. He went on to say that the existing crossing warning signal system is satisfactory even with the increase in traffic volumes, however their concern is the affect that this tonnage will have on the grade crossing surface and subsurface.

A web link to the PIC #4 display boards was emailed to Mr. Lukianow and Mr. Rojik on July 17th, 2008 any comments are still forthcoming.

13.2.8 Hamilton –Wentworth District School Board

On October 16, 2007, Darryl Sage from the Hamilton-Wentworth District School Board was contacted and provided with a few details about the project. At that time iTRANS requested information regarding school bus routes that are currently in operation within the study area. It was explained that this information would be used to help determine the most suitable truck haul route for the proposed Flamborough Quarry. The data were printed on October 19, 2007 and provided to iTRANS shortly thereafter.

A web link to the PIC #4 display boards was emailed to Mr. Sage on July 17th, 2008 any comments are still forthcoming.

13.2.9 Hamilton – Wentworth Catholic District School Board

On October 16, 2007, Vince Ramelli from the Hamilton-Wentworth Catholic District School Board was contacted and provided with a few details about the project. At that time iTRANS requested information regarding school bus routes that are currently in operation within the study area. It was explained that this information would be used to help determine the most suitable truck haul route for the proposed Flamborough Quarry. The data were printed on October 18, 2007 and provided to iTRANS shortly thereafter.

A web link to the PIC #4 display boards was emailed to Mr. Ramelli on July 17th, 2008 any comments are still forthcoming.

13.2.10 Halton District School Board

On October 31st, 2007, Karen Lacroix from the Halton District School Board was contacted and provided with a few details about the project. At that time iTRANS requested information regarding school bus routes that are currently in operation within the study area. It was explained that this information would be used to help determine the most suitable truck haul route for the proposed Flamborough Quarry. The data were printed on October 31st, 2007 and provided to iTRANS shortly thereafter.

A web link to the PIC #4 display boards was emailed to Ms. Lacroix on July 17th, 2008 any comments are still forthcoming.

13.2.11 Halton Catholic District School Board

On November 9th, 2007, Sandy Morgan from the Halton Catholic District School Board was contacted and provided with a few details about the project. At that time iTRANS requested information regarding school bus routes that are currently in operation within the study area. It was explained that this information would be used to help determine the most suitable truck haul route for the proposed Flamborough Quarry. The data were compiled on November 9th, 2007 and provided to iTRANS shortly thereafter.

A web link to the PIC #4 display boards was emailed to Mr. Ramelli on July 17th, 2008 any comments are still forthcoming.

13.2.12 Hamilton – Wentworth Federation of Agriculture

On July 7th, 2008, Philip Krakar was contacted by email to inquire if and how the Hamilton-Wentworth Federation of Agriculture would like to be involved in the study. When no response was received a subsequent inquiry was made with Dorothy Jones the Secretary/Treasurer and on July 15th, 2008 a web link to the PIC #4 display boards was emailed. On July 22nd, 2008 Ms. Jones confirmed receipt of the link and explained that she would present the material at their August meeting. Comments are still forthcoming.

On July 24th, 2008, Ms. Jones requested that the group be informed of the date for PIC#5.

13.2.13 Ministry of Culture

On July 4th, 2008 Katherine Cappella from the Ministry of Culture sent a fax to Jim Wilson and copied iTRANS to advise them that they had the opportunity to review the Stage 1 archaeological assessment report. The correspondence went on to note the Ministry concurs with the recommendation that a Stage 2 archaeological assessment be conducted for those areas identified as having archaeological potential along whichever haul route is chosen to service the quarry. If any significant archaeological sites are documented during the Stage 2 assessment, they will have to be mitigated through either avoidance or excavation.

13.2.14 Cycling Committees

Members of CART provided the names of cycling committees that are active within the study area and suggest iTRANS contact each of them.

On January 23rd, 2008 Darryl Bender the City staff person that supports the Hamilton Cycling Committee was contacted via email. Mr. Bender responded the same day and provided a link to the map of cycling routes for the entire City and suggested that iTRANS also contact Burlington/Halton to acquire similar information for the remainder of the study area.
http://www.map.hamilton.ca/Static/PDFs/Public%20Works/citywide%20bike%20map-rural_2005.pdf

Mr. Bender advised that there were cycling clubs in the city, but did not know their specific cycling routes. He is under the assumption that some of the groups have variable routes. The two groups that immediately came to mind were the Hamilton Cycling Club & a group at McMaster University that organizes rides through "MACycle". He went on to state that there are a few other groups that likely use this area as well. Finally, he added that he was aware of at least one cycling event that exists in the area - in early September.

A web link to the PIC #4 display boards was emailed to Mr. Bender on July 17th, 2008 and he advised on July 23rd, 2008 that he forward the link to the members of the Hamilton Cycling Committee for their review.

On August 20th, 2008 Mr. Bender replied and explained that The Hamilton Cycling Committee discussed the Flamborough Quarry project at their August 6th meeting and the members asked that the following comments be forwarded:

- Ensure paved shoulders for cyclists along all of the haul routes
- Ensure very regular street sweeping
- Ensure enforcement of “loads must be covered”
- Turning lanes for the trucks was suggested

On January 23rd, 2008 iTRANS emailed Kim Philips from the City of Burlington to inquire about cycling in the study area. Ms. Philips forwarded the message to Ashley Grigg a clerk with the City of Burlington who provided the following response to iTRANS on March 6th, 2008.

The Burlington Cycling Committee is a Citizen Advisory Committee to Burlington City Council, which provides advice on matters pertaining to cycling within the City of Burlington. The cycling committee responds to requests from staff and Council related to utilitarian and recreational cycling on-road lanes and multi-use pathways within Burlington and provides input to City staff about reports, proposed by-laws, annual capital and operating budget requests and other relevant materials related to cycling within Burlington. The committee also identifies issues regarding safety of on-road lanes and off-road pathways within Burlington and promotes the expansion of on-road and multi-use cycling facilities and safe cycling with in the City of Burlington. Further information regarding the Burlington Cycling Committee is available at www.burlington.ca (under the following path: Welcome to City Hall / Boards and Committees / Burlington Cycling Committee).

The Burlington Cycling Guide which contains the Burlington pathway and bikeway map was attached to the email.

Two prominent cycling stores Brant Cycle and Newworld Cycle in Burlington were also contacted on January 23rd, 2007 to request cycling information and see if they would like to be involved in the study but neither responded to the request.

14. SUMMARY OF MAJOR CONCLUSIONS AND RECOMMENDATIONS

Both the qualitative evaluation and the quantitative evaluation independently arrived at the same conclusion, that Alternative Haul Route 3 is the preliminary preferred alternative. The next most preferred alternative is Alternative Haul Route 1, followed by Alternative Haul Routes2 and 4, respectively. Alternative Haul Route 5 was the least preferred alternative for both evaluation methods.

The sensitivity analysis highlighted that while Alternative Haul Route 3 continues to remain the preferred option under different weighting scenarios, Alternative Haul Route 1 remains a reasonable option.

In conclusion Alternative Haul Route 3 is the preliminary preferred alternative.

To ensure smooth and safe traffic operations are maintained effectively along the preferred haul route, it is recommended that the following road alterations be implemented:

- Upgrade of the road cross sections to incorporate up to date engineering standards, wider travelling lanes, and a continuous cycling lane in both directions.
- Signalization of the Campbellville Road and Milburough Line Intersection.
- Signalization of the Campbellville Road and Twiss Road Intersection.
- Signalization of the Reid Sideroad / Highway 401 EB Ramp Intersection.
- Construction of eastbound and westbound exclusive left-turn lanes at Campbellville Road and Milburough Line.
- Construction of eastbound and westbound exclusive left-turn lanes at Campbellville Road and Twiss Road.
- Construction of a northbound channelized right-turn lane at Campbellville Road and Milburough Line with a truck acceleration lane on the east leg.
- Construction of a southbound channelized right-turn lane at Campbellville Road and Twiss Road with a truck acceleration lane on the west leg.

Other suggested mitigation measures include:

- Coordinate the traffic signals at Campbellville Road and Twiss Road with the signal controls at the rail crossing on Twiss Road
- Horizontal realignment on Campbellville Road to remove the existing substandard curves
- Modify rail crossing controls on Campbellville Road to include lights and gates
- Reduce speed limit on Milburough Line to 50 km/h

With the addition of quarry truck traffic and the recommended road alterations in place, the preferred haul route can operate safely and efficiently. This is supported by the traffic analysis that considers the 2021 and 2031 horizon years for both signalized and unsignalized intersections

Appendix A

City of Hamilton

Terms of Reference

Mountsberg Quarry Haul Route Evaluation

April 2006

Dillon Consulting Limited

1.0 Introduction

The Lowndes Holdings Corp. has proposed to develop a Dolostone Quarry in the City of Hamilton at a location between Centre Rd and Milburough Line, north of Concession 11. **Figure 1** shows the location of the proposed quarry and the recommended study area for the haul route evaluation.

A concern associated with the project is the large volume of heavy truck traffic that would be generated by the quarry and the impact of traffic movement on traffic safety, social features and the natural environment along the haul route(s). In response to the Lowndes Holdings application for an amendment to the City of Hamilton Official Plan/Zoning By-law, the City is requesting that an evaluation be undertaken to select the preferred mode/routes to transport the aggregate material from the proposed quarry site.

The municipalities of Hamilton, Halton, Burlington and Milton are requesting that the evaluation to be completed be consistent with the requirements of the *Ontario Environmental Assessment Act* and its regulations (if applicable). Should there be a need to improve roadways to support the project (if the application receives *Planning Act* and *Aggregate Resource Act* approvals), a Class EA for these improvements will likely need to be undertaken (the MEA Municipal Class EA and/or the MTO Class EA for Provincial Highways). This haul route evaluation would serve to support the preferred alternative as part of possible future EAs to fulfill Ontario EA Act requirements and possibly the *Canadian Environmental Assessment Act.*

The activities that are to be undertaken in conducting the haul route assessment and comparative evaluation include:

- Define Study Parameter Assumptions;
- Identify and Evaluate Alternative Solutions;
- Identify Reasonable Alternative Routes within the study area giving consideration to applicable plans and policies including municipal official plans, the Greenbelt Plan and the Niagara Escarpment Plan;
- Identify and describe any needed improvements to the alternative routes to support projected truck volumes;
- Describe Baseline Environmental, Socio-cultural, Economic and Transportation Conditions;
- Develop the Evaluation Approach;
- Assess & Evaluate the Alternative Routes (considering the identified needed improvements);
- Select the Preferred Route(s);
- Describe Effects for the Preferred Route(s);
- Identify Potential Road Improvement Needs;

- Identify financial implications and proponent (Lowndes Holdings) and municipal responsibilities (short and long term);
- Prepare Draft and Final Evaluation Reports;
- Public Consultation (e.g. meetings/workshops (4)) and;
- Agency Consultation with but not limited to the following agencies (identified as the Agency Review Group):
  - The Municipalities of Hamilton, Halton, Burlington and Milton;
  - The Ministry of Transportation;
  - The Ministry of Natural Resources;
  - Halton Conservation;
  - The Niagara Escarpment Commission; and
  - Other agencies identified by the proponent

This Terms of Reference is to be considered as the minimum expectation for conducting this study and that the applicable municipalities reserve the right to request reasonable additions to the study should results warrant the need for additional or more detailed investigations.

2.0 Define Study Parameter Assumptions

Key assumptions regarding the project that are to be defined include but are not limited to:

- Assumed in-service date;
- Sizes of the trucks to be used;
- Volume of truck traffic to be generated;
- Location of truck queuing area(s);
- The distribution of truck traffic volumes among the potential haul routes (if more than one haul route is to be utilized);
- A description as to how truck volumes and truck tonnages might vary over the life of the project and by hours of the day, days of the week, and time of the year;
- Destinations of the material;
- Trucking base origins;
- Hours of facility operation, etc;
- How the use of routes would be regulated/enforced; and
- Horizon year and intervals required for analysis (20 yrs in 10 year increments).

The assessment should also identify Best Practices for both design/construction and operation activities with respect to aggregate transportation of similar operations in Ontario and other jurisdictions.

Should a Class EA be required for possible future road upgrades to the preferred haul route(s), these parameters would serve to support the rationale for the road improvements.

The selection of the proposed haul route is to consider potential quarry expansion plans.

3.0 Review of Alternative Solutions

To satisfy the Class EA requirement to consider “alternatives to” the undertaking, the proponent should identify and evaluate alternative solutions to transport the quarried material from the site. This may include road-based options; rail based options; or a combination thereof.

4.0 Identify Alternative Routes Within the Study Area

The reasonable alternative routes to be considered are to be identified and described. A map/air photo showing these routes is to be provided. As the future market area for aggregates is uncertain, the study area/alternative routes are to extend from the proposed quarry site to the entrance points of Ontario “400” series highways in all directions. If the proponent can rationalize/demonstrate why some travel directions from the quarry would not be used, or that the volume of truck traffic would be so low throughout the entire life of the facility so as to not result in any appreciable negative effects, then routes in these directions would not need to be assessed.

If more than one haul route is required for the quarry operation, or if return and exit trips are to be by separate routes then it is expected that several sets of alternatives routes would be generated (and evaluated) with each set having the same end point (i.e. a provincial “400” series Highway).

The identified alternative routes are to be presented to the agencies and public for review and comment prior to their assessment and evaluation. It is expected that agencies will be provided with the opportunity to review all materials in draft prior to public release.

5.0 Describe Baseline Conditions

A description of baseline conditions for all of the alternative routes is to be provided. As much of the information as possible should be presented on mapping/air photos using GIS or a reasonable alternative (ArcGIS preferred). A description of the following environmental components is to be provided:

- Aquatic Environment;
- Terrestrial environment including ESAs and other sensitive areas/features;
- Surface Water Features;
- Existing and Proposed Land Uses;
- Land use plans and designations including municipal official plans, the Green Belt Plan and the Niagara Escarpment Plan;

- Social Environment (residences, community features, recreation facilities, community function and character, school bus routes, emergency vehicle access, etc.);
- Air quality conditions;
- Noise levels;
- Economic Environment (location and type of business enterprises);
- Agriculture;
- Recreational uses (trail crossings, cycling uses, walking etc);
- Cultural resources (built heritage, cultural landscape, archaeology);
- Road characterization (roadway classification, right-of-way widths, level of service (current and projected), weight restrictions, number of lanes, pavement structure, intersection configuration, road alignment (vertical and horizontal), reduced load designations, posted speed, truck route designation, watercourse crossings, culvert types, rail crossings, steep grades, visibility etc.);
- Traffic Volumes; and
- 5 yr vehicle collision history by link/intersection including wildlife.

Baseline conditions need to be determined for the “future no build” scenario. The description of the baseline conditions will be used as the basis from which to assess the potential for change as a result of the use and possible improvement to the alternative options being considered.

6.0 Develop the Evaluation Approach

The evaluation of the identified alternative routes is to be conducted in a systematic, comprehensive and traceable manner consistent with the *Ontario Environmental Assessment Act*. The evaluation is to be based on a set of evaluation criteria and indicators. As an example, a basic list of assessment/ evaluation criteria is provided in ***Table 1***. It is noted that several of the example criteria may not apply, nevertheless they should be considered at the onset of the study. The data to be collected on the basis of the criteria is expected to be a mix on quantitative and qualitative data. The criteria and their relative importance are to be confirmed through agency and public consultation prior to their application.

The effects assessment is to consider the potential increase in truck volumes, as a result of quarry activity, over the anticipated future background traffic volumes for each alternative route. As well, the assessment of the alternative routes is to consider any needed improvements to the routes to support the projected increase in truck volumes.

Once developed, the assessment and comparative evaluation approach is to be submitted to the Agency Review Group for their review and comment.

7.0 Assess Effects of the Alternative Routes

Prior to the assessment of the alternatives, road improvements that are needed to support the existing uses and proposed use of each alternative route are to be identified (e.g. road widenings, resurfacing, turning lanes, new crossings/grade separations, paved shoulders, signals, etc.) and considered in the effects analysis/route comparison. There may be a need for additional supporting studies (e.g. geotechnical investigations, cost analysis) to establish road improvement needs.

For each set of alternative routes, the routes are to be assessed and a description of potential effects provided based on the selected assessment/ evaluation criteria. The data is to be presented in a matrix format that describes the potential for effect for each indicator/alternative.

8.0 Comparatively Evaluate and Recommend the Preferred Route(s)

On the basis of the collected data/assessment of effects for each of the alternative routes, the alternatives are to be comparatively evaluated. The preference would be to use qualitative evaluation method, to be supported by a quantitative evaluation method if the data type supports one. In comparing the alternatives, the relative importance of the criteria is to be considered.

For each set of alternatives, the advantages and disadvantages of the alternatives are to be compared and considered in the rationalization of the preferred route(s).

The recommended preferred route(s) and the method by which this preference is achieved is to be presented to the agencies and then the public prior to its confirmation.

Table 1 – Example Evaluation Criteria	
Criteria	**Indicators**
Aquatic Environment/Surface Water	
Potential for disturbance to aquatic habitat	Number, character and sensitivity of watercourses crossed. Likelihood of increased runoff effects on these watercourses.
Potential for removal of aquatic habitat from road improvements (e.g. culvert extensions)	Number of watercourse culverts/structures that could require extension to accommodate road improvements. Magnitude of removal effects. Sensitivity of habitat affected.
Terrestrial Environment	
Potential for disturbance to natural habitat	Number/length and character of sensitive habitats that the haul routes pass by. Effects on vegetation from increased run-off from new road works, dust, emissions, etc..
Potential for removal of natural habitat from road improvements	Area, character and sensitivity of vegetation to be removed due to required road improvements. Potential effects on wildlife as a result of habitat removal.
Potential for increased wildlife kills	Presence of wildlife corridors that the routes pass through. Likelihood of increased wildlife kills as a result of increased truck traffic volumes.
Existing and Planned Land Uses	
Potential for disruption effects to sensitive planned land uses	Number, character of planned development areas. Sensitivity of planned development to increased truck traffic.
Potential for removal of planned land uses from road improvements	Area and importance of planned land use removed from road improvements.
Conformity with applicable plans and polices	Degree of conformity with official plans, the Greenbelt Plan and the Niagara Escarpment Plan.
Social Environment	
Potential for disruption to residents	Number and proximity of residences potentially affected by truck traffic.
	Effects on the character of communities.
	Effects on community function.
	Number of residences expected to experience a > 5 dbA increase in noise levels over future baseline conditions for any given hour and a description of the magnitude of change.
	Potential for health risks

Table 1 – Example Evaluation Criteria

Criteria	Indicators
Potential for disruption to users of recreation facilities, community features and institutions	Number, proximity, character/sensitivity and level of use of recreation facilities, community features and institutions potentially affected by truck traffic.
Potential for displacement/removal of residents & residential property from road improvements	Number and area of residences/residential property required (distinguish between partial and full removals).
Potential for removal of recreation, community features & institutions	Number, area and character of recreation, community features (including trails, bicycle routes, parks and open space) & institutional properties required (distinguish between partial and full removals).
Economic Environment	
Potential for disruption to business enterprises	Number, character/sensitivity, and proximity of businesses potentially affected by truck traffic.
Potential for removal of business enterprises and/ or property	Number, area, and character/sensitivity of businesses and business properties required (distinguish between partial and full removals)
Potential for affect on property values	Projected change in property values as a result of roadway use by quarry trucks.
Potential for effect on agricultural operations	Number of farms along the haul route potentially disrupted by truck traffic.
	Number, area and productivity/value of cropland removed for road improvements.
	Number and area of farm properties required for road improvements.
Cultural Resources	
Potential for disturbance to built heritage features	Number and character of built heritage features potentially affected by truck traffic
	Number of heritage properties removed from road improvements (distinguish between partial and full removals)
Potential for effects on archaeological resources	Potential for effects on archaeological resources as a result of road improvements (as reflected through archaeological potential)
Transportation	
Change in road service level	Change in road level of service/congestion
	Change in access levels for road users
	Effects on other roadways as a result of traffic diversion
Potential for change in road safety level	Potential for increase in collision frequency and severity
	Number of access points and intersections along the haul route
	Presence of other potential safety issues along the haul route (e.g. limited sight lines, steep grades, school bus routes, movement of agricultural vehicles and equipment)
Potential for impact on alternative transportation modes.	Potential for conflicts with other modes of transport along the haul route

Table 1 – Example Evaluation Criteria

Criteria	Indicators
Cost	
Estimated infrastructure costs	Estimated cost for all required road and other infrastructure improvements.
	Potential for additional costs to the municipality(s) (e.g. impacts to municipal maintenance operations)

9.0 Describe Effects and Mitigation for the Preferred Route(s)

For the preferred haul route(s), provide a description of the potential effects that are expected to occur from the anticipated truck traffic volumes. This description of effects is to be based on the evaluation criteria plus other more detailed criteria if appropriate. Assess overall acceptability of the route and the effects of increased tuck traffic on the quality of life for the affected individuals/ communities. The proponent is to demonstrate that the effects of the preferred alternative (with the proposed truck volumes) can be considered as being “reasonable” and “acceptable”.

Any property requirements to support the preferred haul route(s) are to be described.

Mitigation measures to avoid or minimize effects, as input to the design phase also need to be described. Also, the method to regulate/enforce the use of the prescribed route(s) by all trucks associated with the quarry is to be described.

10.0 Prepare Draft and Final Evaluation Reports

A table of contents of the report is to be prepared and circulated to the municipalities of Hamilton, Halton, Burlington and Milton.

A draft report is to be prepared that describes the evaluation process, which is to be circulated to the affected municipalities (Hamilton, Halton, Burlington & Milton), other agencies and the public for review and comment. The report is to be finalized considering the comments received on the draft report.

11.0 Public and Agency Consultation

It is expected that there will be several consultation opportunities with stakeholders throughout the evaluation process. At a minimum, the study is to involve the following consultation activities:

- Involve agencies through the CART agency advisory process. Applicable agencies that are not part of CART are also to be involved. (The full complement of reviewing agencies is to be known as the Agency Review Group.)
- Initial public notice in local newspapers announcing the initiation of the study and where more information can be obtained; Residents, business owners and property owners within 100 m of the alternative haul routes are to receive the notice directly through mail out/drop-off.
- A meeting with the Agency Review Group to review the study approach/process, evaluation criteria, level of study detail, etc.
- Public notifications in local newspapers announcing the PICs/workshops two weeks and one week in advance of the events. Stakeholders along the alternative haul routes are also to receive a drop-off notice of the events in advance.
- Four public consultation events (with presentations) are to be held:
  - #1 - to introduce the project, to identify how the public would like to be involved and to identify initial public concerns and issues;
  - #2 - to present the draft alternative routes and the evaluation approach
  - #3 - a public workshop that allows the opportunity to provide input on the evaluation criteria, the relative importance of the criteria and the evaluation approach;
  - #4 - to present the draft results of the comparative evaluation/ effects assessment;
- A meeting with the Agency Review Group to review the draft study findings; and
- The circulation of the draft report for public and agency review and comments (providing at least 30 days for the review of this report).

We expect that the proponent would consult with the Ministry of Transportation on issues relating to provincial highways. In addition to the agencies listed under section1, other agencies to be involved/consulted include the County of Wellington, Township of Puslinch and CP/CN Rail. It is requested that written acknowledgement be obtained from these agencies regarding their interest and/or concerns with the project.

It is expected that the proponent will be responsive to the issues and concerns of the agencies throughout the study period.

All consultation related materials including meeting minutes and comments received and responses are to be provided throughout the study process.

An initial fifty (50) hard copies and 50 CDs of the draft report are to be made available to the agencies as part of the 30-day review period. The same number of hard copies and CDs will be required of the Final Report.

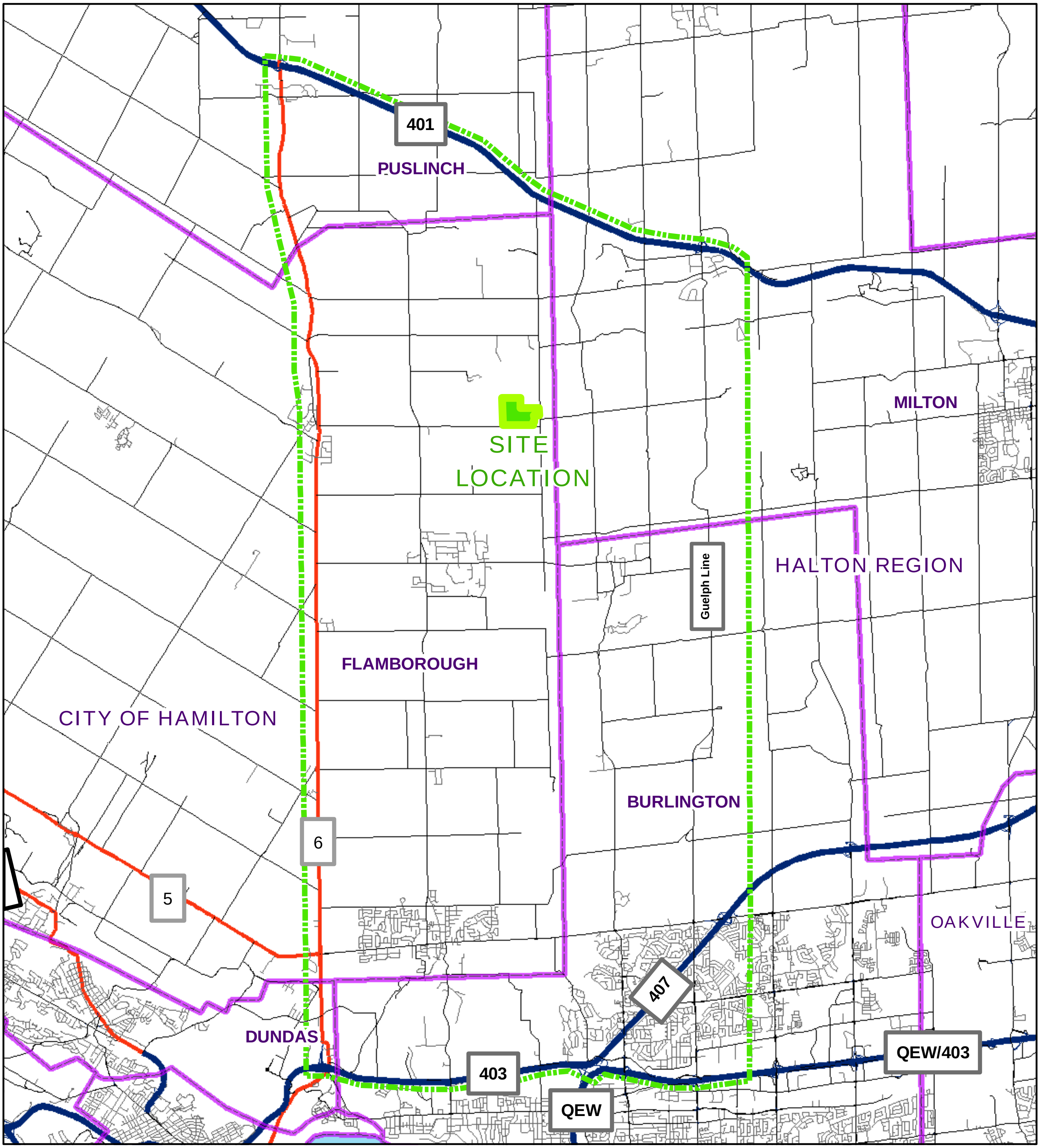


Figure 1

Mountsberg Quarry
Haul Route Evaluation
Terms of Reference-

Haul Route Evaluation
Study Area

Road Type

- Major Highway
- Ramp
- Highway
- Major Road
- Local Road

- Proposed Lowndes Quarry
- Study Area
- Municipal Boundary

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Appendix B

Table 1: Screening of Alternative Haul Route Links

Link No. / Road Link/ To/From	Aquatic and Terrestrial Environment		Existing and Planned Land Use		Social Environment		Economic Environment		Cultural Resources		Transportation		Costs		Carry Forward
	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Yes/No
No. 1 Centre Road From Campbellville Rd To Concession 11 E	-No impacts on conservation lands -No impacts on sensitive wetlands	-Crosses an ESA		-34 driveways		-Passes by Mountsberg Baptist Church and Cemetery -45 driveways -Frequency of 23 school buses daily in total for both directions along this route	-No businesses				-Existing designated truck route -No CP railway crossings -Easily accessible for trucks from quarry site	-On-street bike route (cautionary, un-signed)		-Road upgrades	Yes
No. 2 Centre Road From Concession 11 E To Carlisle Road	-No impacts on sensitive wetlands			-Passes through the heart of the Carlisle community -Passes by two schools, Balaclava Elementary School and our Lady of Mount Carmel Catholic School - Passes by Carlisle Community Centre and Hamilton Public Library -Passes by Flamborough Carlisle Memorial Park		-Passes through the heart of the Carlisle community -Passes by two schools, Balaclava Elementary School and our Lady of Mount Carmel Catholic School - Passes by Carlisle Community Centre and Hamilton Public Library -Passes by Flamborough Carlisle Memorial Park -Frequency of 54 school buses daily in total for both directions along this route		-Passes through the heart of the Carlisle community -6 businesses			-No CP railway crossings	-On-street bike route (cautionary, un-signed) -Reconstruction and widening required -Existing designated truck route with maximum 30-tonne restriction		-Reconstruction and widening required.	No
No. 3 Centre Road From Carlisle Road To Dundas Street		-Passes by Carlisle Conservation Area -Crosses several ESAs		-Passes through the heart of the Carlisle community -Passes by Carlisle United Church and Cemetery -Passes through Flamborough Centre -Passes through Concession 5 E settlement area -Passes through the Waterdown community		-Passes through the heart of the Carlisle community -Passes by Carlisle United Church and Cemetery -Passes through Flamborough Centre -Passes through Concession 5 E settlement area -Passes through the Waterdown community		-Passes through the heart of the Carlisle community -Passes by Carlisle United Church and Cemetery -Passes through Flamborough Centre -Passes through the Waterdown community			-Designated truck route with no restrictions	-Congestion through Waterdown -Speed limits to <60km/hr near Carlisle and Waterdown -Reconstruction and widening required -On-street bike route (cautionary, un-signed)		-Reconstruction and widening required	No

Link No. / Road Link/ To/From	Aquatic and Terrestrial Environment		Existing and Planned Land Use		Social Environment		Economic Environment		Cultural Resources		Transportation		Costs		Carry Forward
	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Yes/No
				-Passes by four schools: Riverwalk Country Day Montessori, Guardian Angels Elementary School, Flamborough Centre Elementary and St. Thomas. -Passes by four parks, Carlisle Conservation Area, Flamborough Centre Community Park, Centre Park and Waterdown Memorial Park		-Passes by four schools, Riverwalk Country Day Montessori, Guardian Angels Elementary School, Flamborough Centre Elementary and St. Thomas. -Passes by four parks, Carlisle Conservation Area, Flamborough Centre Community Park, Centre Park and Waterdown Memorial Park -Frequency of 232 school buses daily in total for both directions along this route		-Passes by four parks, Carlisle Conservation Area, Flamborough Centre Community Park, Centre Park and Waterdown Memorial Park -27 businesses							
No. 4 Milburough Line From Highway 401 To Campbellville Road		-Passes by Mountsberg Wildlife Centre -Passes by Environmentally Significant Area -Conservation Land		-Passes by Mountsberg Wildlife Centre -Conservation Land		-On-street bike route						-Not an existing truck route -Questionable feasibility for new 401 interchange -Existing railway crossing with lights only control -On-street bike route (cautionary, un-signed) -Significant engineering deficiencies -Major reconstruction and widening required		-Significant engineering deficiencies -Major reconstruction and widening required -Construction of a trumpet interchange required	Yes
No. 5 Milburough Line From Campbellville Rd To Concession 11 E		-Passes an ESA		-25 driveways		-On-street bike route -25 driveways -Frequency of 11 school buses daily in total for both directions along this route		-1 business			-Easily accessible for trucks from quarry site	-Truck route with seasonal or year round load restrictions -Substandard visibility -On-street bike route (cautionary, un-signed)		-Reconstruction and widening required	Yes
No. 6 Milburough Line From Concession 11 E To Derry Road		-Passes several ESAs				-On-street bike route -Frequency of 25 school buses daily in total for both directions along this route		-1 business				-Not an existing truck route -Substandard visibility and significant engineering		-Significant engineering deficiencies -Major reconstruction and widening required	No

Link No. / Road Link/ To/From	Aquatic and Terrestrial Environment		Existing and Planned Land Use		Social Environment		Economic Environment		Cultural Resources		Transportation		Costs		Carry Forward
	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Yes/No
												deficiencies -On-street bike route (cautionary, un-signed) -Major reconstruction and widening required -CP rail crossing (lights only)			
No. 7 Brant Street From Dundas Street To QEW				-Passes through heavily-built up area in Burlington -Passes by Kingsbridge School -Passes by Brant Hill Community Centre & Library -Passes by two churches, Brant Hills Presbyterian Church and Prince of Peace Lutheran Church -Numerous homes backing on to Brant -Numerous business along Brant		-Passes through heavily-built up area in Burlington -Passes by Kingsbridge School -Passes by Brant Hill Community Centre & Library -Passes by two churches, Brant Hills Presbyterian Church and Prince of Peace Lutheran Church -Numerous homes backing on to Brant		-Numerous businesses along Brant				-Cannot access QEW Niagara without going on Faireview or Plains Road -Numerous traffic signals along this link -Significant traffic congestion on Brant			No
No. 8 Guelph Line From Highway 401 To Derry Road		-Passes by Conservation Areas: Campbellville Conservation Area, Carwford Lake Forestry Tract, Crawford Lake Conservation Area		-Passes through the heart of the Campbellville -Passes by many businesses -Passes by church and several parks/conservation areas		-Passes by several churches, St. David's Presbyterian Church & Cemetery and St. Andrew's Anglican Church -Passes by Campbellville Ball Park -Frequency of 30 school buses daily in total for both directions along this route		-Passes by 7 businesses in Campbellville and numerous other further south			-No cycling facilities -Truck route with no restrictions	-Potential conflicts with auto traffic and pedestrians -Not easily accessible for trucks from the quarry site -Cannot access 401 without passing through business heart of Campbellville -Long steep grades north of Derry Road and south of Campbellville -Interchange near 401 under construction			No
No. 9 Guelph Line From Derry Road To Dundas Street		-Passes by Mount Nemo Conservation Area		-Passes through Lowville community		-Passes by Lowville Park and Burlington Memorial Gardens		-Passes by many businesses			-No cycling facilities -Truck route with no restrictions	-Potential conflicts with auto traffic and pedestrians -Long steep grades			No

Link No. / Road Link/ To/From	Aquatic and Terrestrial Environment		Existing and Planned Land Use		Social Environment		Economic Environment		Cultural Resources		Transportation		Costs		Carry Forward
	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Yes/No
				-Passes through Mount Nemo community -Passes by parks and Conservation Area		-Passes by Happy Times for Kids Daycare -Frequency of 47 school buses daily in total for both directions along this route		-Passes by Crosswinds Golf & Country Club and Lowville Golf Club				in Lowville area and north of Dundas Street -Not easily accessible for trucks from the quarry site			
No. 10 Guelph Line From Dundas Street To QEW				-Passes through heavily-built up area in Burlington -Passes by several churches, St. Johns Anglican Church, Calvary Baptist Church, and Glad Tidings Pentecostal Church -Passes by MM Robinson High School -Numerous homes backing on to Guelph Line -Numerous businesses along Guelph Line		-Numerous homes backing on to Guelph Line -Passes by several churches, St. Johns Anglican Church, Calvary Baptist Church, and Glad Tidings Pentecostal Church -Passes by MM Robinson High School -Frequency of 8 school buses daily in total for both directions along this route		-Numerous businesses along Guelph Line			-No cycling facilities -Truck route with no restrictions	-Guelph Line not easily accessible for trucks from the quarry site -Significant traffic congestion on Guelph Line through Burlington -Numerous traffic signals			No
No. 11 Campbellville Road From Highway 6 To Centre Road		-Crosses ESA		-Passes by Mountsberg Baptist Church & Cemetery -218 driveways		-18 driveways -Frequency of 6 school buses daily in total for both directions along this route		-2 businesses			-Designated truck route with seasonal load restrictions			-Reconstruction or and road upgrades required	Yes
No. 12 Campbellville Road From Centre Street To Milburough Line		-Crosses 2 ESAs		-38 driveways		-38 driveways -Major reconstruction required with significant implications to adjacent properties/accesses expected -5 businesses -Frequency of 5 school buses daily in total for both directions along this route					-Designated truck route with seasonal road restrictions	-Significant visibility problems with ‘roller coaster’ alignment -Major reconstruction required with significant implications to adjacent properties/accesses expected		-Major reconstruction required with significant implications to adjacent properties/accesses expected	Yes
No. 13 Campbellville Road From Milburough Line To Twiss Road		-Passes by Laking Tract and Thomas William Harrison Tract		-Passes by Laking Tract and Thomas William Harrison Tract -17 driveways		-17 driveways -Frequency of 8 school buses daily in total for both directions along this route		-1 business			-Truck route with seasonal load restrictions	-Passes through a CP crossing (lights only)		-Reconstruction or and road upgrades required	Yes

Link No. / Road Link/ To/From	Aquatic and Terrestrial Environment		Existing and Planned Land Use		Social Environment		Economic Environment		Cultural Resources		Transportation		Costs		Carry Forward
	Advantage	**Disadvantage**	**Advantage**	**Disadvantage**	**Advantage**	**Disadvantage**	**Advantage**	**Disadvantage**	**Advantage**	**Disadvantage**	**Advantage**	**Disadvantage**	**Advantage**	**Disadvantage**	**Yes/No**
No. 14 Campbellville Road From Twiss Road To Guelph Line		-Passes by Campbellville Conservation Area		-Passes through Campbellville built-up area -Numerous homes and driveways -Passes by Campbellville Conservation Area -Passes by St. David's Presbyterian Church & Cemetery -Passes by Campbellville Ball Park		-Passes through Campbellville built-up area -Numerous homes and driveways -Passes by St. David's Presbyterian Church & Cemetery -Passes by Campbellville Ball Park -Frequency of 4 school buses daily in total for both directions along this route		-Passes through Campbellville built-up area -1 business			-Designated truck route with year-round load restrictions	-Passes through a CP crossing (with lights and gates) -Deficient road alignment at CP crossing -Major physical constraints at Guelph Line intersection for turning truck traffic -Cannot access 401 without passing through business heart of Campbellville -Interchange near 401 under construction		-Reconstruction required to mitigate the deficient road alignment at CP crossing -Upgrade existing road structure	No
No. 15 Carlisle Road From Highway 6 To Milburough Line		-Passes by Carlisle Conservation Area		-Passes through the heart of Carlisle community -Passes by Courtcliff Park and Carlisle Conservation Area -Numerous homes and businesses		-Passes through the heart of Carlisle community -Numerous homes along the route -Passes by Carlisle Golf & Country Club -Frequency of 36 school buses daily in total for both directions along this route		-Passes through the heart of Carlisle community -11 businesses along the route -Passes by Carlisle Golf & Country Club			-Designated truck route with seasonal load restrictions	-Passes through a CP crossing (lights only) -Numerous driveways and accesses along the route -On-street bike route (cautionary, un-signed) -Potential conflicts with autos and pedestrians -Reconstruction and widening required		-Reconstruction, upgrade and widening required	No
No. 16 Derry Road From Milburough Line To Guelph Line						-Frequency of 16 school buses daily in total for both directions along this route						-Milburough Line not suitable access route to Derry due to significant engineering and safety deficiencies -Suggested bike route east of Twiss Road -Reconstruction and widening required		-Reconstruction, upgrade and widening required	No
No. 17 Concession 11 E From Highway 6 To Centre Road		-ANSI -ESA		-37 driveways		-Passes by 37 driveways -Frequency of 9 school buses daily in total for both directions along this route					-Easily accessible for trucks from the quarry site -Direct access from quarry site to Highway 6 via this route	-On-street bike route (cautionary, un-signed) -Not an existing truck route		-Reconstruction and widening required	Yes

Link No. / Road Link/ To/From	Aquatic and Terrestrial Environment		Existing and Planned Land Use		Social Environment		Economic Environment		Cultural Resources		Transportation		Costs		Carry Forward
	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Yes/No
No. 18 Concession 11 E From Centre Road To Milburough Line		-Passes by an ESA		-44 driveways		-Passes by Lawson Park -Passes by 44 driveways -Frequency of 5 school buses daily in total for both directions along this route					-Easily accessible for trucks from the quarry site -Direct access from quarry site to Highway 6 via this route	-Short section of substandard visibility -			Yes
No. 19 Concession 6 E From Highway 6 To Centre Road				-Passes through Flamborough Centre Community -Passes by Flamborough Centre Community Park, Centre Park -Passes by Community Church, Flamborough Christian Fellowship -Passes by Flamborough Centre Elementary School		-Passes by Community Church, Flamborough Christian Fellowship -Passes by Flamborough Centre Elementary School -Frequency of 10 school buses daily in total for both directions along this route					-Designated truck route with seasonal load restrictions -Traffic signal at Highway 6	-On-street bike route (cautionary, un-signed)			No
No. 20 Parkside Drive From Highway 6 To Evans Road				-Passes through the Waterdown built-up area -Numerous homes along the route -Passes by several schools		-Numerous homes along the route -Passes by Flamborough YMCA -Passes by several schools, Allan A. Greenleaf, Guy Brown, Waterdown District Secondary School -Passes by James United Church -Passes by Fire Station #24		-Numerous businesses along the route -Passes by Flamborough YMCA				-Traffic congestion -Passes through a CP crossing (lights and gates) -Passes by Fire Station #24 -On-street bike route (cautionary, un-signed)			No
No. 21 Dundas Street From Highway 6 To Guelph Line				-Passes by numerous homes -Passes by numerous businesses		-Numerous homes along the route -Passes by St. Thomas Church, St. Johns Anglican Church, Nelson United Church and Cemetery -Passes by Kingsbridge School		-Numerous businesses along the route			-Designated truck route with no restrictions	-Significant conflicts with pedestrians and auto traffic -Passes by numerous driveways and acceses			No

Link No. / Road Link/ To/From	Aquatic and Terrestrial Environment		Existing and Planned Land Use		Social Environment		Economic Environment		Cultural Resources		Transportation		Costs		Carry Forward
	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Yes/No
						-Passes through the heart of the Waterdown community -Passes by New City Park									
No. 22 Concession 12 E		-Significant impacts on the natural environment -Large ESA -Located on sensitive wetlands		-Located on sensitive wetlands		-Neighbouring subdivision						-Not an existing truck route -Significant construction required		-Significant construction required	No
No. 23 Highway 6 From Highway 401 To Campbellville Road		-Passes by ESA				-Passes through Morriston community -Frequency of 6 school buses daily in total for both directions along this route		-Passes numerous businesses			-Easily accessible for trucks from quarry site -Direct access to 401 and 403 -Designated truck route with no restrictions -No widening required	-Existing congestion through Morriston	-No widening required		Yes
No. 24 Highway 6 From Campbellville Rd To Concession 11 E		-Passes by ESA				-Passes through Freelton community -Frequency of 10 school buses daily in total for both directions along this route		-Passes through Freelton community			-Easily accessible for trucks from quarry site -Direct access to 401 and 403 -Designated truck route with no restrictions		-No new construction		Yes
No. 25 Highway 6 From Concession 11 E To Highway 403		-Passes by small ESAs				-Passes through Millgrove community -Frequency of 73 school buses daily in total for both directions along this route		-Passes through Millgrove community			-Easily accessible for trucks from quarry site -Direct access to 401 and 403 -Designated truck route with no restrictions -No widening required		-No new construction		
No. 26 Twiss Road From Campbellville Rd To Reid Sideroad								-2 businesses			-Truck route with no restrictions	-Passes through a CP crossing (lights and gates) -May require railway crossing upgrade			Yes
No. 27 Reid Sideroad From Twiss Road To Guelph Line				-Passes by Campbellville Ball Park		-Passes by Campbellville Emergency Response Centre (Fire Station #2)		-1 business			-Truck route with no restrictions				Yes

Link No. / Road Link/ To/From	Aquatic and Terrestrial Environment		Existing and Planned Land Use		Social Environment		Economic Environment		Cultural Resources		Transportation		Costs		Carry Forward
	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Yes/No
						-Passes by St. David's Presbyterian Church and Cemetery -Passes by Campbellville Ball Park -Frequency of 4 school buses daily in total for both directions along this route									

Appendix C

1. TRAVEL TIME SURVEY

1.1 Travel Time of Alternative Haul Routes

In response to the peer review request for specific travel time information, iTRANS conducted travel time runs to compare and evaluate the Alternative Haul Routes. Since Alternative Haul Routes 4 and 5 are a combination of the other Alternative Haul Routes, runs were conducted for Alternative Haul Routes 1, 2, and 3. The location of these three survey runs are shown in **Exhibit 1**. Runs were conducted for both the AM peak and mid-day peak periods, separated for inbound and outbound trips, and standard procedures for travel time surveys were followed. The runs were conducted on Thursday, September 4, 2008 and Thursday September 11, 2008.

Since the majority of the aggregate from the proposed quarry is anticipated to require transportation to the north-east, by first travelling north to Highway 401, the travel time surveys were conducted for this primary travel route from the proposed site to Highway 401. For Alternative Haul Routes 1 and 2, the surveys started at the proposed site at the intersection of Milburough Line and Concession 11 E, then along the respective routes to Highway 401 via Highway 6. Similarly, the travel times for Alternative Haul Route 3 were for the respective route, from the Concession 11 E and Milburough Line intersection to the Guelph Line and Highway 401 interchange.

The results of the travel time surveys are shown in **Table 1** and indicate that Alternative Haul Route 3 has the shortest combined average travel time from the proposed site to Highway 401 with an average round trip travel time of approximately 16 minutes. The next fastest time was for Alternative Haul Route 2 at over 10 minutes longer, followed by Alternative Haul Route 1 with an average round trip travel time of almost 30 minutes.

Table 1: Summary of Travel Time Results for Alternative Haul Routes

	Travel Time (min:sec)				
Route ID	Time of Day	Run 1	Run 2	Run 3	Average
Alternative Haul Route 1 Inbound	AM Peak	12:07	13:04	12:53	12:41
Alternative Haul Route 1 Inbound	Mid Day	11:29	12:59	11:49	12:06
Alternative Haul Route 1 Outbound	AM Peak	13:39	17:10	20:37	17:09
Alternative Haul Route 1 Outbound	Mid Day	12:13	12:37	12:28	12:26
Alternative Haul Route 2 Inbound	AM Peak	12:26	13:12	12:21	12:40
Alternative Haul Route 2 Inbound	Mid Day	13:24	12:56	13:26	13:15
Alternative Haul Route 2 Outbound	AM Peak	13:22	13:29	14:23	13:45
Alternative Haul Route 2 Outbound	Mid Day	12:54	13:47	14:33	13:45
Alternative Haul Route 3 Inbound	AM Peak	7:50	7:46	8:41	8:06
Alternative Haul Route 3 Inbound	Mid Day	6:54	6:58	9:18	7:43
Alternative Haul Route 3 Outbound	AM Peak	7:50	7:52	8:11	7:58
Alternative Haul Route 3 Outbound	Mid Day	7:03	6:58	7:43	7:15

Furthermore, 78% of the trucks accessing the proposed quarry are expected to travel north to Highway 401 and then east past Guelph Line to service the markets of the City of Toronto and the Regions of Peel, York, and Durham. Accordingly, the travel time savings of Alternative Haul Route 3, for the significant majority of quarry truck trips, is even greater given that there is additional travel time required for Alternative Haul Routes 1 and 2 to travel along Highway 401 between Highway 6 and Guelph Line.

1.2 Synchro Travel Times

The results of the travel time runs for Alternative Haul Routes 1, 2, and 3 were compared to travel times extracted from the Synchro model for the same route. The travel times extracted from the Synchro AM peak hour model, based on link travel time and intersection delays, are summarized in **Table 2**.

Table 2: Existing AM Peak Hour Synchro Travel Times

	Travel Time (min)		Delay (min)		Total (min)	
Scenario	**Inbound**	**Outbound**	**Inbound**	**Outbound**	**Inbound**	**Outbound**
Alternative 1	14.68	14.30	1.49	2.34	16.17	16.64
Alternative 2	14.12	13.74	1.36	3.01	15.48	16.75
Alternative 3	8.39	7.74	0.54	0.38	8.93	8.12

The travel times extracted from the Synchro model are consistently, but proportionally, longer than the surveyed travel times. This is typical in traffic analysis and a few of the reasons are as follows:

- The travel time survey used the “floating car technique” to follow traffic. This means that the driver will not necessarily travel at the posted speed limit, as assumed by Synchro, but instead with the flow of traffic on the road.
- Traffic signals operate with side street detectors and usually provide longer green times and fewer red lights on main streets than is assumed by Synchro.
- The limits of the network assumed by Synchro may be slightly different than experienced during the travel time surveys. Synchro does not consider topography of the route and the network is scaled from maps.

The AM peak travel times from the survey (**Table 1**) and the Synchro results in **Table 2** both indicate that Alternative Haul Route 3 has the shortest travel time for the significant majority of truck trips and Alternative Haul Route 1 has the longest. Alternative Haul Routes 1 and 2 are similar, as expected. Compared to Alternative Haul Route 1, Alternative Haul Route 3 is about 60% shorter in terms of time for both the surveyed travel times and the Synchro travel times.

1.3 Travel Time for Major Facilities

To compliment our understanding of the travel times in a broader sense, travel time surveys were also conducted for major transportation facilities in the greater study area. As shown in **Exhibit 1,** the facilities surveyed are Guelph Line between Highway 401 and Highway 403, Highway 401 between Highway 6 and Guelph Line, and Highway 6 between Highway 401 and Highway 403. The survey runs were conducted for the mid-day period on Thursday, September 4 and Thursday, September 11, 2008. The same procedures were followed as for the survey discussed above comparing Alternative Haul Routes 1, 2 and 3.

As shown in **Table 3**, the results indicate that the travel time on Guelph Line is almost 5 minutes longer for a round trip compared to Highway 6.

Table 3: Travel Times Results for Provincial Facilities

Guelph Line NB	Mid Day	20:57	22:08	21:57	21:41
Guelph Line SB	Mid Day	21:01	24:10	21:53	22:21
Highway 401 (Highway 6 to Guelph Line) EB	Mid Day	6:18	5:53	5:58	6:03
Highway 401 (Highway 6 to Guelph Line) WB	Mid Day	5:47	5:46	6:21	5:58
Highway 6 (Hwy 401 to Hwy 403) NB	Mid Day	20:34	18:56	19:58	19:49
Highway 6 (Hwy 401 to Hwy 403) SB	Mid Day	20:20	18:51	19:04	19:25

1.4 Conclusions

Wherever possible, the design of recommended road improvements, in combination with appropriate signage, will facilitate truck movements in the direction of the selected alternative haul route and hinder un-designated movements. However, given that travel time is a major concern for truck drivers, an important factor that will assist in the ultimate enforceability of the selected haul route will be the travel time of the selected route compared with other available routes. The results of the travel time survey indicate that the Alternative Haul Route 3 has the shortest travel time and, therefore, adds support to the Haul Route Evaluation Study recommendation of Alternative Haul Route 3 as the preliminary Preferred Alternative Haul Route.

The results from the travel time survey also supported the Synchro model that has been used for the analysis of multiple transportation related criteria and indicators. Although the travel times extracted from the Synchro model are consistently longer than the survey results, the proportional difference between the alternatives' travel times are similar for the survey and the model.

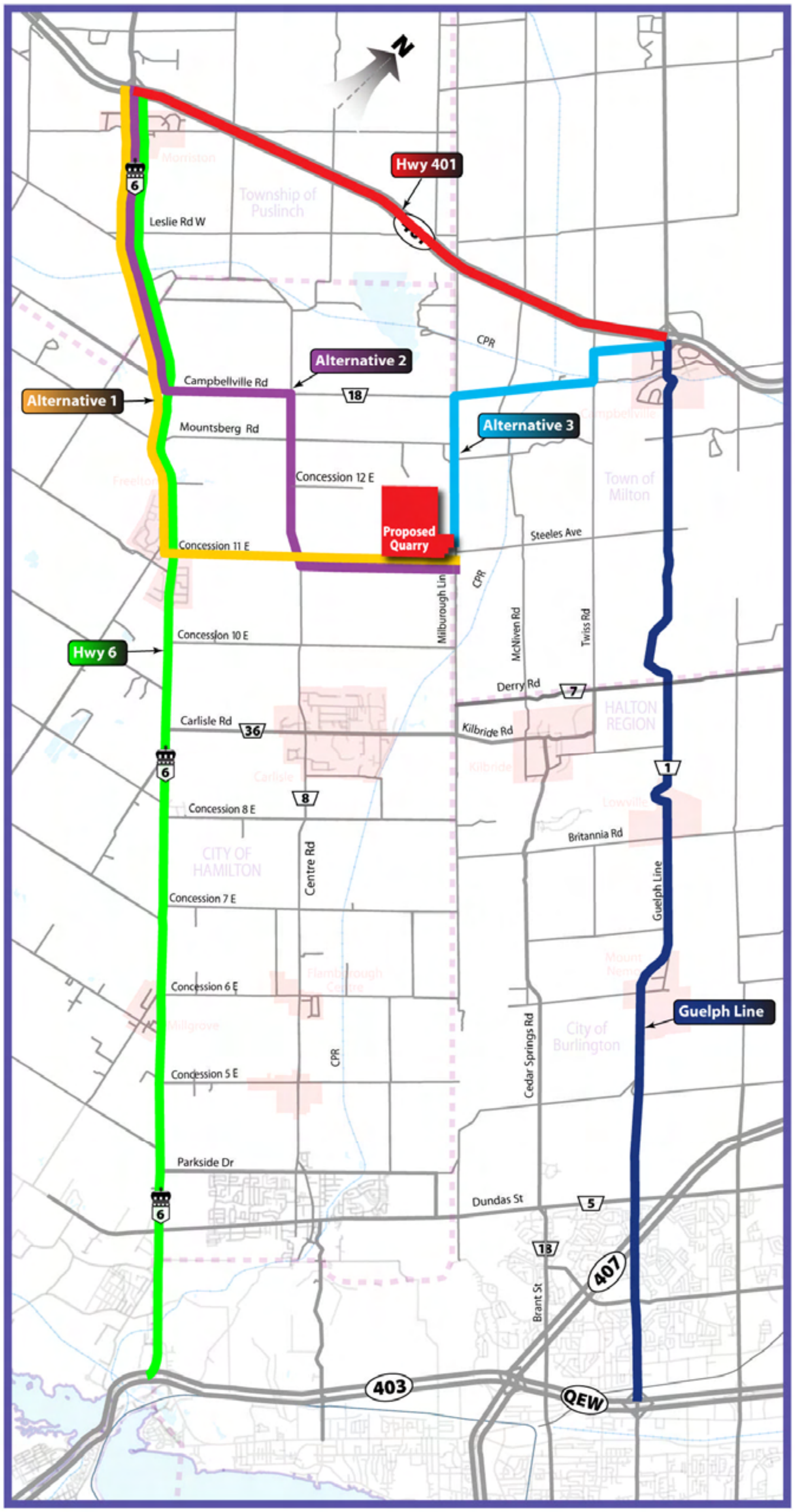

Exhibit 1: Location of Each Travel Time Survey Run