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transportation planning
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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

TABLE OF CONTENTS

Appendices

Tables

Exhibits

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.

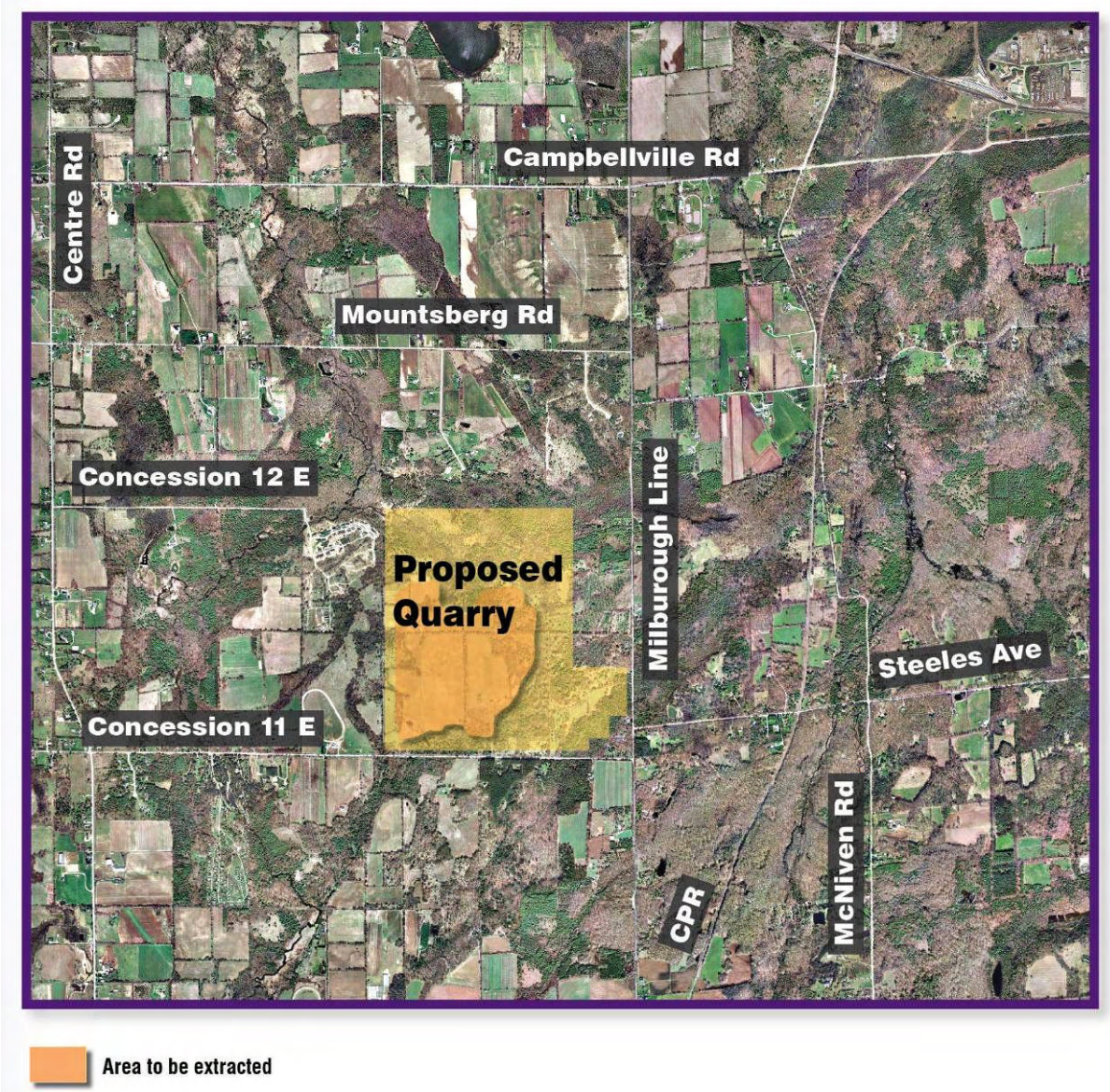

Exhibit 1-1: Location of the Proposed St. Marys Flamborough Quarry

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).

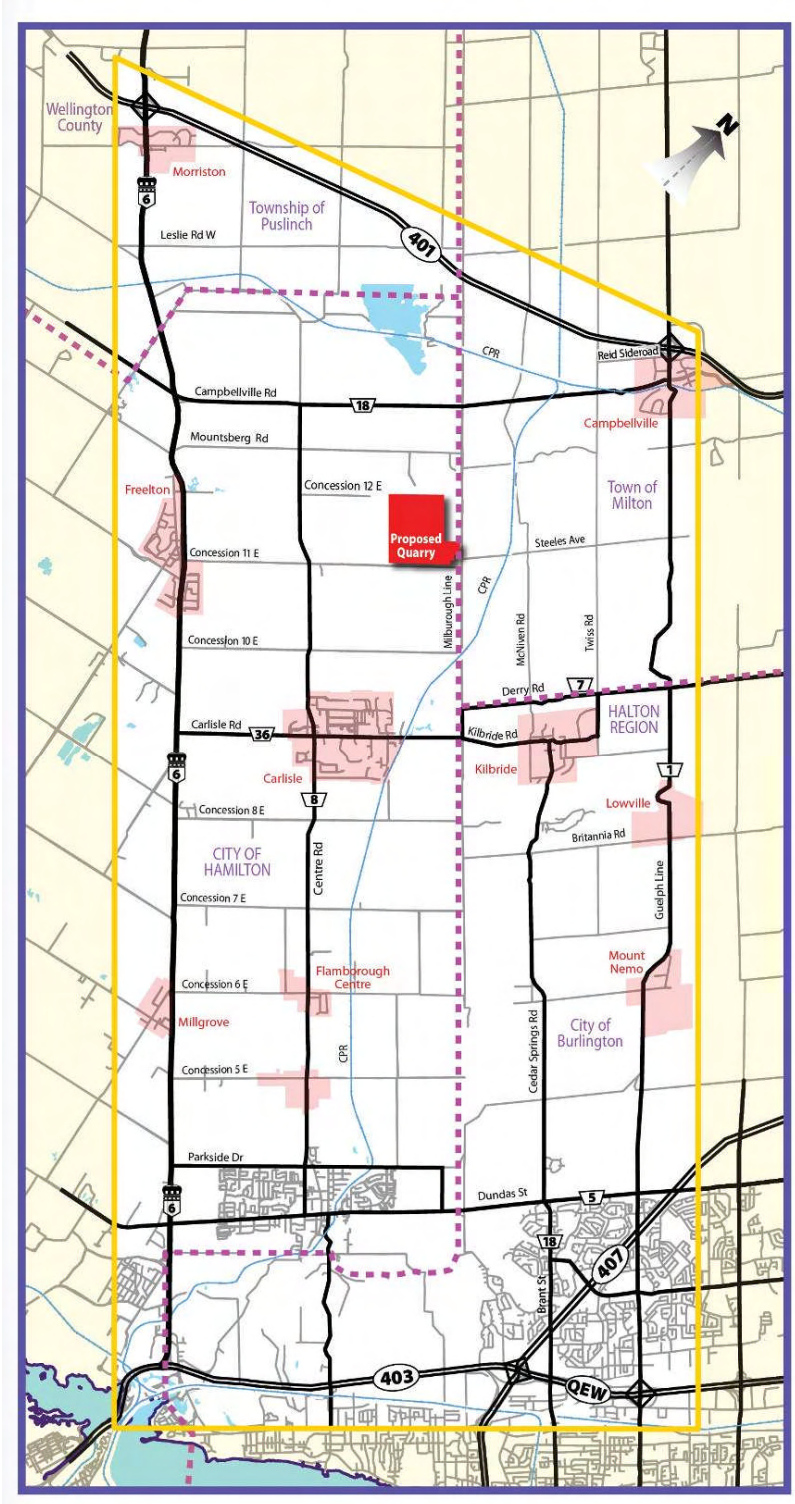

Exhibit 2-1: Study Area

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).

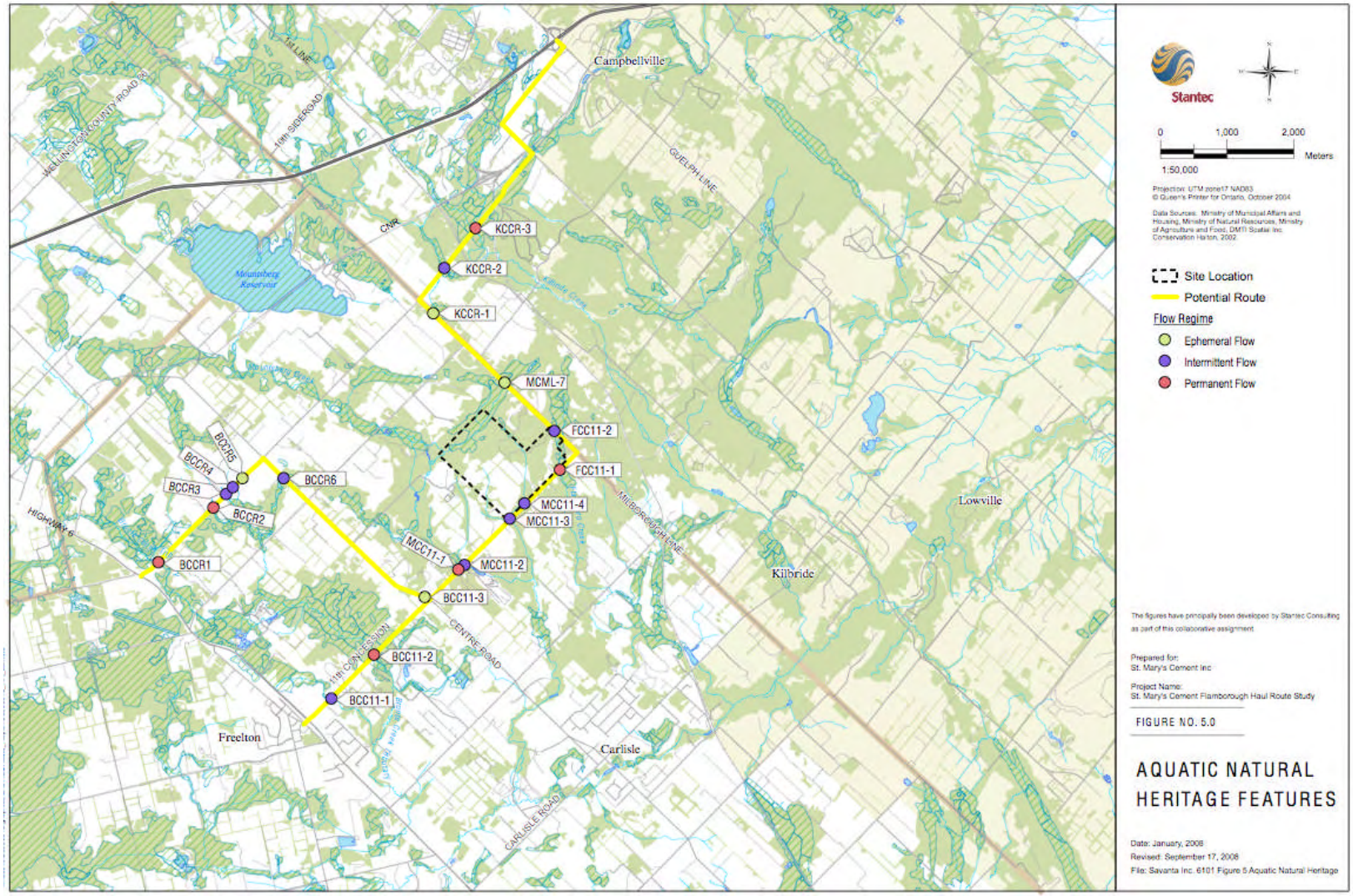

Exhibit 3-1: Aquatic Natural Heritage Features

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.

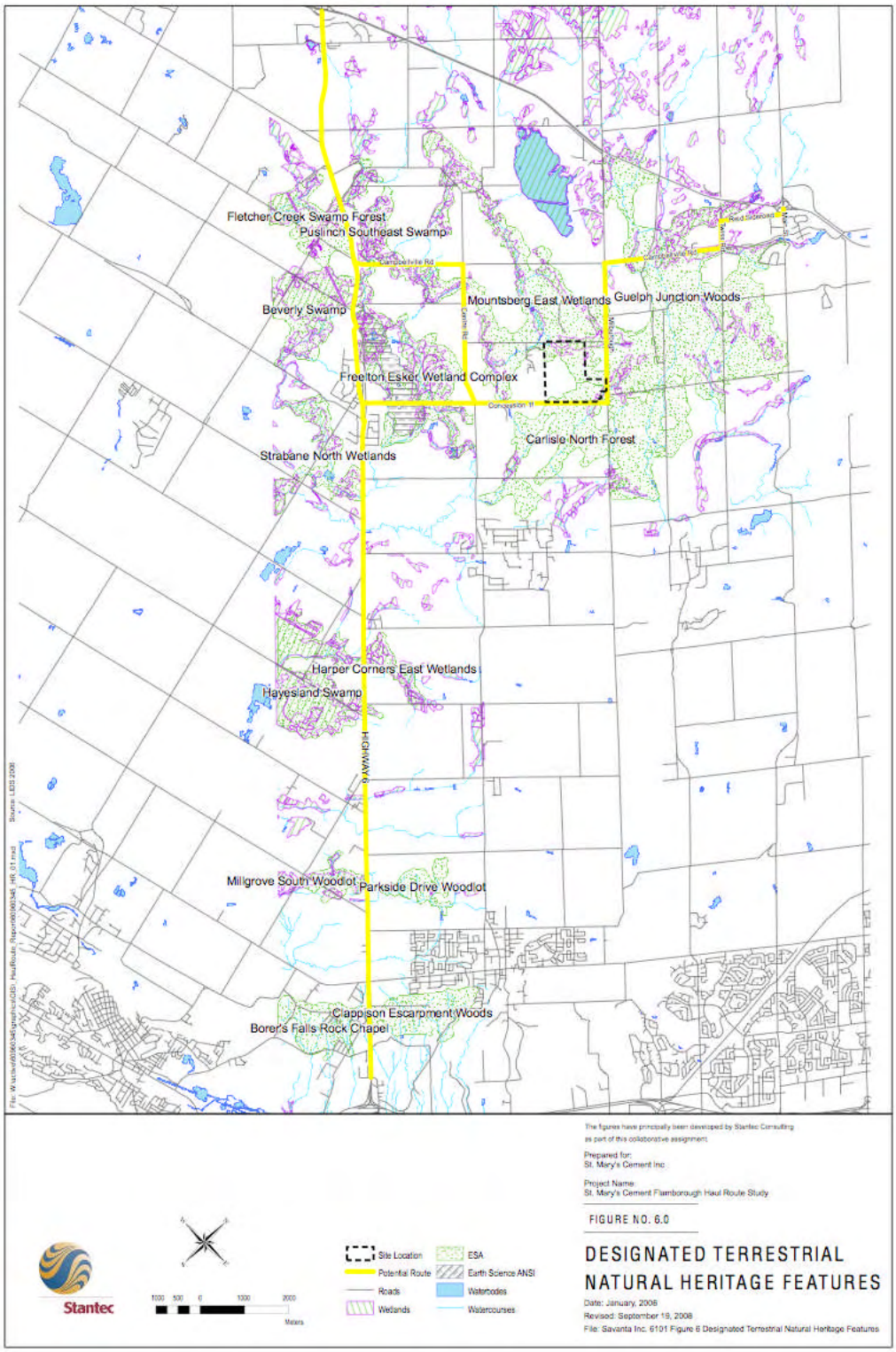

Exhibit 3-2: Designated Terrestrial Natural Heritage Features

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.