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.

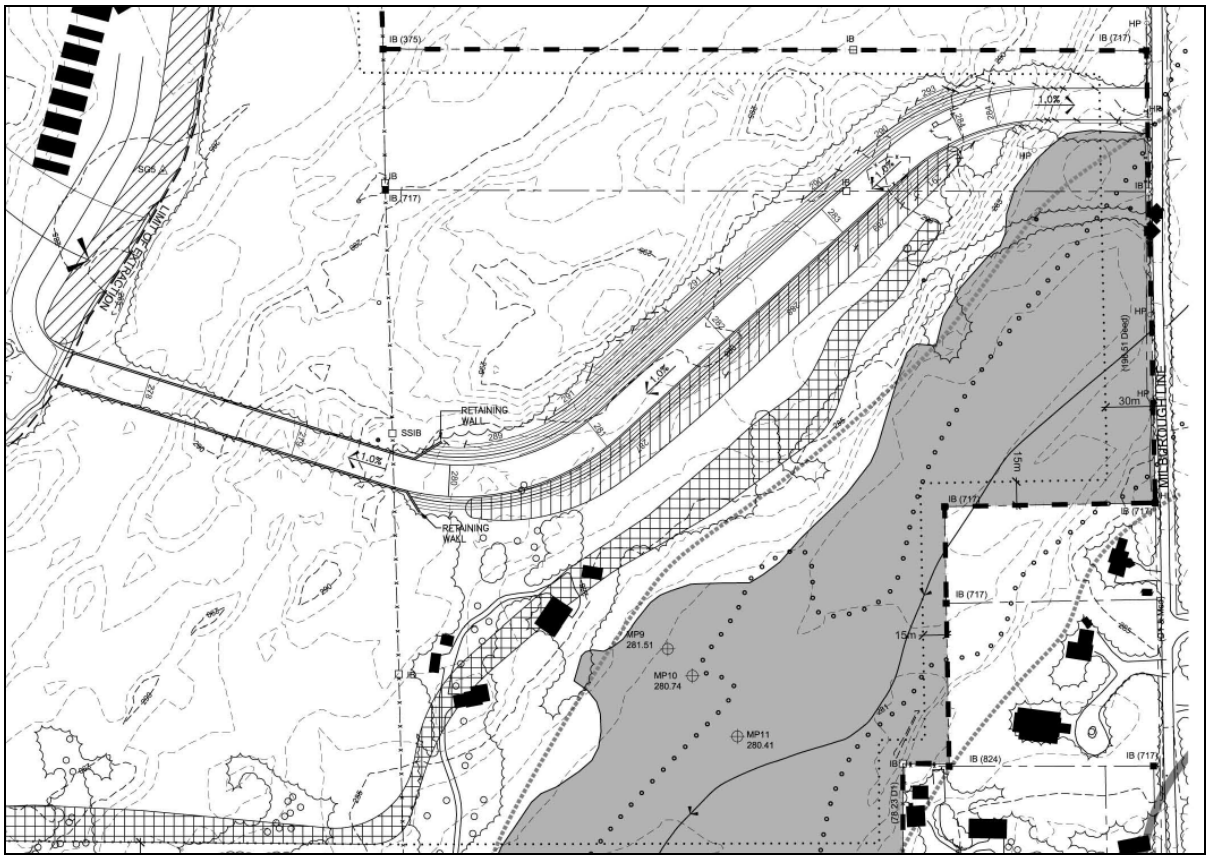


Exhibit 9-7: Illustration of the proposed site driveway on Milburough Line

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.

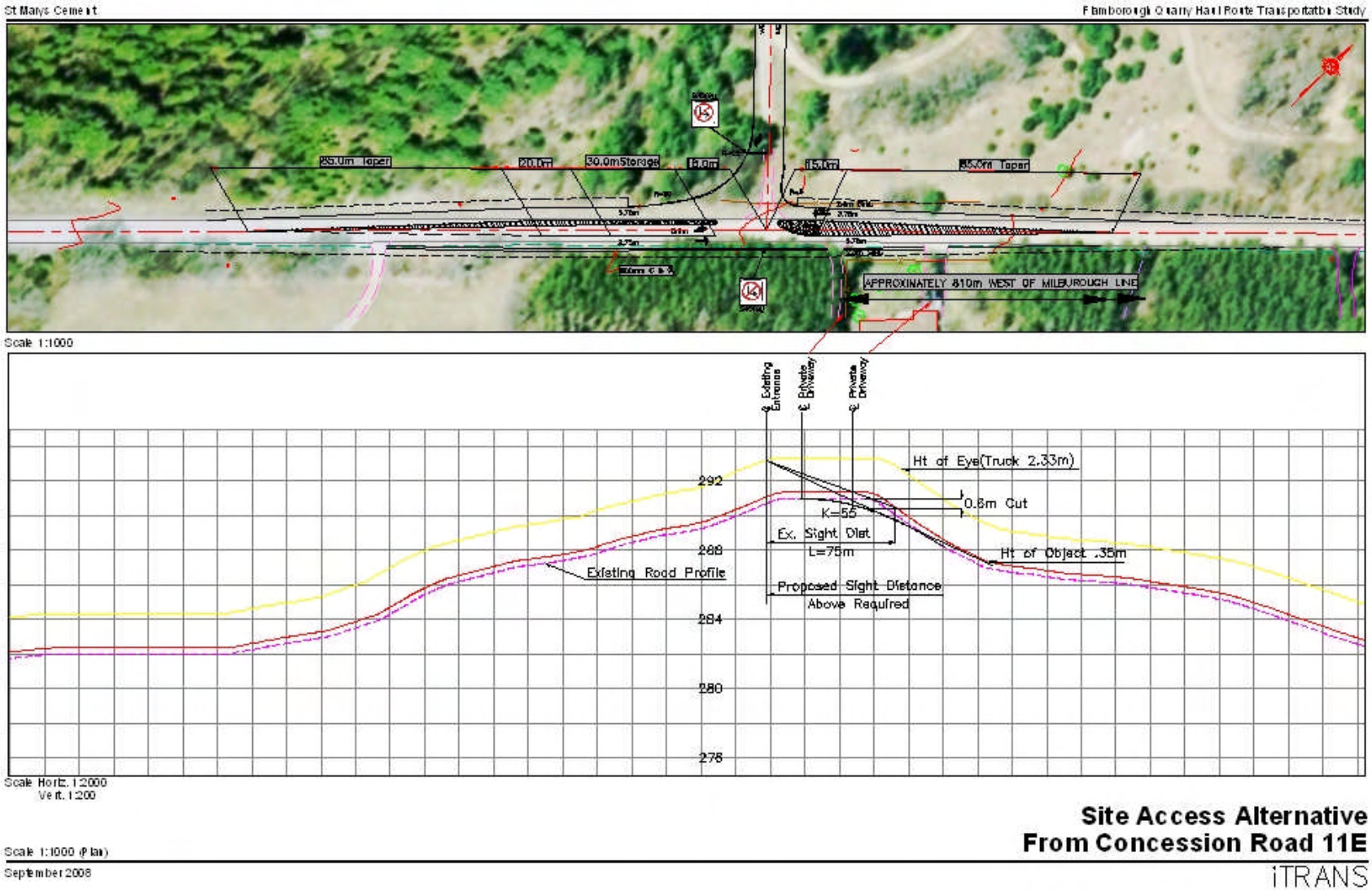


Exhibit 9-8: Recommended Design of Site Access on Concession 11

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.

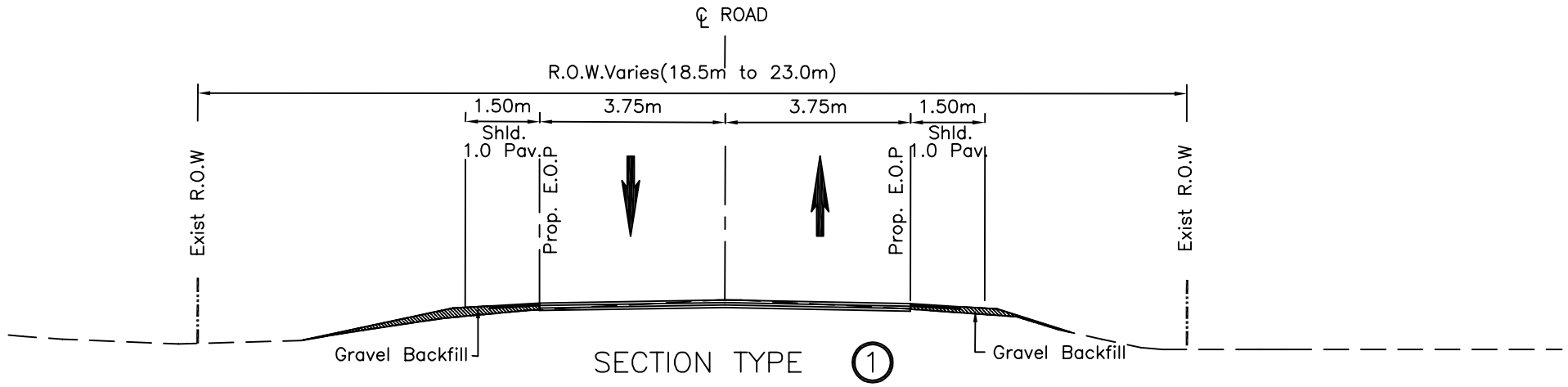
Table 9-6: Alternative 5 Assumed Road Network Alterations

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

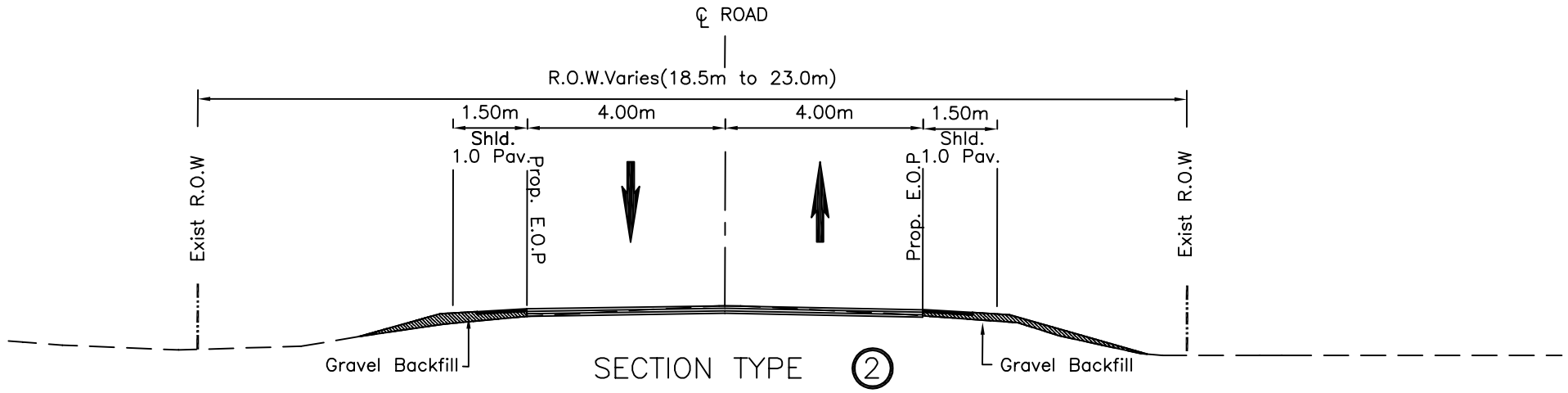
The alternative haul routes were each assessed on the basis that the preferred haul route would be upgraded to eliminate any load restrictions and the cross-sections shown in **Exhibit 9-9** would be constructed. The recommended cross section type for each road link for each alternative is shown in **Exhibits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



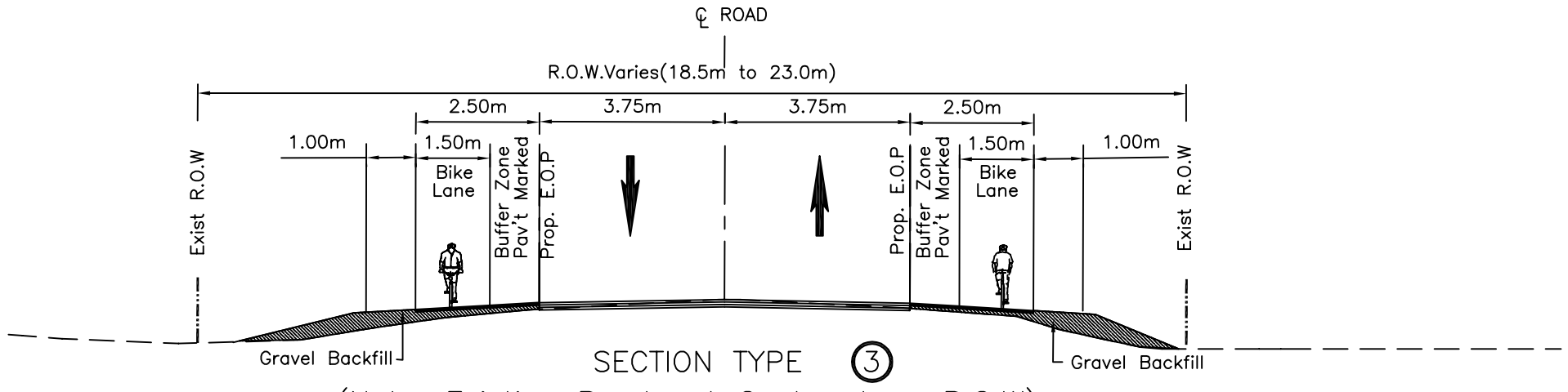
SECTION TYPE ①

(Note. Existing Road not Centered on R.O.W)



SECTION TYPE ②

(Note. Existing Road not Centered on R.O.W)



SECTION TYPE ③

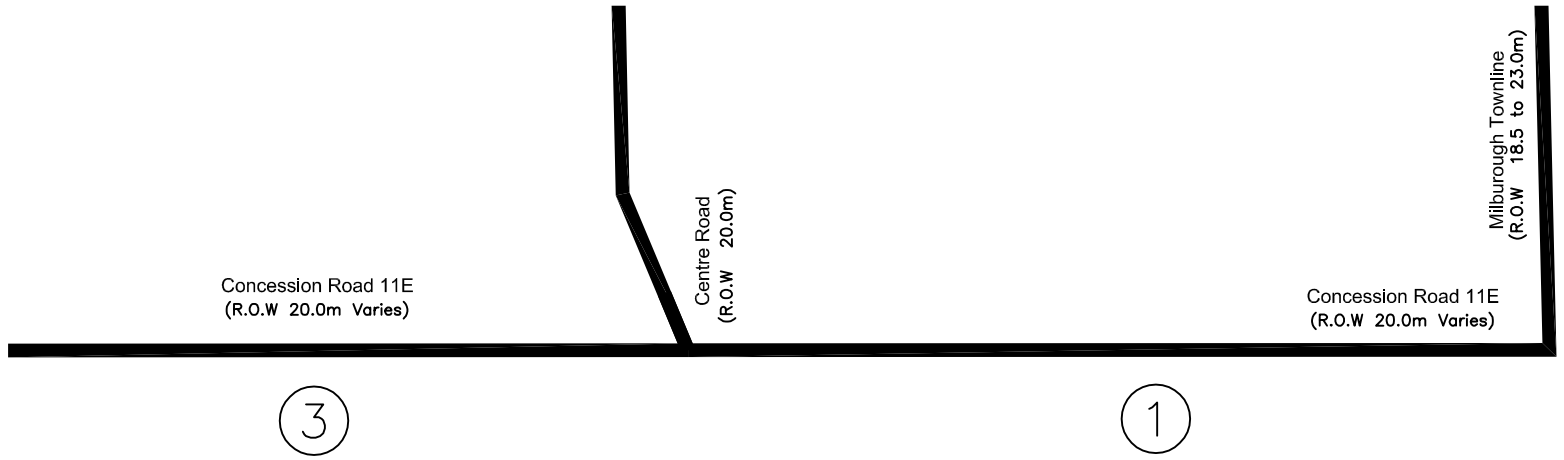
(Note. Existing Road not Centered on R.O.W)

Exhibit 9-9
Representative Cross Section Alternatives
Flamborough Quarry

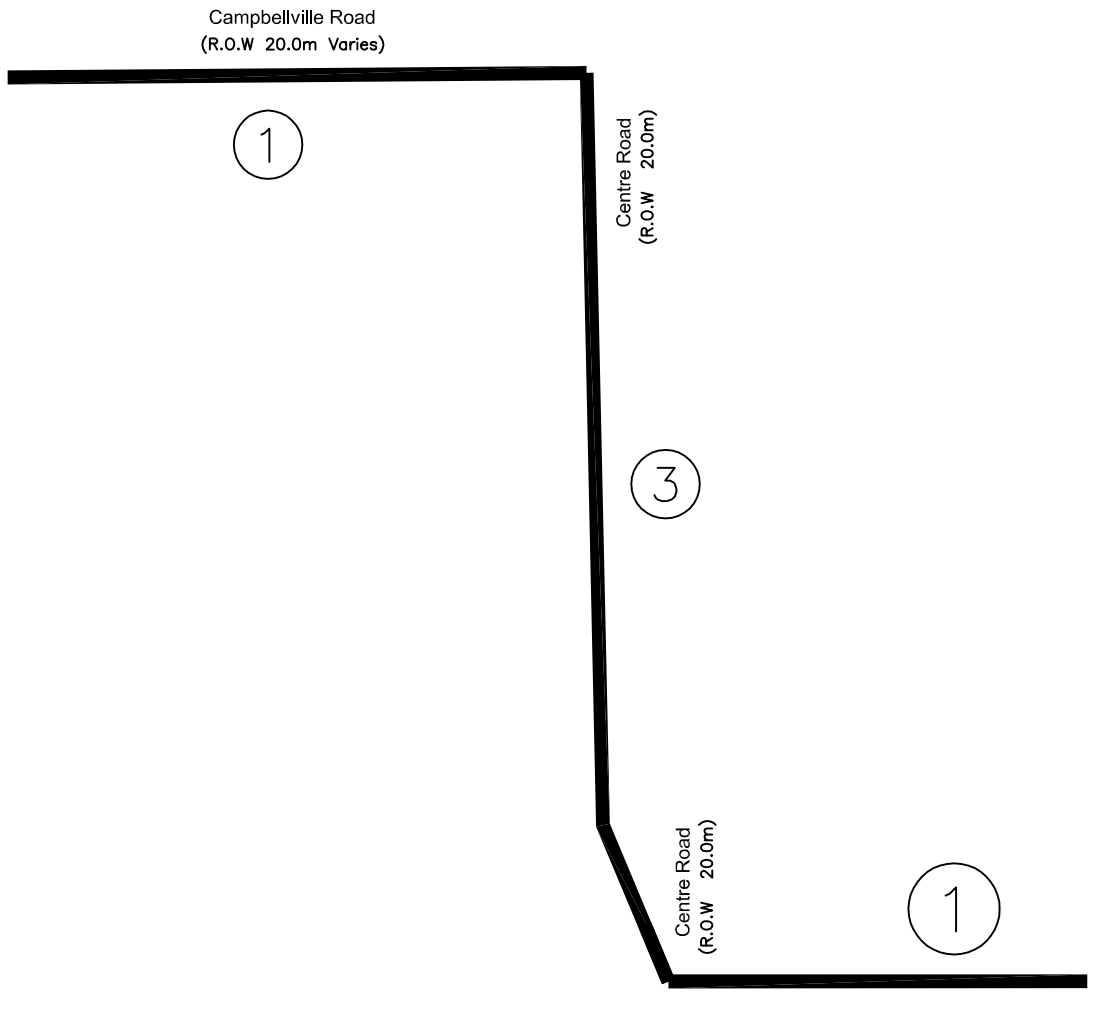
Scale 1:125

October 2008

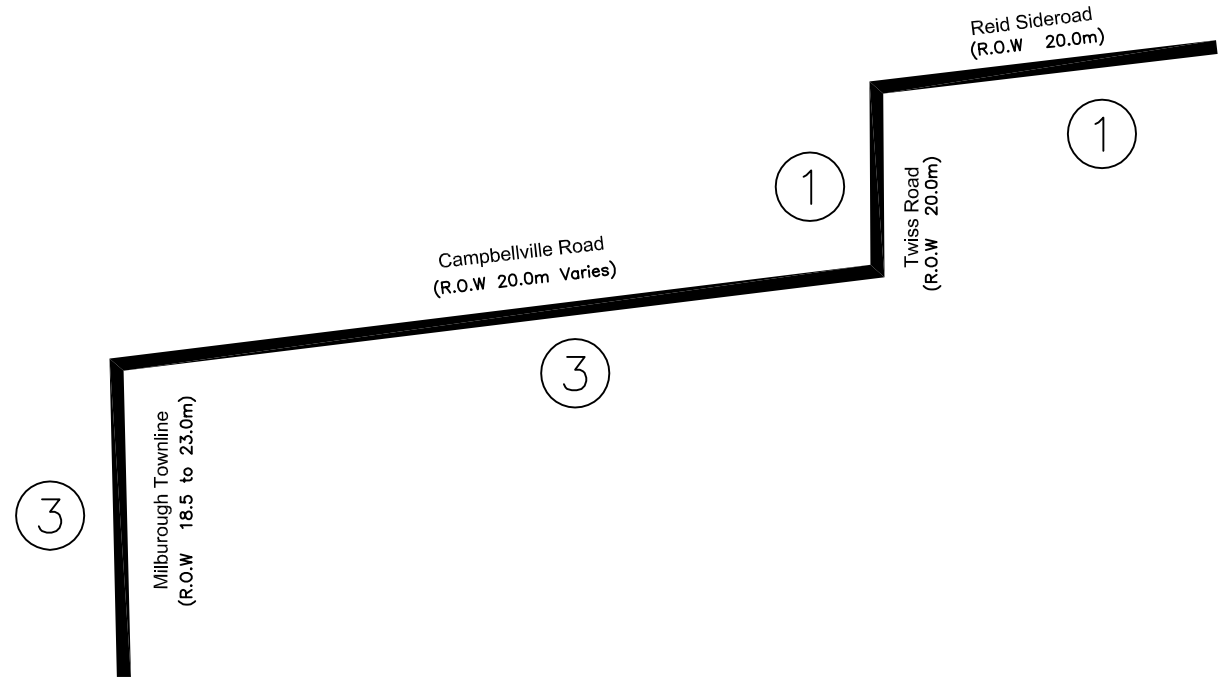
iTRANS



Alternative 1



Alternative 2



Alternative 3

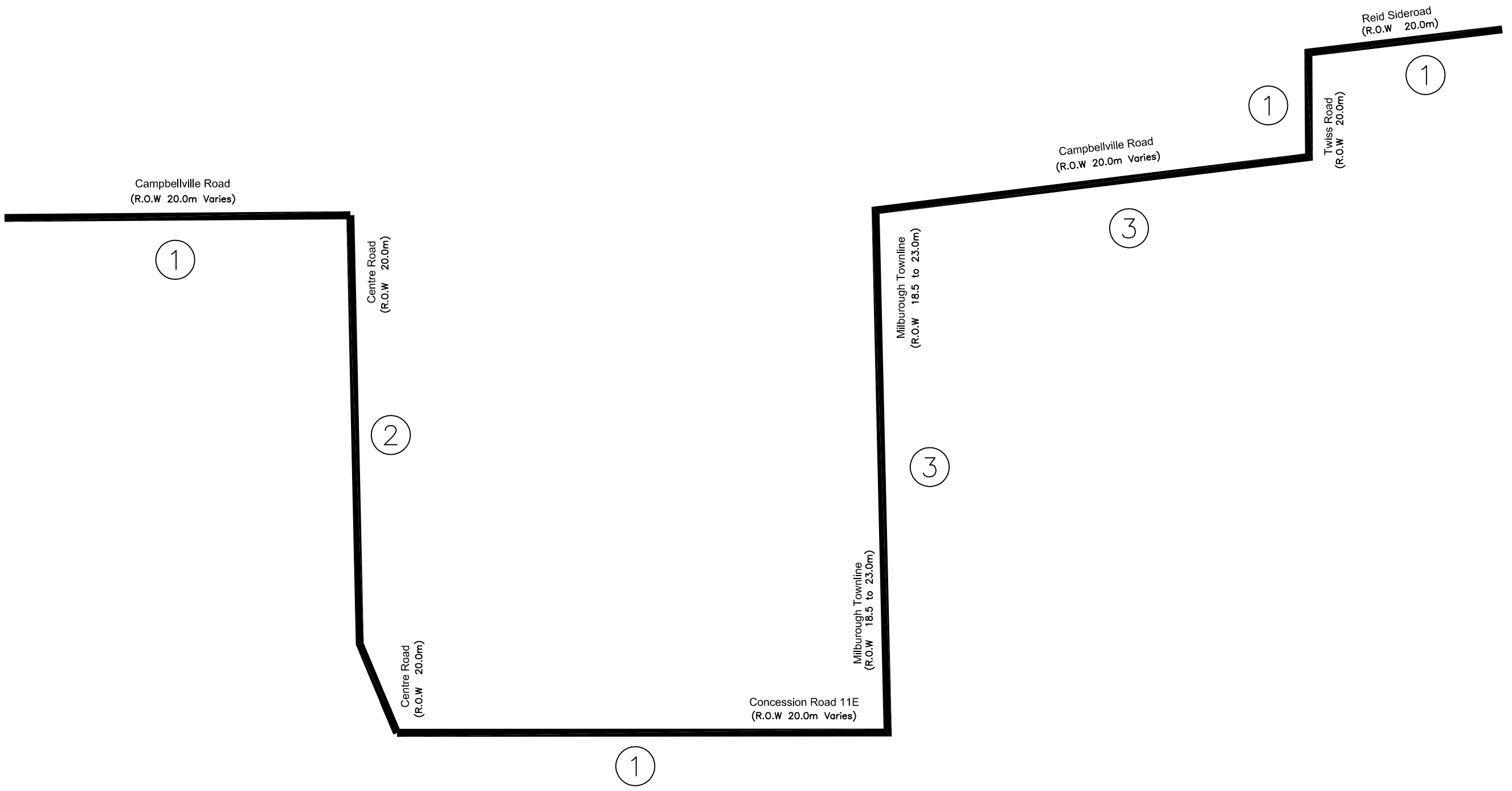
Exhibit 9-10
Representative Cross Section Alternatives
Flamborough Quarry

Not to Scale
October 2008

Alternative 4

Exhibit 9-11
Representative Cross Section Alternatives
Flamborough Quarry

Not to Scale
October 2008



Alternative 5

Exhibit 9-12
Representative Cross Section Alternatives
Flamborough Quarry

Not to Scale

October 2008

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.

Driveway Exposure Index = $\sum_{Link}$ No. Driveways * 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 =

$\sum_{Link}$ Frequency of school daily bus trips in both directions * 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.

Truck Exposure Index = $\sum_{Link}$ No. school bus km * 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:

Area of Additional Pavement = $\sum_{Link}$ Length * $\sum_{Link}$ (Proposed – 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. Approximate property area potentially impacted.	Least expensive 22,000sq m	2nd least expensive 23,000sq m	3rd most expensive 34,000 sq m	2nd most expensive 48,000 sq m	Most expensive 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.

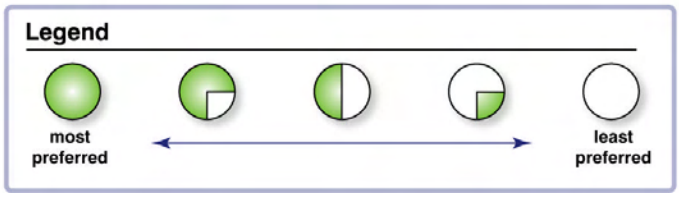
A comparative evaluation was carried out of the alternative haul routes for a proposed quarry in the area of Concession 11 E and Milburough Line. The evaluation process involved two separate evaluations – a qualitative evaluation and a quantitative evaluation. The use of two different evaluation methods 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					



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.

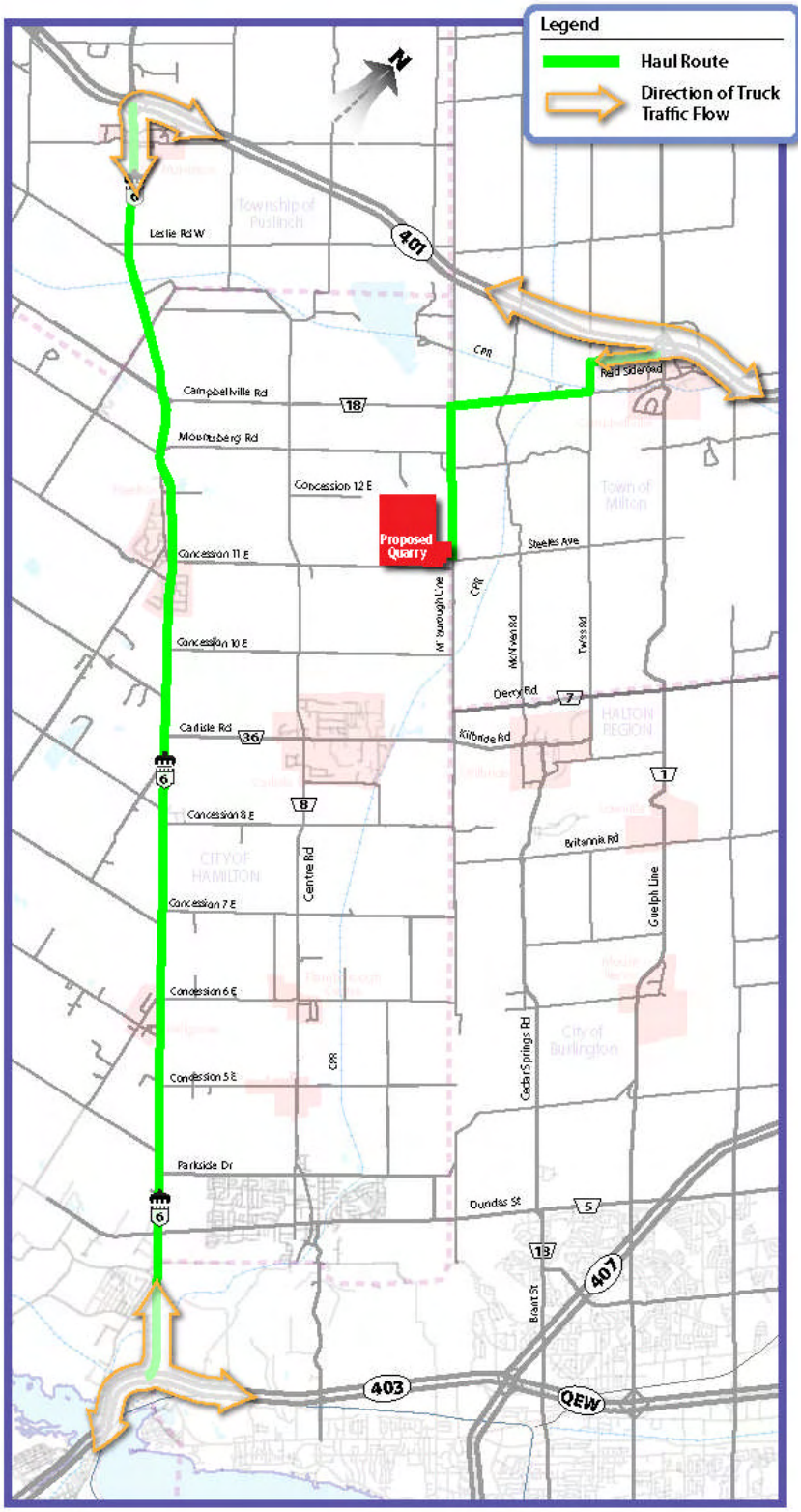


Exhibit 12-1: Preferred Alternative Haul Route

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.

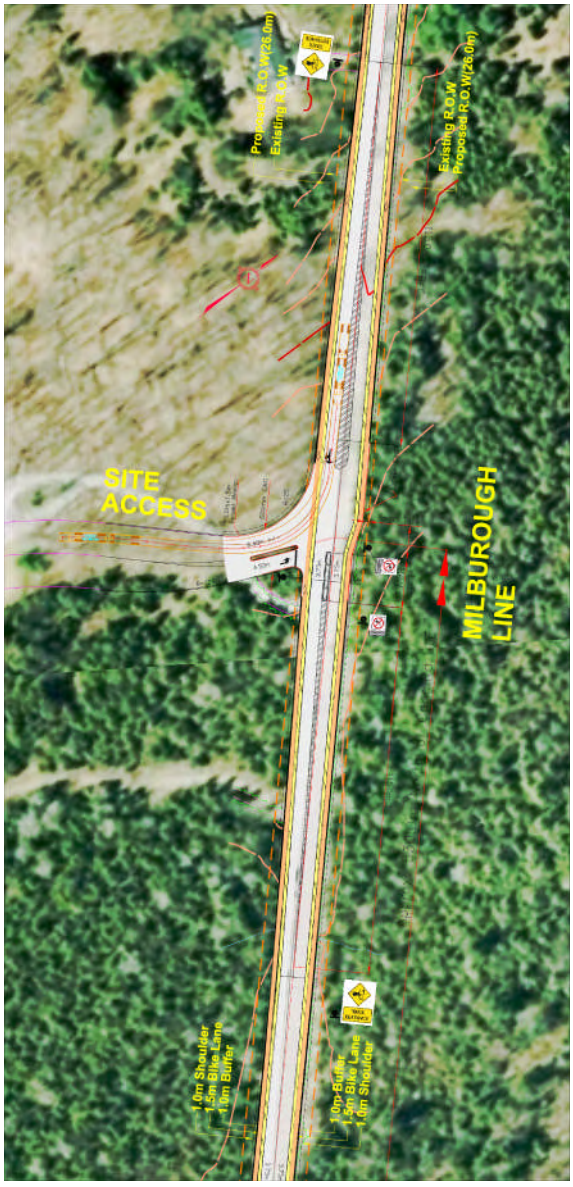


Exhibit 12-2: Recommended Design of Site Access on Milburough Line

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**.

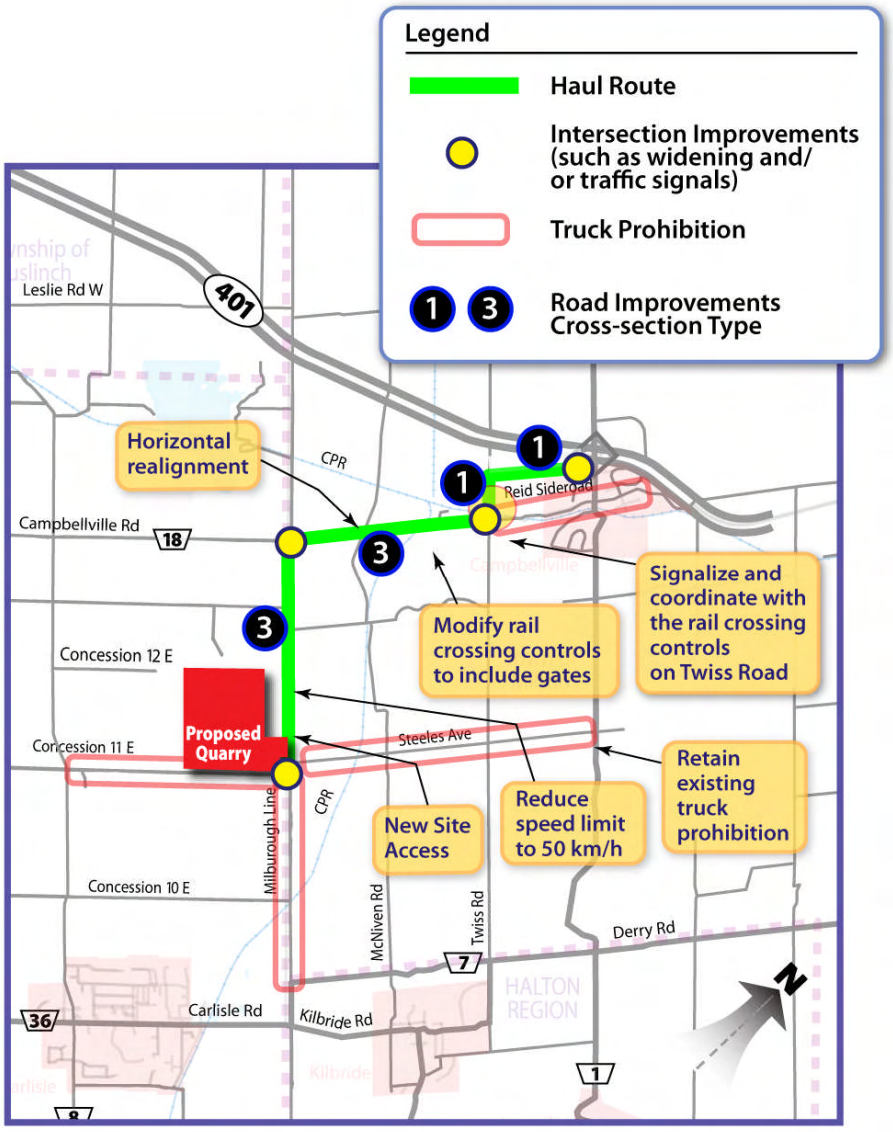


Exhibit 12-3: Summary of Recommend Road Alterations

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.

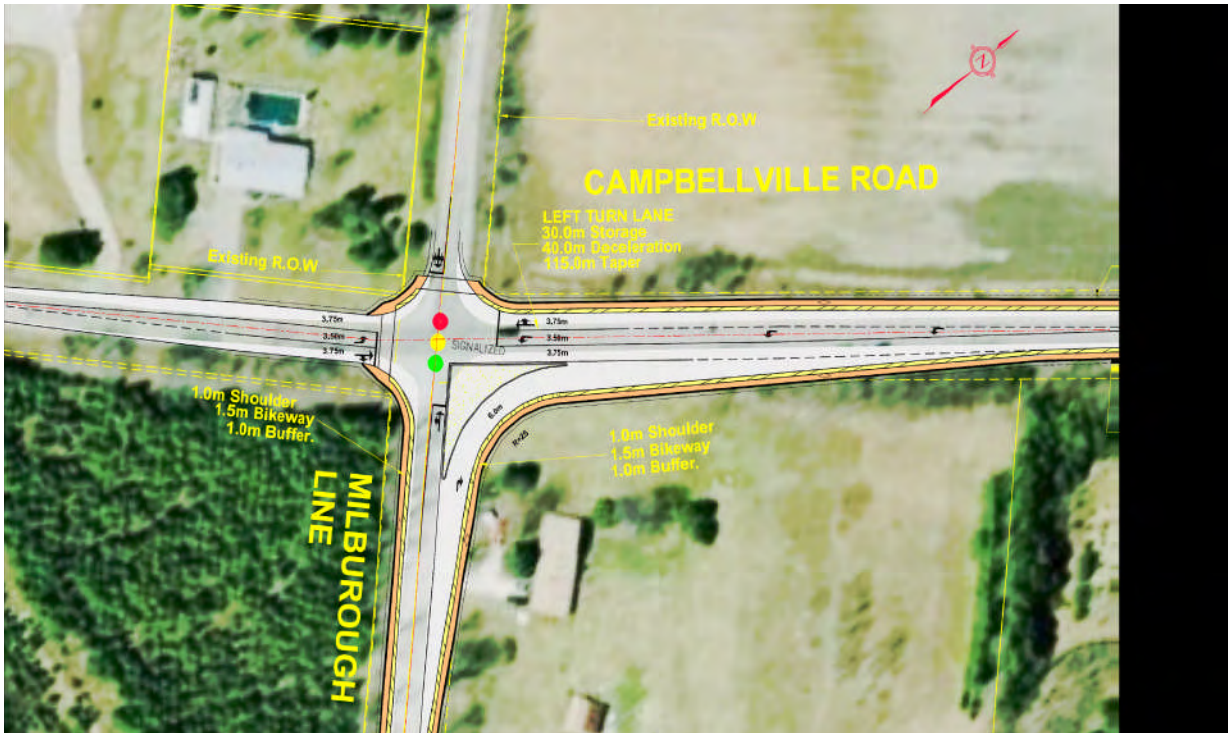


Exhibit 12-4: Intersection Alterations at Campbellville Road and Milburough Line

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**.

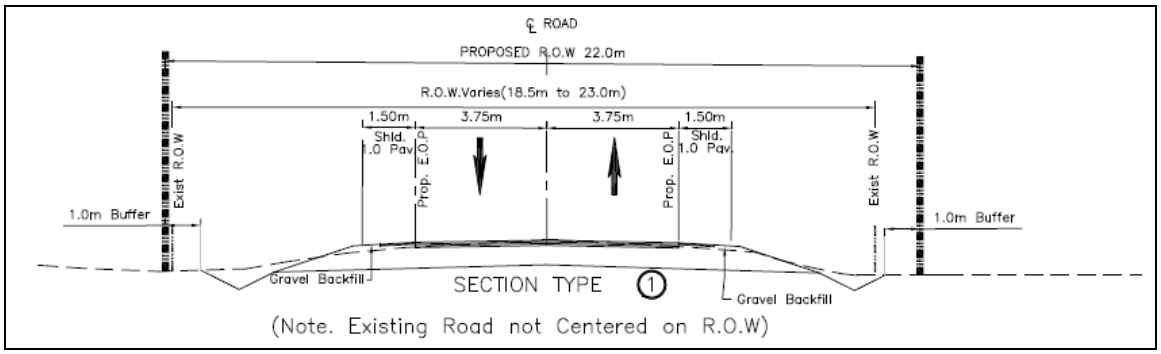


Exhibit 12-8: Type 1 (Rural) Cross-Section

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**).

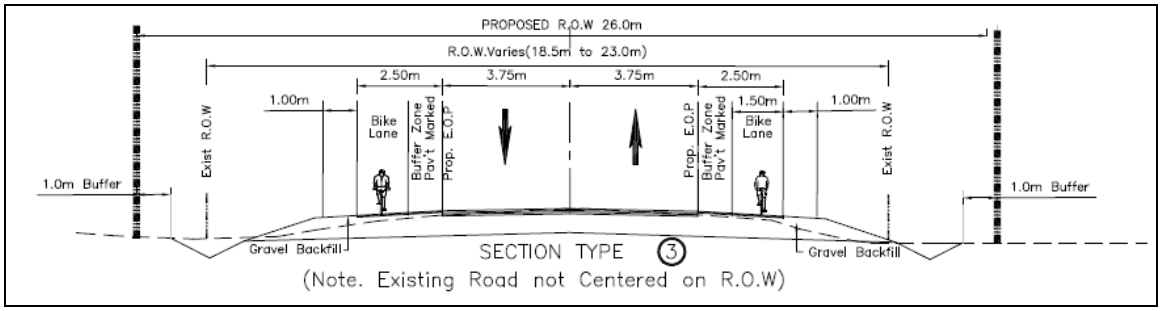


Exhibit 12-9: Type 3 (Rural) Cross-Section

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.

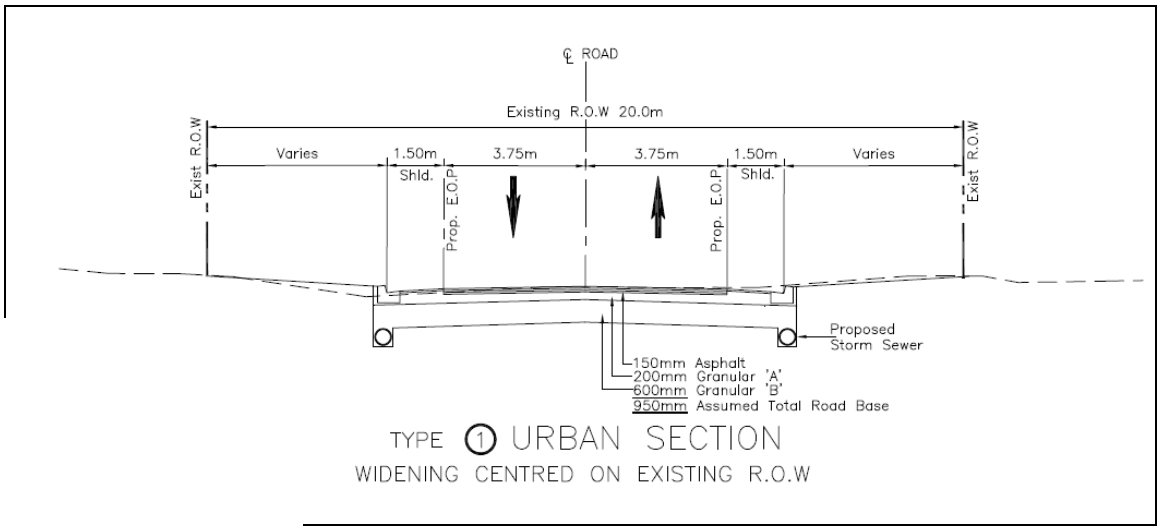


Exhibit 12-10: Type 1 Urban Cross-Section

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.

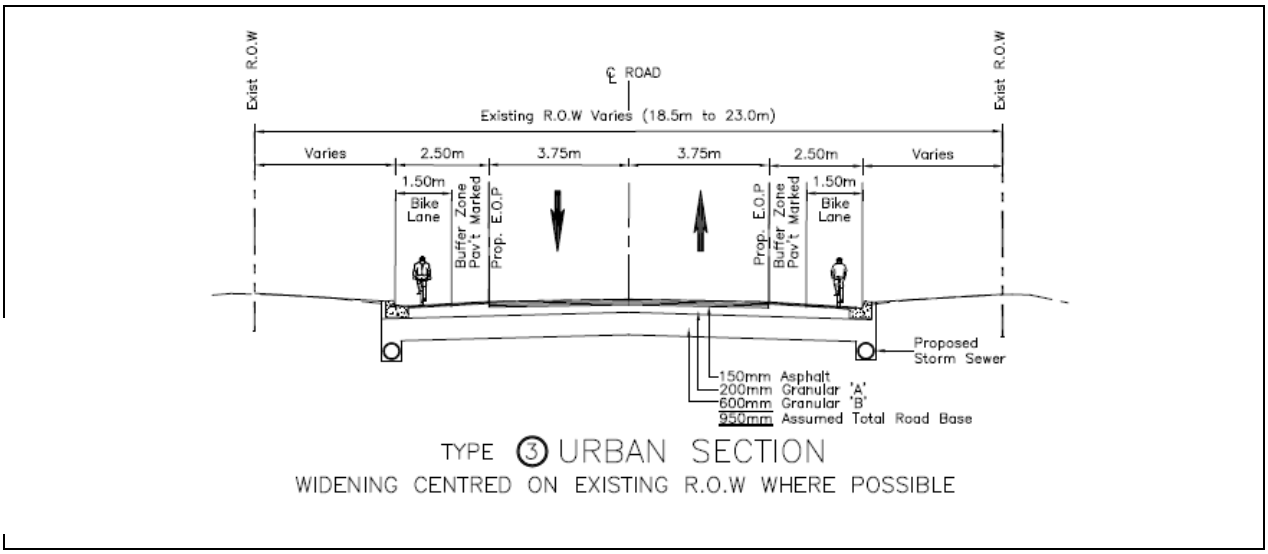


Exhibit 12-11: Type 3 Urban Cross-Section

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

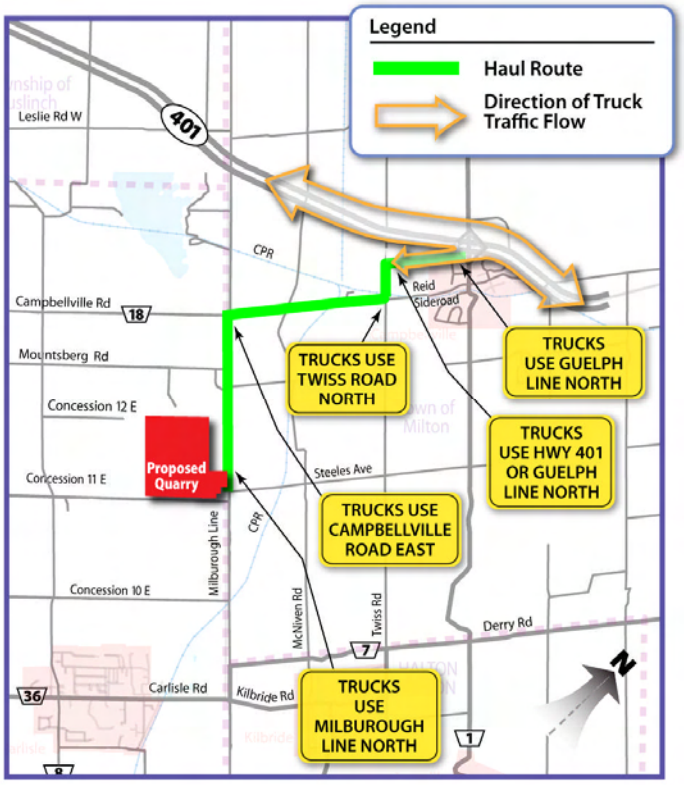


Exhibit 12-12: Recommended Road Signs along the Preferred Haul Route

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

Wellington Advertiser
Friday June 15, 2007

Milton Canadian Champion
Friday June 8, 2007
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.

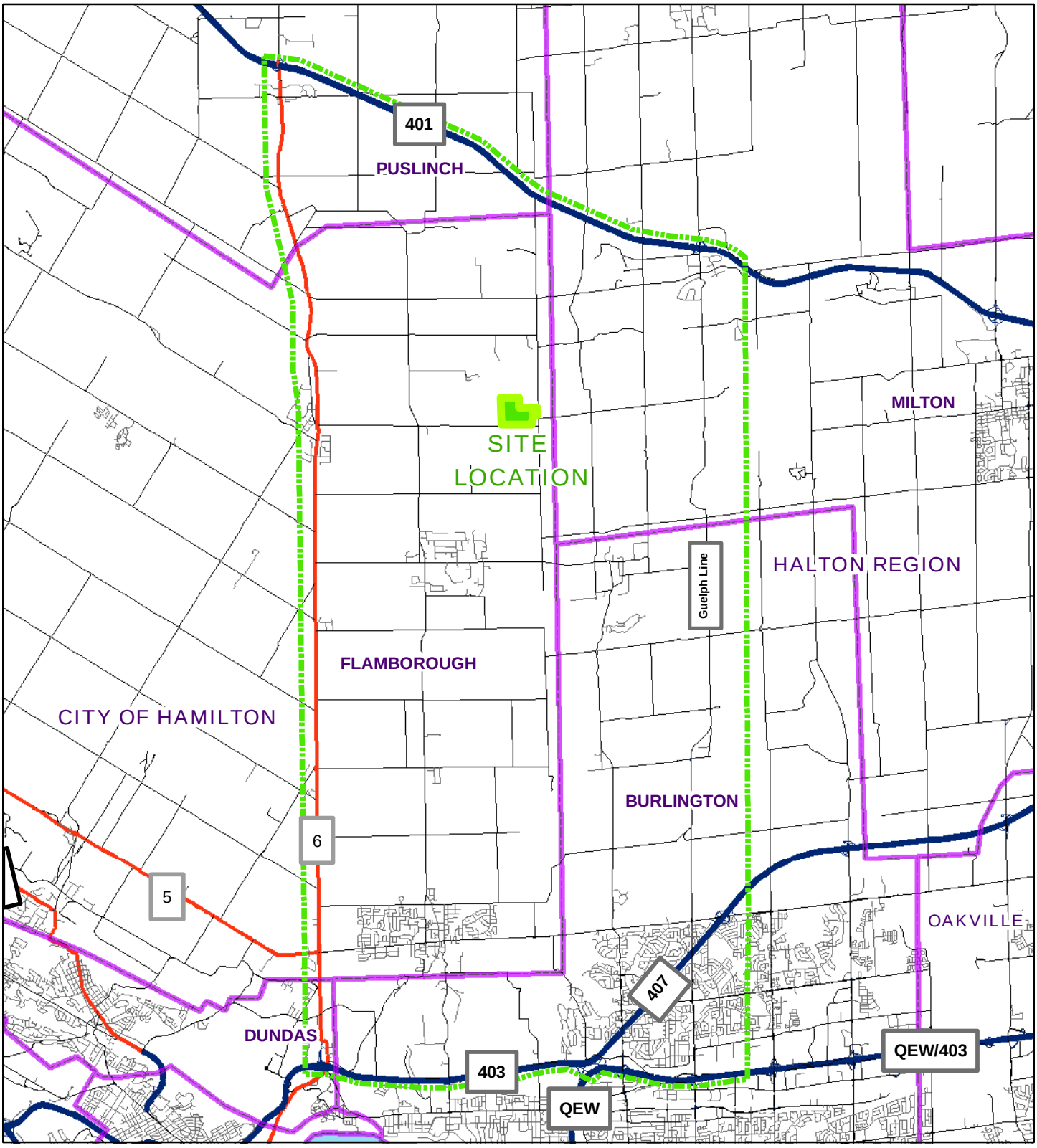


Figure 1

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

DILLON CONSULTING

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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.

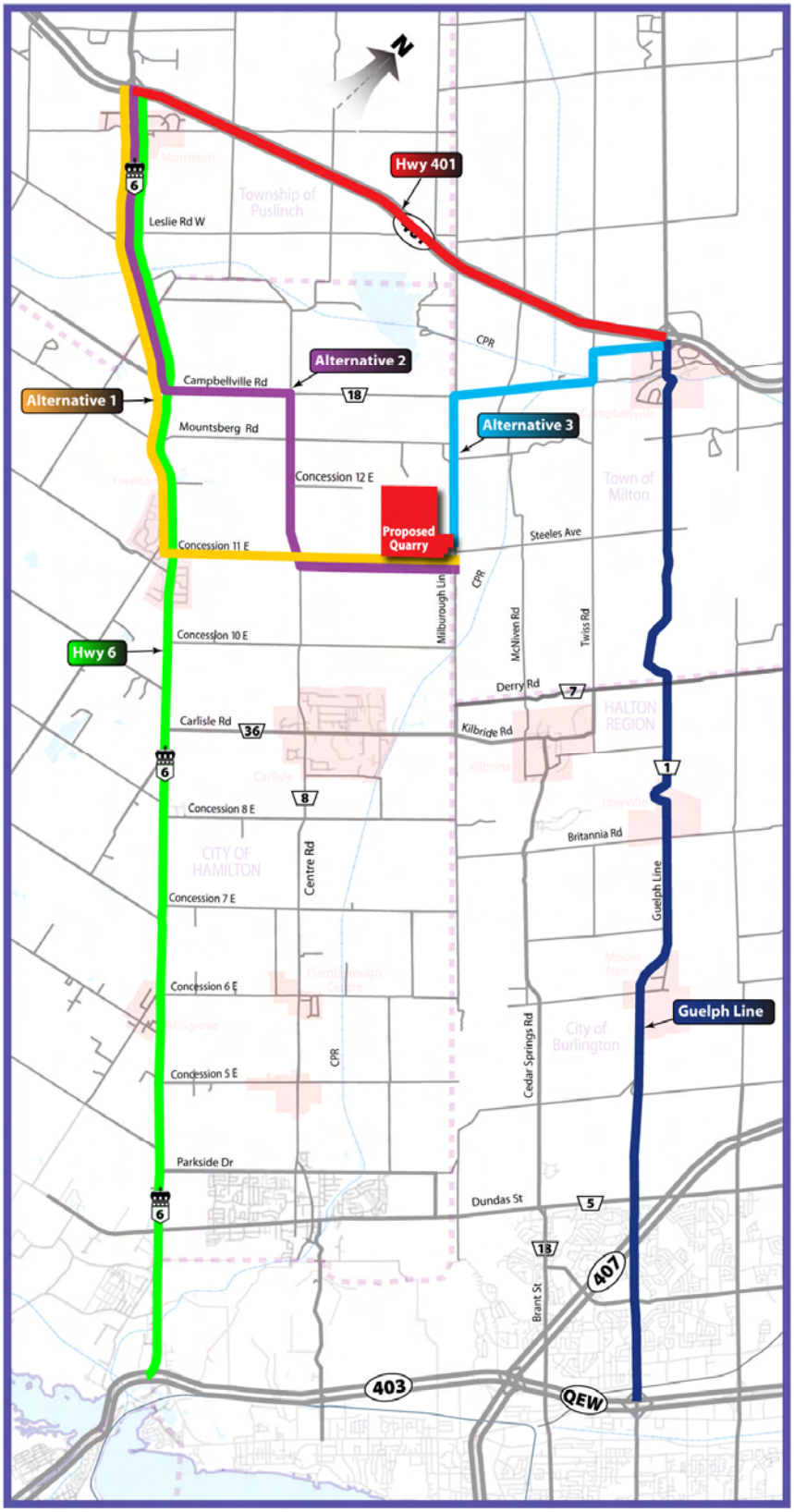

Exhibit 1: Location of Each Travel Time Survey Run