



Transportation Report

# Elginburg Quarry Truck Route Evaluation Study

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Prepared for Cruickshank Construction Ltd.  
by IBI Group

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# Document Control Page

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# 1 Introduction

In early 2014, a Transportation Review of the planned Elginburg Quarry expansion was undertaken and formally submitted to the City of Kingston. Following the submission of the report, concerns were raised by the public with respect to truck traffic through the community of Elginburg. Presently, trucks travel on a variety of routes between the Quarry and the general market area of Kingston. The route travelled is determined by the location of the contract with the majority of trucks using Cordukes Road at this time.

This report provides a comprehensive analysis of the available truck routes between Elginburg Quarry and the city of Kingston to evaluate whether an ideal route exists.

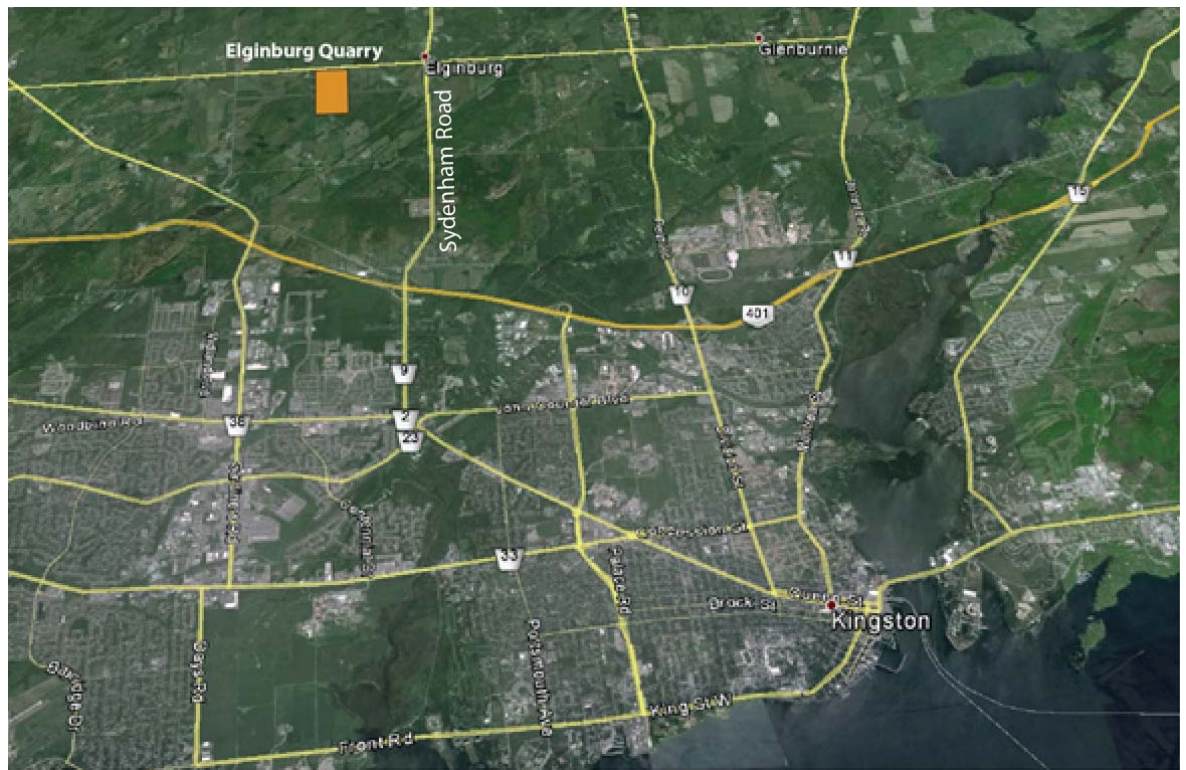


Figure 1 – Location of Elginburg Quarry

## 2 Study Methodology

### 2.1 Evaluation Criteria

An evaluation framework was established to quantify the suitability of all reasonable trucking routes between the Quarry and the general market area (Kingston). The criteria that will be evaluated are based on 3 general categories:

#### Safety to the Business and the Community

- **Visibility at Intersections** – Poor visibility to oncoming vehicles is of concern, particularly to slow-accelerating vehicles.
- **Speed on Intersection Approaches** – The speed of traffic on intersecting roadways can present a hazard to slow-moving Quarry vehicles attempting to manoeuvre through an intersection.
- **Collision History** – Historical collision records provide insight into which routes provide the most risk and where problem areas are located.

#### Efficiency of the business:

- **Route Length** – With heavy payloads, distance is a critical factor in keeping costs low and remaining competitive in the marketplace.
- **Route Grading** - The terrain of the route affects vehicle speeds, fuel efficiency, and the environment.
- **Route Disruptions/Stoppages** – As Quarry vehicles are heavy and slow to accelerate, numerous stoppages along a route can cause delays to general traffic, increase vehicular noise and emissions, and reduce the efficiency of the business.

#### Social Impact to the Community

- **Houses and Businesses Affected** – Homes and businesses along arterial roadways are negatively-affected by the passage of heavy vehicles, primarily due to noise and vibration.

#### Operational Constraints

- **Roadway Load Restrictions** – With consideration that the business operates year-round, seasonal load restrictions imposed by the municipality limit the number of available routes.
- **Roadway Geometry** – Reduced lane widths and inadequate curb radii at intersections impact traffic operations and restrict the turning movements of heavy vehicles.

### 2.2 Scoring

For the purposes of this analysis, each route will be scored against each of the other alternatives and ranked from lowest to highest (1 to 6) for each of the evaluation criteria above. All criteria are weighted equally.

## 3 Existing Road Network

The existing roadways in the vicinity of the Elginburg Quarry which make up a portion of the routes evaluated this study are described below.

### 3.1 Study Area Roadways

#### Unity Road

Unity Road, also known of Regional Road 19, is an east-west road connecting Highway 401 in Odessa with Battersea Road (Regional Road 11) in Kingston.

##### Study area details

- Posted Speed Limit: 80km/h, reducing to 50km/h through Elginburg
- Topography: Relatively Flat
- Intersections: Signalized intersection at Sydenham Road, Stop-Control at Highway 38, Signalized intersection at Perth Road
- Weight Restrictions: None
- Other observations: Low-lying area east of Sydenham Road which makes the road prone to flooding. 'Water Over Road' signs are present.

#### Sydenham Road

Sydenham Road, also known of Regional Road 9, is a north-south road connecting Rutledge Road in the community of Sydenham with Highway 2 (Princess Street) in Kingston.

##### Study area details

- Posted Speed Limit: 60km/h, increasing to 80km/h north of Bur Brook Road, then reducing to 50km/h through Elginburg
- Topography: Moderate grades. Deep valley between Unity Road and Bur Brook Road with steep grades.
- Intersections: Signalized intersection at Sydenham Road
  - *Note: Some Quarry vehicles were observed mounting the curb at the southwest corner of the intersection in order to negotiate the intersection. Stop bars are setback approximately six meters from the crosswalks on all approaches to facilitate wide turning radii of trucks. It was observed on several approaches that trucks infringed on the opposing lane of traffic to negotiate the turn and often vehicles stopped at the intersection would be required to reverse to accommodate the turning movement. This is a result of the small corner radii of the intersection and occurred for a variety of trucks and not exclusively those of quarry-related vehicles.*
- Weight Restrictions: None
- Other observations: Many residential frontages in vicinity of the Bur Brook Road intersection and to the south near Sunnyside Road.

#### Cordukes Road

Cordukes Road is a 2-lane, north-south road connecting Unity Road with Highway 38.

- Posted Speed Limit: 60km/h
- Topography: Relatively flat north of Bur Brook Road. Moderate grading on a curve south of Bur Brook Road
- Intersections: Two-Way stop control at Unity Road, Bur Brook Road and Highway 38 in the north-south direction.
  - *Note: It was observed that southbound vehicles on Cordukes Road at the intersection of Highway 38 can experience significant delays due to restricted visibility and traffic speeds resulting in a reduced gap acceptance for Quarry vehicles attempting to turn onto Highway 38.*
- Weight Restrictions: Seasonal load restrictions from March 1 to April 30.
- Other observations: Kingston KOA Campground on Cordukes, north of Bur Brook. Cordukes is sparsely populated. K&P Trail crosses Cordukes on the north side of the intersection with Bur Brook Road.

### Highway 38

King's Highway 38, commonly referred to as Highway 38, is a provincially maintained highway under the jurisdiction of the Ontario Ministry of Transportation. The road connects both Highway 2 and Highway 401 in Kingston with Highway 7 west of Perth.

- Posted Speed Limit: 80km/h, reducing to 70km/h on the southbound approach to Highway 401.
- Topography: Generally flat with a valley in the vicinity of the Cordukes Road intersection.
- Intersections: Signalized intersection at Ayers Road, near the Highway 401 ramp terminals.
- Weight Restrictions: None
- Other observations: None

### Bur Brook Road

Bur Brook Road is an east-west road which connects Highway 38 with Perth Road.

- Posted Speed Limit: 50km/h
- Topography: Undulating roadway profile with steep grades and a valley midway between Cordukes Road and Sydenham Road.
- Intersections: Stop-control at Highway 38 in the west, and Sydenham Road in the east.
- Weight Restrictions: Seasonal load restrictions from March 1 to April 30.
- Other observations: K&P Trail crosses Bur Brook Road. The road has a residential feel and is very low-lying at places which make it prone to flooding. 'Water Over Road' signs are present.

## Perth Road

Perth Road is (Regional Road 10) a north-south road which connects Highway 401 with the town of Perth.

- Posted Speed Limit: Varies (80/km/h through study area, reducing to 60km/h in built-up areas)
- Topography: Generally Flat between Unity Road and Highway 401.
- Intersections: Signalized Intersection at Unity Road and at McAdoo's Lane.
- Weight Restrictions: None
- Other observations: Road travels adjacent to the Little Cataraqui Creek Conservation Area and Kingston Family Fun World Park

# 4 Truck Route Analysis

## 4.1 Route Alternatives

Since the Elginburg Quarry operates throughout the region, Quarry-related vehicles make use of all major roads in the area, however the core of their business is to the south. To address concerns raised by the public in relation to truck traffic, a number of routes were evaluated to determine if an alternative route exists which meets the needs of the quarry and addresses the public concern regarding truck traffic. The following route alternatives have been identified and are presented in Figure 2 below.

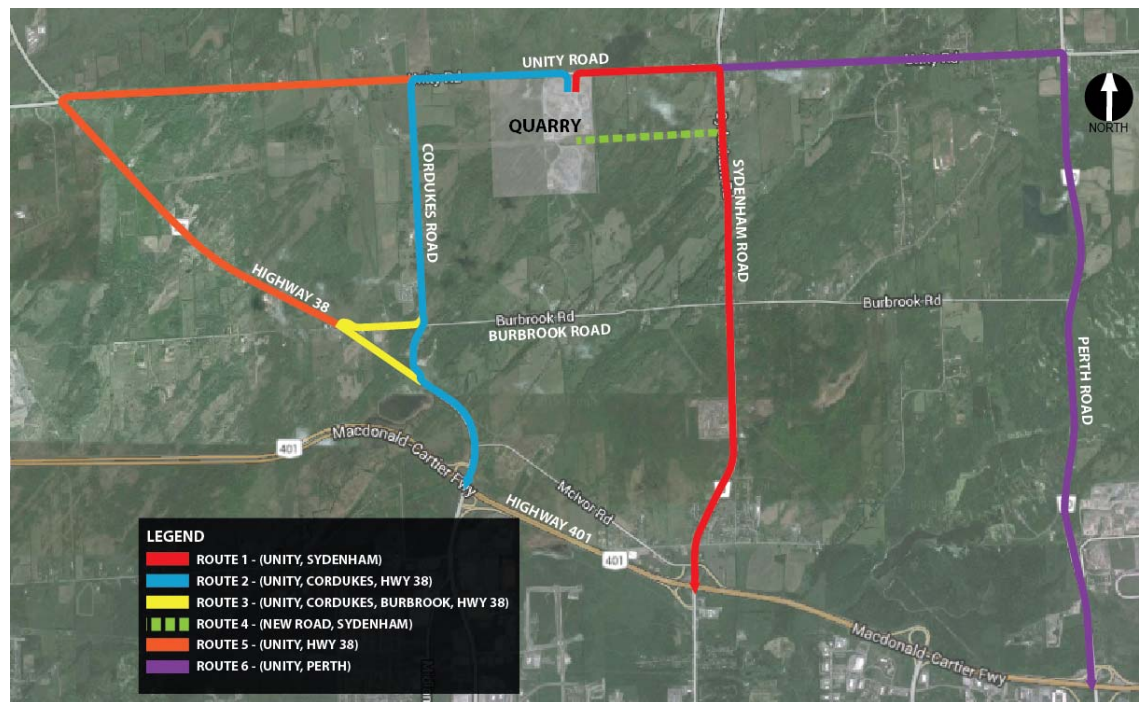


Figure 2 – Alternative Routes

## Route 1



Route 1 is among the Quarry's most direct routes to the centre of Kingston and the general market area of the business. It is comprised of Unity Road and Sydenham Road and passes through the centre of Elginburg via the signalized intersection of Unity Road and Sydenham Road. This intersection has small curb radii and is not traversable by larger heavy vehicles such as pups and tractor trailers, thereby physically limiting the amount of outbound Quarry traffic that can use this route. Set-back stop bars enable triaxle trucks to negotiate the eastbound right-turn while minimizing impacts to northbound vehicles, however these trucks often mount the curb in order to make this movement to avoid conflicts with queued northbound vehicles.

#### Route 2

Route 2 is the most commonly-used route to Highway 401 and is comprised of Unity Road, Cordukes Road and Highway 38. This route provides relatively-direct access to the market area, however there are visibility constraints combined with high vehicles speeds on Highway 38 at the intersection with Cordukes Road that present perceived safety issues and significant delays for Quarry vehicle drivers. Furthermore, seasonal load restrictions impact the practicality of this route for two months of the year.

#### Route 3

The Route 3 alternative is similar to Route 2 except with access to Highway 38 at Bur Brook Road. This route is less-commonly used by Quarry vehicles because drivers feel that visibility is not ideal with respect to traffic speeds along Highway 38.

#### Route 4

Route 4 is hypothetical alternative that may be considered to bypass the intersection of Unity/Sydenham in order to address the concerns of the community. This route could potentially follow the northern edge of the existing pipeline right-of-way and provide direct access to Sydenham Road, just south of the Elginburg limits. The feasibility of such an access road is unknown as the land necessary is currently privately-owned.

#### Route 5

Route 5 uses only Unity Road and Highway 38. The only major intersection encountered is the intersection of Unity/Highway 38. The route is relatively high-speed with minimal stoppages, however it is non-direct to the market area and the distance as compared to other routes is not ideal.

#### Route 6

Route 6 uses only Unity Road and Perth Road, passing through the intersections of Unity/Sydenham and the intersection of Unity/Perth. The route directly-impacts the communities of Elginburg and Shannon's Corners and the distance as compared to other routes is also not ideal.

## 4.2 Analysis of Alternatives

The six routes described above have been analysed based on a review of field conditions. The results consider the individual evaluation criteria and have been scored against each other for each category. The total score for each route will help quantitatively rank the practicality of each route. The lowest score represents the best overall conditions.

### Safety to the Business and the Community

#### Visibility at Intersections \*

- Route 1: No major visibility issues observed **(Rank 1)**
- Route 2: Visibility appears to be somewhat restricted at Cordukes/Highway 38 due to grades **(Rank 5)**
- Route 3: Visibility appears to be adequate but could be limited at Bur Brook/Highway 38 due to grades, intersection approach angle and overgrowth of vegetation **(Rank 4)**
- Route 4: Visibility appears to be adequate but could be limited on Sydenham near pipeline ROW **(Rank 3)**
- Route 5: Visibility appears to be adequate but could be limited by grades at Unity/Highway 38 **(Rank 3)**
- Route 6: No major visibility issues observed **(Rank 1)**

*\* Based on field observations only and not confirmed by sight-line analysis*

#### Speed on Intersection Approaches

- Route 1: 80km/h on Unity at Site Access & signalized intersection at Unity/Sydenham **(Rank 2)**
- Route 2: 80km/h on Unity at Cordukes & 80km/h on Hwy 38 at Cordukes **(Rank 5)**
- Route 3: 80km/h on Unity at Cordukes & 80km/h on Hwy 38 at Bur Brook **(Rank 5)**
- Route 4: 60km/h on Sydenham at potential site access. **(Rank 1)**
- Route 5: 80km/h on Highway 38 at Unity with flashing beacon and oversized stop sign **(Rank 4)**
- Route 6: Signalized intersection at all turning-movement intersections along route **(Rank 3)**

#### Collision History

- Route 1: 30 Reported Collisions along route in the past 5 years **(Rank 4)**
- Route 2: 12 Reported Collisions along route in the past 5 years **(Rank 1)**
- Route 3: 15 Reported Collisions along route in the past 5 years **(Rank 2)**
- Route 4: 24 Reported Collisions along route in the past 5 years **(Rank 3)**
- Route 5: 62 Reported Collisions along route in the past 5 years **(Rank 5)**
- Route 6: 67 Reported Collisions along route in the past 5 years **(Rank 6)**

**Note: No safety impact assessment or sight-line analyses have been conducted for this study. The evaluation of this category is based strictly on field observations and opinion for the purposes of establishing a high-level comparison of route alternatives and should not be interpreted in any other way.**

Efficiency of the business:

**Route Length**

- Route 1: Route is approximately 6.3 km to Highway 401/Sydenham **(Rank 2)**
- Route 2: Route is approximately 7.3 km to Highway 401/Sydenham **(Rank 3)**
- Route 3: Route is approximately 8.5 km to Highway 401/Sydenham **(Rank 4)**
- Route 4: Route is approximately 5.8 km to Highway 401/Sydenham **(Rank 1)**
- Route 5: Route is approximately 11.9 km to Highway 401/Sydenham **(Rank 5)**
- Route 6: Route is approximately 14.1 km to Highway 401/Sydenham **(Rank 6)**

**Route Grading**

- Route 1: Mostly flat except for a steep portion of Sydenham north of Bur Brook **(Rank 3)**
- Route 2: Mostly flat with some minor grades south of Bur Brook **(Rank 2)**
- Route 3: Mostly flat except for a steep portion of Hwy 38 west of Cordukes **(Rank 3)**
- Route 4: Mostly flat except for a steep portion of Sydenham north of Bur Brook **(Rank 3)**
- Route 5: Mostly flat except for a steep portion of Hwy 38 west of Cordukes **(Rank 3)**
- Route 6: Generally flat **(Rank 1)**

**Route Disruptions/Stoppages**

- Route 1: 2 Stoppages en-route to/from Highway 401/Sydenham **(Rank 3)**
- Route 2: 4 Stoppages en-route to/from Highway 401/Sydenham **(Rank 5)**
- Route 3: 3-4 Stoppages en-route to/from Highway 401/Sydenham **(Rank 4)**
- Route 4: 1 Stoppages en-route to/from Highway 401/Sydenham **(Rank 1)**
- Route 5: 1-2 Stoppages en-route to/from Highway 401/Sydenham **(Rank 2)**
- Route 6: 4 Stoppages en-route to/from Highway 401/Sydenham **(Rank 5)**

Social Impact to the Community

**Houses and Businesses Affected**

- Route 1: Route passes adjacent to approximately 128 homes/businesses **(Rank 5)**
- Route 2: Route passes adjacent to approximately 29 homes/businesses, KOA Kingston Campground and crosses the K& P Trail **(Rank 1)**
- Route 3: Route passes adjacent to approximately 26 homes/businesses, KOA Kingston Campground and crosses the K& P Trail **(Rank 1)**
- Route 4: Route passes adjacent to approximately 84 homes/businesses **(Rank 4)**
- Route 5: Route passes adjacent to approximately 57 homes/businesses and crosses the K& P Trail **(Rank 3)**
- Route 6: Route passes adjacent to approximately 140 homes/businesses and is adjacent to Elginburg Public School, Little Cataraqui Creek Conservation Area and Kingston Family Fun World Park **(Rank 6)**

Operational Constraints

**Load Restrictions**

- Route 1: No Roadway Loading Restrictions **(Rank 1)**
- Route 2: Seasonal Roadway Loading Restrictions on Cordukes **(Rank 2)**
- Route 3: Seasonal Roadway Loading Restrictions on Cordukes and Bur Brook **(Rank 2)**
- Route 4: No Roadway Loading Restrictions **(Rank 1)**
- Route 5: No Roadway Loading Restrictions **(Rank 1)**
- Route 6: No Roadway Loading Restrictions **(Rank 1)**

**Roadway Geometry**

- Route 1: Small Curb Radii / Operational Limitations **(Rank 6)**
- Route 2: Adequate Intersection Geometry **(Rank 1)**
- Route 3: Adequate Intersection Geometry **(Rank 1)**
- Route 4: Adequate Intersection Geometry **(Rank 1)**
- Route 5: Adequate Intersection Geometry **(Rank 1)**
- Route 6: Adequate Intersection Geometry **(Rank 1)**

**4.3 Summary of Results**

Table 1 below present a summary of the evaluation of each route based on the study criteria:

CRITERION	ROUTE 1	ROUTE 2	ROUTE 3	ROUTE 4	ROUTE 5	ROUTE 6
<b>Safety</b>						
Visibility at Intersections	1	5	4	3	3	1
Speed at Intersections	2	5	5	1	4	3
Collision History	4	1	2	3	5	6
<b>Efficiency</b>						
Route Length	2	3	4	1	5	6
Route Grading	3	2	3	3	3	1
Route Disruptions/ Stoppages	3	5	4	1	2	5
<b>Social Impacts</b>						
Houses & Businesses Affected	5	1	1	4	3	6
<b>Operational Constraints</b>						
Load Restrictions	1	5	5	1	1	1
Roadway Geometry	6	1	1	1	1	1
<b>TOTAL SCORE</b>	<b>27</b>	<b>28</b>	<b>29</b>	<b>18</b>	<b>27</b>	<b>30</b>

Table 1 – Summary of Alternative Route Evaluation

Based on the results of the analysis presented in **Table 1** above, **Route 4** has the lowest score and therefore provides the best balance of features to allow the Elginburg Quarry to safely and efficiently operate their business while minimizing negative impacts to the community. **Route 4** would require a new access road to be constructed through private property along the north side of an existing pipeline right-of-way corridor with direct access to Sydenham Road and so the feasibility of constructing such a corridor is currently unknown, but could be investigated.

Interestingly, the analysis indicates that each of the existing routes rank similarly with consideration of all the evaluation criteria. This suggests that there no single route that stands out as being the most optimal solution for both the quarry and the community. Although Route 2 (Cordukes Road) is presently the most-used route by the quarry based on the location of a number of current contracts, the continued use of a variety of routing options will dilute the social impact to any one route by distributing quarry traffic amongst the surrounding road network while permitting the quarry to serve its customers in the most efficient way.

## 5 CONCLUSIONS AND RECOMMENDATIONS

The analysis presented above reviewed each of the viable truck routes between the Elginburg Quarry and the city of Kingston. The purpose of this high-level analysis was to quantitatively rank each of the alternative routes in recognition of a number of varying criteria to fairly identify the best routes from each a business, operational, social and safety perspective. A total of six alternative routes were analyzed, including an option for an entirely new route.

Based on the evaluation criteria utilized in this study, each route analysed incorporated both the best and worst features, resulting in a relatively balanced overall scoring, with the exception of Route 4 – a hypothetical future connection between the Quarry and Sydenham Road. It is clear from the analysis that this connection would provide the greatest benefit compared to existing routes and mitigate the impacts of the Quarry to the community. This new road would allow a substantial volume of truck traffic to bypass the intersection of Unity/Sydenham, thus providing mutual benefit to both the Quarry and the community. The development of such a route, however, does not appear to be an achievable solution at the present time, but will continue to be investigated by Cruickshank.

Of the existing available routes, Route 1 (Unity Road, Sydenham Road) and Route 5 (Unity Road, Highway 38) have been found to be slightly more favorable when compared to all other existing route options, but they are not without their own drawbacks.

The overall conclusion of this Route Evaluation Study is that there is no ideal route that exists today and that each alternative has its benefits and drawbacks, whether in terms of efficiency, social impacts or traffic safety. Maintaining the greatest number of route alternatives aides in the distribution of quarry-related traffic and its associated social drawbacks.

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