Chatsworth

PEER REVIEW

STUDIES RELATED TO THE TRAFFIC ROUTE ASSOCIATED WITH THE PROPOSED "BUMSTEAD PIT"

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Consulting Engineers & Planners

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1.0 INTRODUCTION

LEA Consulting Ltd. (LEA) was retained by the Township of Chatsworth to undertake a Peer Review of studies related to the haul route associated with the proposed "Bumstead Pit". The subject site is located west of Highway 10 on Sideroad 60, just east of Veterans Road South, as shown on **Figure 1**.

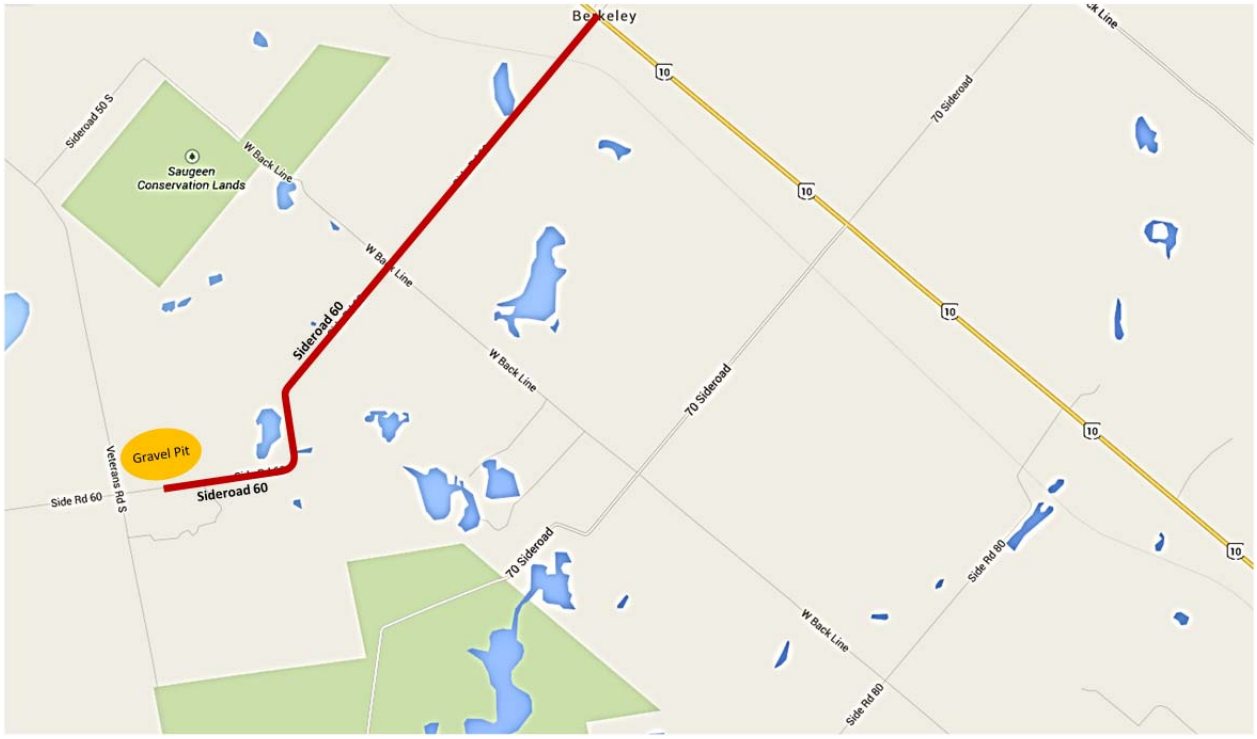

Figure 1: Site Location

Several reports have been submitted in conjunction with the gravel pit (Bumstead) rezoning application for Part Lot 27, Concession 7, Geographic Township of Holland, Township of Chatsworth, County of Grey. In addition, several correspondences have been submitted involving the Ontario Ministry of Transportation as well as groups of concerned residents. Therefore, LEA will conduct a review of these reports and correspondence, issue observations, provide comments on each and recommend actions for the continuation of the rezoning application.

2.0 PEER REVIEW

2.1 STUDIES UNDER REVIEW

The following documents are included as part of the Peer Review:

1. Gamsby and Mannerow Engineers (May 2013). *ROAD ASSESSMENT PROPOSED CLASS "A" GRAVEL PIT 584015 – SIDEROAD 60, BERKELEY Part Lot 27, Concession 7 (FORMER TOWNSHIP OF HOLLAND) TOWNSHIP OF CHATSWORTH COUNTY OF GREY.*
2. Gamsby and Mannerow Engineers (Sept. 2014), *ROAD GEOMETRICS EVALUATION Sideroad 60 (Between Highway #10 & Veterans Road South) PROPOSED CLASS "A" GRAVEL PIT 584015 – SIDEROAD 60, BERKELEY Part Lot 27, Concession 7 (FORMER TOWNSHIP OF HOLLAND) TOWNSHIP OF CHATSWORTH COUNTY OF GREY.*
3. Paradigm Transportation Solution Ltd. (Sept. 2014), *Bumstead Pit Chatsworth, ON - Scoped Traffic Impact Study.*
4. Comments of Ontario Ministry of Transportation (MTO) on Traffic Impact Study (December 2014)
5. Hunter, J. (2014), Chatsworth Taxpayers for a Safe and Healthy Environment. *Chatsworth Gravel Pit: Traffic and Road Impact Study.*
6. Community's ongoing interests in the Terms of Reference for the Township of Chatsworth Road Peer Review of the proposed haul route for the Bumstead Pit (December 2014).

2.2 INSPECTION OF THE HAUL ROUTE

Inspection of the haul route was undertaken by LEA on Thursday April 2 2015 in the afternoon. During inspection, sight line issues were noted with existing shrubs / trees along the roadway radius. **Figures 2 and 3** show the existing conditions.

During the site visit, a tanker truck was observed to encroach onto the opposing lane while turning along the S-curve of Sideroad 60. Based on that observation, considerations should be given to address horizontal sight line issues along Sideroad 60. Possible solutions include trimming of shrubs and trees within road right of way.

Figure 2: Looking South on South-East Bend of Sideroad 60

Figure 3: Looking North on North-East Bend of Sideroad 60

2.3 REVIEW

2.3.1 Road Assessment

The firm SPL Consultants Limited reviewed the document submitted by Gamsby and Mannerow Engineers that supported the zoning application. Following are findings of the SPL peer review of that document:

- Sideroad 60, within the project limits, is 4.7 km long and there were 7 boreholes drilled at about 500 to 750m spacing; borehole spacing of about 500m is usually suitable for preliminary investigation.
- Table 3.4 Structural Design Guidelines for Flexible Pavement - Secondary Highways, from the 1990 MTO Pavement Design and Rehabilitation Manual, is applicable only for up to about 10% trucks, which was indicated in the report submitted by Gamsby and Mannerow. Based on this, it assumed the required Granular Base Equivalency (GBE) to be 250 mm. This also assumes that drainage is adequate, which needs to be confirmed. Note that in BH6, wet sand and gravel subgrade was encountered at a depth of about 1 m. The frost depth in this area is about 1.4m.
- From the traffic data provided in the Report, it is estimated that percentages of trucks will be greater than 20% in the future. Based on this, Table 3.4 is not applicable and other design methods such as AASHTO should be used to analyze the required Structural Number (SN), which takes into account the truck loading, drainage and service life of pavement. This will provide the required pavement structure.
- The presence of 0.8m thick peat in BH 5 at a depth of 1.5m should be investigated further and its horizontal extent should be delineated as much as possible. It should also be determined if 100mm of hotmix is sufficient. It is noted that the east section of the road is in good condition now, but without the truck loading.
- Overall, further investigation and/or analysis are required to confirm if the existing pavement structure and shoulders are adequate to support the future trucks for the gravel pit operation.

In regard to the traffic data presented in the report, the specific information associated to the data that was used to estimate daily traffic volumes is not provided. In addition, there is no mention of the current distribution of traffic indicating the proportion of trucks that currently travel on Sideroad 60. This information is needed to properly validate the assessment.

2.3.2 Road Geometrics Evaluation

The following analysis is a revision of the Road Geometrics Evaluation (September 2014) submitted by Gamsby and Mannerow Engineers:

- The evaluation is adequate for the following road geometrics:
  - Stopping sight distances approaching the proposed entrance from each of the easterly and westerly directions;
  - Cross-sections including travel lane and shoulder; and
  - Guiderail warrants along wetlands and hazard lands located west of the Hamlet of Berkeley.
- **Sideroad 60 - South-East Bend Review**
  - Pavement Widening

    The existing South-East bend has a circular curve with centerline radius of 89 m based on survey data. It is suggested that pavement widening on curves for tractor trailers WB-17.5 be incorporated for the 89 m curve radius. The MTO's Geometric Design Standards for Ontario Highways (table D3-3 below) illustrates suggested pavement widening at the turns according to the road's Design speed, pavement width and curve radius. While Sideroad 60 is a surface treated road with no defined pavement width, the MTO table suggests a minimum curve widening of 2.0 m for a curve radius of 100 m or less. This widening is to accommodate two trucks turning simultaneously.

Table D3-3

PAVEMENT WIDENING VALUES ON CURVES FOR TRACTOR-SEMI-TRAILER (WB-17.5) VEHICLES

PAVEMENT WIDTH 7.5 m								
Design Speed								
km/h	50	60	70	80	90	100	110	120
W	R	R	R	R	R	R	R	R
2.00	115-125	120-130	125-140	130-150	140-150	150-160	160-170	160-180
1.75	130-150	140-160	150-170	160-180	170-190	170-200	180-210	190-230
1.50	160-180	170-190	180-210	190-220	200-240	210-250	220-250	240-280
1.25	190-240	200-250	220-250	230-300	250-320	280-340	280-300	300-380
1.00	250-320	280-350	280-380	320-420	340-450	350-500	380-550	400-575
0.75	340-525	380-600	400-650	450-700	475-800	525-850	575-950	600-1050
0.50	550-1250	150-1400	700-1600	750-1800	850-2000	900-2200	1000-2500	1100-3000
0.25	1300-10000	1500-10000	1700-10000	2000-10000	2200-10000	2500-10000	3000-10000	3500-10000
PAVEMENT WIDTH 7.0 m								
2.00	105-120	115-125	120-130	125-140	130-140	140-150	150-160	
1.75	125-140	130-140	140-150	150-160	150-170	160-180	170-200	
1.50	150-170	160-180	160-190	170-200	180-220	190-230	210-240	
1.25	180-210	190-230	200-240	210-250	230-280	240-300	250-320	
1.00	220-280	240-300	250-340	280-350	300-380	320-420	340-450	
0.75	300-420	320-475	350-525	380-575	400-600	450-650	475-750	
0.50	450-800	500-900	550-1050	600-1150	650-1300	700-1400	800-1600	
0.25	850-3500	950-4500	1100-5000	1200-6000	1400-7000	1500-8000	1700-10000	
PAVEMENT WIDTH 6.5 m								
2.00	100-110	105-115	110-125	120-130	125-140	130-140		
1.75	115-130	120-130	130-140	140-150	150-160	150-170		
1.50	140-150	140-160	150-170	160-180	170-200	180-210		
1.25	160-190	170-200	180-220	140-230	210-250	220-250		
1.00	200-250	210-250	230-280	240-320	280-340	280-350		
0.75	280-350	280-380	300-420	340-450	350-500	380-550		
0.50	380-600	400-650	450-750	475-800	525-900	575-1000		
0.25	650-1600	700-1800	800-2200	850-2500	950-2500	1050-3000		

Notes:

- W - widening values in metres are based on WB-17.5 design vehicles travelling at the design speed.
- R - denotes centreline radius in metres.
- For methods of widening see Standards OPSD 213.01 and OPSD 213.02.
- Not to be used for interchanges.

Table 1: Table D3-3 extracted from Geometric Design Standards for Ontario Hwys - Chapter D

- Super Elevation

  The South-East Bend has a cross fall of 7.76 % and 0.89 % for the circular curve of 89 m. The Design speed of the road suggests a minimum super elevation requirement of 6 % for this curve radius. The minimum radius standard for roads based on the super elevation is met in the southbound direction, currently at 7.76 %. The northbound direction is limited to 0.89 % super elevation which is significantly less than the 6 % requirement, and would have to be re-graded.

- Horizontal Sight Distance

  The minimum Stopping Sight Distance (SSD) for a 50 km/hr design speed is 65 m. Currently, with trees/shrubs along the curve approximately 2.0 m off the edge of pavement, a horizontal stopping sight distance of 52 m is achieved which does not meet the 65 m required . Further site review / survey of existing vegetation on horizontal sight distance is recommended.

Source: maps.google.ca/2015

Figure 4: Looking North on North-East Bend of Sideroad 60

- **Sideroad 60 - North-East Bend Review**

  - Pavement Widening

    Similar to the South-East bend, the existing North-East bend has a circular curve with centerline radius of 89 m based on survey data. As with the South-East bend, the MTO's Table D3-3 suggests a curve widening of a minimum of 2.0 m.

- Super Elevation

  The North-East bend has a cross fall of 2.82 % and 8.73 % in the northbound and southbound directions respectively for the 89 m circular curve. The same requirement of 6% is applicable as for the South-East Bend, and the northbound direction would have to be re-graded to the 6% minimum super elevation.

- Horizontal Sight Distance

  As observed on the South-East bend, further review or survey of existing vegetation on the horizontal sight distance for pruning is recommended in order order to achieve the minimum stopping sight distance of 65m.

- **Conclusion**

  It is recommended that the Town of Chatsworth review the widening, super elevation and horizontal sight distance issues outlined above and develop an improvement plan which takes these suggestions into consideration.

2.3.3 Paradigm Traffic Impact Study (TIS)

Paradigm conducted a Scoped Transportation Impact Study of the intersection of Highway 10 and Sideroad 60, based on the assumption that the proposed gravel pit's aggregate trucks would travel via Highway 10 only. Their analysis is based on Turning Movement Counts (TMC) conducted in June 2014, and factored to a yearly peak using the MTO's Seasonal Adjustment Factors for a provincial recreation route.

Trip generation for the proposed site was based on the 2013 Road Assessment Study by Gamsby and Mannerow. It assumed that the licensed maximum extraction of 150,000 tonnes per year was split evenly across 170 working days (5-day work week) and that standard tri-axle 22-tonne aggregate trucks would be used. This resulted in a daily truck trip generation of approximately 8 truck trips per hour (4 in / 4 out). Paradigm noted that on occasion, construction work nearby might require more frequent aggregate delivery, thereby pushing the trip generation to 6 in / 6 out. This assumption was carried over from Gamsby and Mannerow's Road Assessment Study, but no initial rationale was provided for this number. It was used as the worst case scenario peak hour trip generation.

Two horizons were analyzed, 2021 and 2026, with a 2.1% compound annual growth rate applied to all movements. This growth rate was calculated from historical count data and is reasonable.

Ultimately the analysis shows very minor impact to the Highway 10 and Sideroad 60 intersection.

Following the review of the document submitted by Paradigm, these are our observations:

- There is no discussion of employee-generated trips at the proposed pit. On a pit like the one proposed, we would expect a number of staff working in addition to the truck drivers, operating administration, loaders and screen sifters. These employees would also generate trips to and from the site, especially at the start and end of shifts. Furthermore, the possibility of customers purchasing small amounts of aggregate is not considered. While adding additional employee-generated or private customer trips would likely have minor

impact on the analysis, it nonetheless should be included. There is also no discussion of the impacts to existing or future pedestrian, cycling or other recreational vehicles.

- While Paradigm remains consistent with the assumption of Gamsby and Mannerow that 22-tonne aggregate trucks will be used, there is no way to guarantee that larger aggregate trailers will not be used. We note that no test of truck turning manoeuvers was performed at the intersection of Highway 10 and Sideroad 60, or anywhere along the proposed Haul Route. This analysis should be carried out to validate that the intersection configuration and turns on the S bend on Sideroad 60 will be adequate to support the truck volumes generated and the larger aggregate trailers likely to be used.

2.3.4 Comments of MTO on Paradigm TIS

An email sent on December 11, 2014 by Graham DeRose, from Ontario Ministry of Transportation (MTO), states: *"The proposed development will contribute approximately 12 trucks on Highway 10 during the weekday peak hours. It is expected that this additional traffic will not result in traffic operational issues at the intersection of Highway 10 and Sideroad 60 in Chatsworth. There are no required improvements identified as a result of this development."*

Our understanding is that the Ministry is in agreement with the conclusions of the Paradigm Study.

2.3.5 Chatsworth Taxpayers Traffic and Road Impact Study

In response to Paradigm's Scoped Traffic Impact Study, the Chatsworth Taxpayers for a Safe and Healthy Environment organization submitted a report outlining their own analysis of the issues surrounding the proposed haul route, and comments on the Paradigm study.

The organization estimated 112 vehicles using Sideroad 60 daily, including 8 commercial vehicles and 7 school buses. The report projects a high weight increase to the road given the additional truck volume forecasted. A weight of 2.2 tonnes is assumed for the 112 vehicles counted, and 63 tonnes are assumed for the aggregate trucks (corresponding to the maximum vehicle load permissible on Sideroad 60 at the site access).

The organization is concerned with the possibility of conflicts between the 7 school buses observed to use Sideroad 60 and aggregate trucks. Similarly, there is concern that recreational vehicles using the CP Rail corridor west of Highway 10 under an agreement with CP Rail might face safety issues when crossing Sideroad 60 on account of the aggregate truck traffic.

The report also notes that the Gamesby and Mannerow's report analysis did not consider any trips generated by employees in addition to truck volumes.

At the S bend, there is concern that two trucks passing the same point would not leave sufficient room on the pavement for pedestrians, horse riders or recreational vehicles. The report considers tractor-trailer vehicles using the S bend and notes that 12 m trailers cannot safely make the turns without encroaching onto oncoming lanes.

Following our review of the report submitted by the Chatsworth Taxpayers for a Safe and Healthy Environment, we note the following:

- The daily vehicular volumes observed by the organization (113 vehicles) are lower than the daily volumes estimated in Gamesby and Mannerow's Road Assessment Study (289 vehicles daily). The Taxpayers report indicates 8 commercial vehicles and 7 school buses (for a heavy vehicle proportion of 13%). The Taxpayers organization uses their lower surveyed volume to demonstrate the higher impact of the added aggregate truck traffic on the road. Conversely, Gamsby and Mannerow's higher observed vehicular volume suggest a much higher existing volume that would have potentially higher impact on the road than the added aggregate truck traffic. Neither Gamsby and Mannerow nor Paradigm provide the heavy vehicle proportions their surveyed vehicular volumes. We therefore cannot determine which volumes are more relevant to a review for the haul route.
- We note that the analysis conducted by the Taxpayers group to demonstrate the added weight on the road associated with the new aggregate trucks is erroneous. The vehicle weight assumptions appear to be inconsistently used across different vehicles. All of the 112 vehicles counted by the Taxpayers are assumed to weigh 2.2 tonnes (ignoring the 8 commercial vehicles and 7 school buses, which would weigh significantly more), while all of the aggregate trucks are assumed to be a maximum weight of 63 tonnes. This weight is applied to 100 truck trips, not recognizing that these reflect about 40 trucks making 1 empty and 1 loaded trip, with different weights.
- We agree that there is some potential for conflict between the manoeuvres of school buses and aggregate trucks. We do note, however, that the daily volumes observed by Gamsby and Mannerow, Paradigm, and the Taxpayers group suggest relatively small vehicular volumes on Sideroad 60, with sufficient gaps between vehicles to allow safe manoeuvring.
- In regards to concerns over recreational vehicles crossing Sideroad 60 at the CP Rail crossing, we note that the main recreational weekend usage of the corridor does not conflict with the gravel pit's proposed weekday activity. While Paradigm considered that the pit would not be active during weekends, we note that the proposed Operational Plan, dated November 11 2013 also indicates operation on Saturdays, from 9:00 am to 2:00 pm. There is therefore some potential for conflict between aggregate truck movement and seasonal recreational weekend traffic along the CP corridor. Nonetheless, as noted with regards to school bus activity, the low vehicular volumes observed and forecasted on Sideroad 60 ensure ample gaps between vehicles to permit safe passage of recreational users.
- As noted in our review of Paradigm's study and as commented by the Taxpayers group, the site's trip generation should include trips related to employees and to smaller customers, in addition to aggregate trucks.
- As indicated in the Road Geometrics Evaluation (see section 2.3.2), Sideroad 60 may require widening at the turns on the S bend between Veterans Road South and West Back Line. While the site owner proposes using 22-tonne tri-axle aggregate trucks, we suggest that the possibility of larger aggregate trailers should be accounted for.

2.3.6 Community's interests in the Peer Review Terms of Reference

In response to the MTO's comments on Paradigm's study, the Co-chairs of the community organization Chatsworth Taxpayers for a Safe and Healthy Environment submitted additional comments and issues which are outlined below.

The organization notes that the scope of this study is too limited and does not consider impacts on the Hamlet of Berkeley outside of the intersection proper. The community questions Paradigm's consideration for appropriate sightline distances at the intersection of Highway 10 and Sideroad 60, given the vertical grading of the intersection and its approaches. At the same time, the group also calls for analysis of truck movements at this intersection.

The community group notes that no review was made of historical collision data in the vicinity of the intersection. It is therefore unknown if there are existing safety issues facing the operation of the intersection. The community calls for the introduction of shoulders to Sideroad 60 to increase safety.

Following our review of the above comments, we note the following:

- The Paradigm Study was conducted as a Scoped Traffic Impact Study of the intersection of Highway 10 and Sideroad 60 only, as approved by the MTO. We consider that alternative haul routes should be considered to account for the shortest routes in regard to the truck destinations.
- While Paradigm did conduct a sight distance analysis onsite from the point of view of a passenger vehicle, the constraints of the intersection of Highway 10 and Sideroad 60 requires a more detailed analysis of all approaches to the intersection, considering the stopping, turning and accelerating requirements of aggregate trailers.
- No truck turning maneuvering analysis was conducted as part of the Paradigm Study. Considering the potential for large aggregate trailers to use the intersection, a truck movement analysis should be carried out at the intersection. While shoulders and sidewalks are not features typically necessary on a surface-treated rural road, consideration should be given towards improving specific areas of concern to the community along the proposed haul route.

3.0 CONCLUSION AND RECOMMENDATIONS

Based on our review of the documents submitted, we present the following conclusions and recommendations.

We note that the existing traffic data used in Gamby and Mannerow's and Paradigm's studies do not sufficiently reflect the nature of travel demand in the study area. The data provided does not break down volumes by vehicle type, ignoring heavy vehicles recreational vehicles and non-vehicular traffic. It is therefore difficult to assess all of the transportation impacts of the proposed gravel pit.

Review of the road assessment suggests further investigation and analysis to confirm if the existing pavement structure and shoulders are adequate to support the future trucks for the gravel pit operation. Similarly, review of the geometric evaluation suggests the need for improving sight distances along the S bend on Sideroad 60 by pruning vegetation within the road right of way, and considering widening and super-elevation of the turns in the S bend to accommodate two WB-17.5 tractor trailers turning simultaneously. If only smaller trucks are to transport gravel material then the road widening may not be required.

Paradigm's Scoped Traffic Impact Study was conducted, with MTO's approval, on the intersection of Highway 10 and Sideroad 60 only. While this is the main intersection on the proposed haul route, and is the sole scope of that study, consideration should be given to impacts along the entirety of the haul route. Alternative routes which would also serve as a convenient access for demands west and south-west of the proposed Bumstead pit should also be considered. We note that the trip forecast for the site should have included the trip generated by employees and smaller customers as well as the aggregate trucks. Proxy trip generation at a comparable aggregate extraction site in Grey County may provide sufficient data to cover all users of the gravel pit. We do note, however, that this information is only relevant in comparison to existing heavy vehicle volumes to determine if the additional aggregate truck volume would have a significant impact on traffic operations and safety. Otherwise, given the relatively low existing and forecasted volumes on the road, the additional employee and small customer trips should not cause a significant impact on traffic operations.

Lastly, while the site proposal indicates that only standard 22-tonne tri-axle aggregate trucks will be used, there is no guarantee that larger trailer trucks will not be used. The Paradigm study did not consider the possibility of this happening and did not carry out truck movement analysis at either the Highway 10 intersection, or at the turns in the S bend on Sideroad 60.

The review of the community's comments on the studies submitted reveals a number of concerns, chiefly with regards to the safety impacts of additional truck volume on Sideroad 60 and the Highway 10 intersection.

Based on the above, and on the number of larger vehicles that are planned to access the intersection of Highway 10 and Sideroad 60, we recommend the following:

- WB-19 truck simulations for entering and exiting Hwy 10 simultaneously to identify any curb or lane widening requirements.

- Review turning sight distance requirements for the WB-19 trucks onto Hwy 10 from Sideroad 60.
- Review stopping sight distance requirements northbound on Hwy 10 at Sideroad 60.
- Widen the turning curves at the South-East and North-East bends on Sideroad 60 by 2.0 m as per the MTO's guidelines, and correct the super elevation of the northbound lane to 6%.
- Review collision and accident data over the last 10 years at the intersection of Highway 10 and Sideroad 60, and along Sideroad 60, from Highway 10 to the proposed gravel pit site.
- Conduct all day traffic counts on a representative summer day at the intersection of Highway 10 and Sideroad 60 and on the S bend on Sideroad 60 to ascertain existing demand on the road and to identify existing heavy vehicle proportion of all vehicular traffic. Identify demand of pedestrians, cyclists and other users of the road at these locations. Alternatively, procure data from relevant authorities, if available.
- Assess existing issues or constraints along the haul route and propose a strategy for addressing them.