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October 28, 2015 Our Ref.: 9543/210

Ron Davidson
Land Use Planning Consultant Inc.
265 Beattie Street
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Dear Mr. Davidson:

Re: Review of *the Responses to the Traffic Route Associated with the Proposed "Bumstead Pit" Peer Review (September 2015)*

LEA Consulting Ltd. has prepared this letter in response to the September 21, 2015 Addendum Letter submitted by Paradigm Transportation Solutions Limited (Paradigm) in response to LEA's June 2015 Peer Review. In addition to LEA's review, SPL Consultants Limited (SPL) reviewed the September 2015 Response to Peer Review Comments Bumstead – Proposed Category 1 Pit, Supplemental Road Assessment, Sideroad 60, Berkeley, ON (prepared by GM BluePlan Engineering, formerly Gamsby and Mannerow Limited (G&M), GMBP File No. 210099).

The June 2015 Peer Review conducted by LEA included the following items:
- Peer Review by SPL Consultants Limited of Road Assessment submitted May 2013 by Gamsby and Mannerow Engineers;
- Road Geometrics Evaluation submitted September 2014 by Gamsby and Mannerow Engineers;
- Paradigm Scoped Transportation Impact Study; and
- Documents submitted by Community.

Traffic Comments

June 2015 Peer Review Comments:

- The traffic data provided did not breakdown volumes by vehicle type, ignoring heavy vehicles, recreational vehicles and non-vehicular traffic.
- Review of the road assessment suggests the need for 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.
- Sight distances may need improvement along the South-East and North-East bends on Sideroad 60 by pruning vegetation within the road right of way.

- Consider widening and super-elevation of the turns in the South-East and North-East bends to accommodate two WB-17.5 tractor trailers turning simultaneously.
- Paradigm's Scoped Traffic Impact Study was conducted, with MTO's approval, on the intersection of Highway 10 and Sideroad 60 only. No alternative haul routes were considered.
- The trip forecast for the site did not include any trips generated by employees and smaller customers, in addition to the aggregate trucks.
- The Paradigm study 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 community's comments on the studies submitted revealed a number of concerns, chiefly with regards to the safety impacts of additional truck volume on Sideroad 60 and the Highway 10 intersection.

In reviewing the September 2015 responses from Paradigm, LEA have the following comments:

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

   This recommendation was not followed. It remains unknown whether WB-19 trucks can safely manoeuvre simultaneous turns at the Hwy 10 intersection.

2. *Review turning sight distance requirements for the WB-19 trucks onto Hwy 10 from Sideroad 60.*

   Paradigm conducted a turning sight distance analysis. LEA's recommendation is satisfied.

3. *Review stopping sight distance requirements northbound on Hwy 10 at Sideroad 60.*

   Paradigm conducted a stopping sight distance analysis. LEA's recommendation is satisfied.

4. *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%.*

   Paradigm carried out swept path analyses of the South-East and North-East bends on Sideroad 60, using both WB-19 and semi-trailer aggregate trucks. The analysis found that, while semi-trailer trucks would not overlap in the event of passing in the South-East and North-East bends, WB-19 trailers would. It was concluded that widening would be required at a number of places on Sideroad 60, ranging from 0.65 m to 2 m. However, the probability of this occurring was found to be low. Therefore, the response partially satisfies LEA's recommendation.

5. *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.*

   Paradigm reviewed collision and accident data over the last 10 years at the intersection of Highway 10 and Sideroad 60, finding that the majority of accidents were due to weather conditions, not intersection operations. This review satisfies LEA's recommendation.

6. *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.*

   Paradigm carried out turning movement count surveys at the intersection of Highway 10 and Sideroad 60 on July 1, July 3 and July 4, 2015. These dates cover traffic conditions on a summer holiday weekend and represent the maximum traffic volumes expected. Additionally, Paradigm placed automatic traffic counters at two locations along Sideroad 60: 325m west of Highway 10,

and 3.4 km west of Highway 10, between Veterans Road South and West Back Line. The automatic counters captured continuous traffic data from June 28, 2015 to July 4, 2015. Site observations did not register any pedestrians or cyclists. Under future 2026 conditions, Sideroad 20 is expected to experience an AADT volume of over 500 vehicles, including approximately 100 trucks. This satisfies LEA's recommendation.

7. *Assess existing issues or constraints along the haul route and propose a strategy for addressing them.*

   Paradigm carried out auxiliary turn analyses were conducted for the Highway 10 and Sideroad 60 intersection. The analyses found that a northbound left-turn lane was warranted under 2026 background traffic conditions in the weekday PM peak hour, based on north-south volumes, but not considering left-turn volumes making up less than 10% of advancing volumes. The recommendation was made to monitor left-turns under future conditions to determine the need for a left-turn lane. Furthermore, a traffic control signal warrant was carried out at the Highway 10 and Sideroad 60 intersection, under 2026 traffic conditions. The analysis found that signalization was not warranted. Using automatic count data, Paradigm demonstrated that the potential for conflict between aggregate trucks and school buses or recreational vehicles at the Grey County CP Recreational Trail is low. The above analyses partially satisfy LEA's recommendation.

Geotech Comments

June 2015 Peer Review Comments:

- 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.

In reviewing the September 2015 responses from G&M, SPL have the following comments:

- The accuracy of the traffic data presented in Section 2.2, Peer Review comments #2 and #3, of the above report should still be checked by LEA Consulting Ltd to confirm the AADT and % trucks; the classes of the trucks that will utilize the road within the design life should be provided for the design;
- The additional 10 boreholes (in addition to the original 7 boreholes drilled in 2013) are sufficient for preliminary investigation for Class EA study. However, considering the variability of the depths of the "moist to wet" soils encountered in the boreholes, monitoring wells could have been installed to monitor the groundwater levels over a prolonged period of time. In addition, groundwater level measured at completion of each borehole and measurements of natural moisture contents of the soil samples would prove useful in assessing the groundwater, which were not provided in the borehole logs;
- The confirmation of the traffic data would indicate if Table 3.4 Structural Design Guidelines for Flexible Pavement- Secondary Highways, from the 1990 MTO Pavement Design and Rehabilitation Manual, which is to be used for up to about 10% trucks, will be applicable for this project or not. If necessary, the pavement should be designed using the AASHTO Design Method to calculate the required Structural Number (SN), which takes into account the truck loading and service life of the pavement;
- As suspected, the extensive presence of peat is confirmed with the additional boreholes in the areas of the original Boreholes 5 and 6; with relatively low 'N' values measured in the new Boreholes 8 through 15, measured moisture contents would also be helpful in assessing the presence of peat in the granular soils.
- The four alternatives to address the subgrade conditions with peat, as presented in Section 2.3 Peer Review Comment #4, of the Report was not reviewed as part of this Response to Peer Review Comments. We do however agree that the underlying peat layer may present road performance issues, as concluded in the Report.

Conclusions

It was concluded that the new reports submitted in September 2015 generally satisfies our peer review comments provided in June 2015; however, there are four outstanding items:.

- Paradigm maintains that the previous trip generation of 12 trips (6 truck trips in and 6 truck trips out) per hour developed by Gamsby and Mannerow in their May 2013 report represents the worst-case trip generation. Employee trips and small scale customer trips are considered to occur outside of the peak hours. LEA had requested additional backup for this assumption but none was provided.
- There are additional community concerns regarding pedestrian movement on Sideroad 60 at the South-East and North-East bends when two aggregate trucks pass their location in opposing direction.
- No swept path analysis was carried out at the Highway 10 and Sideroad 60 intersection. As such it remains unknown if semi-trailer aggregate trucks or WB-19 trucks can safely turn in the intersection.
- The forecasted AADT volumes under future 2026 conditions suggest a truck percentage on the upper limit of the 10% truck percentage for Table 3.4 of the MTO Pavement Design and Rehabilitation Manual. Furthermore, while the Bumstead Pit application has consistently assumed the future usage of 22-tonne triaxle aggregate truck, there is no way to ensure that higher class trucks will no use the road. As proposed by SPL, pavement design should therefore

be undertaken using the AASHTO design method, to account for the different truck loads expected on Sideroad 60 and the road's expected service life.

We trust that the above information is sufficient for your use at this time. If any additional information is required, please do not hesitate to call Nixon Chan at 905-470-0015 ext. 284.

Yours very truly

LEA Consulting Ltd.

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Encl.