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September 25, 2012

via mail & email (g35xx@yahoo.com)
CCTA File 112132

Anthony Agueci

Oro Ridge Corp.
32 Ellsworth Avenue
Richmond Hill, ON L4C N8V

**Re: Paradise Springs, Municipality of Grey Highlands
Transportation Review**

Dear Sir:

As requested, we have prepared a transportation review for the proposed Paradise Springs development on Osprey-The Blue Mountains Townline in the Municipality of Grey Highlands.

This review examines the following:

- development proposal and truck traffic;
- recommended haul route;
- existing road conditions along the haul route;
- sight lines and visibility along the haul route; and
- need for improvements.

Development Proposal & Truck Traffic

The proposed development is a water loading facility located on Osprey-Blue Mountains Townline west of Road 45 in the Municipality of Grey Highlands. The site location is shown in Figure 1.

The site operated as a water taking facility in the 1990s. In 2006, applications were made by a previous owner for a facility to support an operating level of 112,320 litres per day. Since this time, the ownership of the property has changed. The new owner, Oro Ridge Corp., is proposing a facility with water extraction limited to 49,000 litres per day.

Based on a truck capacity of 40,000 to 50,000 litres, the site is expected to generate 1 load per day, resulting in one truck trip to the site (empty) and 1 truck trip from the site (loaded).

Recommended Haul Route

As part of the previous application, a transportation review¹ was undertaken whereby several alternative haul routes were evaluated based on sightlines, avoidance of built-up areas, road conditions, and other factors. The preferred haul route, which remains applicable to the current proposal, is illustrated in Figure 1. The preference for this haul route was also noted by Municipality of Grey Highlands and the Town of The Blue Mountains given safety concerns relative to some of the intersections on the alternative Grey Road 31 haul route considered.

It is also noted that further to the initial study, Simcoe Road 91 has been identified for closure between Townline and Simcoe Road 124. While this road section does not lie along the preferred haul route, it was part of the Grey Road 31 haul route. Apart from the use of local road (which is not preferred), the noted haul route is the only feasible route.

Existing Road Conditions

As evident in Figure 1, the majority of the haul route is comprised of County roads (Grey County Roads 2 and 4, and Grey/Simcoe County Road 124). These roads are intended to serve longer distance travel, all vehicle types (including trucks) and greater traffic volumes. As such, their use by trucks travelling to/from the site (2 per day) is considered appropriate. For those remaining road sections along the haul route that are considered local roads, additional details are noted in Table 1.

Table 1: Road Conditions – Preferred Haul Route

| | Osprey-The Blue Mountains Townline | Road 45 | 12 th Concession B |
|----------------|------------------------------------|-----------------|---------------------------------------|
| Length | 0.5 km | 2.0 km | 2.05 km |
| Platform Width | 5.0 m | 5.0 m | 7.9 m platform 6.4 m paved surface |
| Surface | gravel | gravel | paved |
| Daily Traffic | < 300 estimated | < 300 estimated | < 300 estimated |
| Posted Speed | not posted | not posted | 80km/h |
| Topography | rolling | rolling | rolling |

¹ *Paradise Springs Transportation Review*. Consult Tatham Transportation Consultants, January 25, 2006.

Through a supplementary field visit and visual inspection in July 2012, it was noted that all roads are in good structural condition. The two gravel roads, Townline and Road 45, appear to have been recently graded (including fresh gravel on Road 45). While the platform widths of these roads are noted as 5.0 metres, there appear to be gravel shoulders on either side that are simply overgrown (the roads were likely constructed initially to a width of 6.0 metres). Photographs are provided in Figure 2.

With respect to speed limits, only 12th Concession B is posted (80 km/h). No speed limit signs are otherwise posted on Townline or Road 45 and thus an 80 km/h speed limit has been assumed (as typical in rural areas not otherwise posted).

Available Sight Lines

Following the initial transportation review, additional field investigations were undertaken in June 2008 to determine sight lines at the existing driveways along Townline and Road 45 (as identified in Figure 3), in response to concerns raised by the Municipality of Grey Highlands. These concerns related specifically to whether or not residents leaving their driveways can see oncoming trucks and can those same trucks see the residents.

MTO geometric design guidelines dictate that sight lines should be measured from the height of the turning vehicle driver's eye of 1.05 metres to the top of the approaching vehicle 1.3 metres above the road. It is recognized however that trucks are somewhat taller than typical automobiles and thus will be more visible upon approach. In this regard, a height of 1.6 metres has been employed as opposed to 1.3 metres (which is still considered to be conservative in that the eye height of a truck driver is typically in the order of 2.6 metres and truck heights are in the order of 4 metres). The resulting sight lines at the noted access points are summarized in Table 2, whereas corresponding photographs are noted in Figure 2. In most cases, the sight lines are restricted by the vertical alignment of the road.

With respect to the sight lines for trucks to observe cars exiting the driveways, a higher eye height would be applicable for trucks (ie. 2.6 metres) with the object height being in the order of 1.05 to 1.3 metres (ranging from the driver to the roofline). However, to maintain a conservative approach, the sight lines of Table 2 have also been applied.

As noted, the existing sight lines are typically in the order of 100 to 200 metres. The sight line to the south as observed at Location 1: Driveway 454638 on Road 45 is noted as 30 metres, which corresponds to the intersection of Road 45 with 12th Concession B (ie. the intersection is approximately 30 metres south of the driveway). While sight lines further south on Road 45 exist (as evident in the photographs of Figure 2), the designated haul route will result in trucks arriving from the east along 12th Concession B and thus will only become evident as they turn the corner at the intersection. Similarly, at Location 6: Quarry driveway on Townline, the sight line to the east is noted as 20 metres which is the approximate distance to the Road 45 intersection (a greater sight distance to the east exists, as evident in the photos of Figure 2). Trucks will approach the site from Road 45 and thus will only be evident upon approach to the intersection, at which time they must stop at Townline

(Road 45 is stop controlled). In either case, a truck turning through these intersections would do so at a reduced speed and thus it is not considered critical.

Table 2: Sight Lines at Driveways

| Access Location | Road 45 | | Townline | |
|--|------------|------------------------|-------------|------------------------|
| | to/from N | to/from S | to/from W | to/from E |
| 1 Driveway 454638 on Road 45 | 130 metres | 30 ¹ metres | - | - |
| 2 Driveway 454730 on Road 45 | 200 | >200 | - | - |
| 3 Driveway 454770 on Road 45 | 150 | 120 | - | - |
| 4 Driveway 454773 on Road 45 | 200 | 160 | - | - |
| 5 Driveway 454824 on Road 45 | 150 | 400 | - | - |
| 6 Quarry Driveway (20m west of Road 45) on Townline ¹ | - | - | >200 metres | 20 ¹ metres |
| 7 Driveway 527682 on Townline | - | - | 200 | 90 |
| 8 Site access on Townline | - | - | 135 | 130 |

¹ these access points are in close proximity to intersections and thus the distances noted correspond to the distance to the intersection; an approaching truck will only be evident as they arrive at the intersection

Sight Line Assessment

In considering the appropriateness of the sight lines, the following must be considered:

- Level of standard: which standard (ie. stopping sight distance, turning sight distance, or some other measure) should be required?
- Design speed: what design speed should be assumed for Road 45 and Townline?
- Flexibility: what amount of deviation from the standard is permissible (noting that in certain circumstances, the relevant design guidelines allow features that are “substandard” to some extent)?

Level of Standard

The most appropriate standard to be applied is stopping sight distance, which is the minimum distance required for a vehicle to observe a hazard in the road and bring their vehicle to a complete stop. In the application being considered, the hazard would be the vehicle exiting the driveway (assuming that it would stall in the path of the oncoming vehicle as opposed to continuing on its path). The corresponding stopping sight distance requirements are provided in Table 3 based on Ministry of Transportation of Ontario (MTO) and Transportation Association of Canada (TAC) standards. It is noted that the latter provides stopping sight distances specific to trucks (assuming conventional

braking systems vs anti-lock brakes). It is generally accepted however that the increased stopping distance requirements for trucks are offset by the increased driver eye height through vertical curves. Notwithstanding, as we have considered higher object heights corresponding to a truck, the truck requirements have been applied.

Table 3: Stopping Sight Distance Requirements

| Design Speed | MTO cars | TAC cars ¹ | TAC trucks ² |
|--------------|-----------|-----------------------|-------------------------|
| 50 km/h | 65 metres | 60 - 65 metres | 85 - 110 metres |
| 60 | 85 | 75 - 85 | 105 - 130 |
| 70 | 110 | 95 - 110 | 135 - 180 |
| 80 | 135 | 115 - 140 | 155 - 210 |
| 90 | 160 | 130 - 170 | 190 - 265 |
| 100 | 185 | 160 - 210 | 235 - 330 |

¹ also reflects requirements for trucks with anti-lock brakes

² reflects trucks with conventional brakes

In considering the available sight distances in relation to the truck requirements, they satisfy the 70 km/h design speed requirements at all but 2 locations, where the sight lines are 120 and 90 metres (corresponding to design speeds of 60 and 50 km/h respectively). Should a greater visibility height for an approaching truck be considered, these design speeds would increase accordingly. In considering the requirements for cars, the existing sight lines correspond to design speeds of 60 to 100 km/h.

It is noted that the sight distance requirements of Table 3 reflect stopping on wet asphalt with poor tire traction. In previous review comments from the Municipality, it was noted that braking distance on gravel may be 40% higher than on wet asphalt. However, as further noted in the comments, the coefficient of friction otherwise employed by MTO for wet asphalt is consistent with that used in studies pertaining to gravel surfaces and thus the MTO criteria can be applied. TAC standards are considered comparable to MTO.

Further to stopping sight distance, previous Municipal comments made reference to the need to provide departure/turning sight distance in accordance with the MTO *Commercial Access Standards*. For a design speed of 80 km/h, the requirement is 180 metres. This requirement pertains specifically to a vehicle turning left onto a 2-lane road across a vehicle approaching from the left (it is such that the approaching vehicle would not have to adjust their travel speed). Given the haul route, we do not anticipate any left turns from the site and thus this criterion would not apply at the site access. While it may be desirable to apply this same criterion to private driveways, there is no such requirement in either the MTO or TAC standards. Furthermore, we do not believe that this is necessary in context of the traffic volumes on Townline and Road 45, including truck volumes, and the amount of activity at the

driveways. We do not believe it to be a significant matter should approaching vehicles be required to adjust their speed. Provided that stopping sight distance is achieved, vehicles have an opportunity to avoid any collision. Furthermore, as vehicles pull out of their driveway they will continue to travel and accelerate and thus will not be standing still.

Design Speed & Posted Speed

The selection of the appropriate sight distance requirement is predicated on the design speed, which in turn is based on the posted speed. For Townline and Road 45, which have an assumed speed limit of 80 km/h as not otherwise posted, a design speed of 80 to 100 km/h would be typical (usually it is 10 to 20 km/h over the posted speed but can equal the speed limit). However, it is evident from the sight line assessment that the existing topography along these roads is not conducive to an 80 km/h posted speed (regardless of whether the proposed development proceeds). Based on the car criteria, the design speed is as low as 60 km/h.

To determine an appropriate speed limit, both Townline and Road 45 were reviewed in accordance with the TAC *Automated Speed Limit Guidelines*, and considering road alignment, surface type, number of intersections and driveways and presence of roadside hazards. In both cases, the review recommends a posted speed of 60 km/h (worksheets are attached).

Through the course of our field visits, it appears that speeds on both Townline and Road 45 are generally low, reflective of the gravel surfaces, narrow widths, rural environments and overall topography through the area.

In consideration of the above, a posted speed of 60 km/h is considered appropriate. The MTO *Geometric Design Standards for Ontario Highways* provides the following guidance for the selection of a design speed:

A design speed equal to the maximum posted speed is accepted where warranted by such factors as low traffic volumes, rugged terrain and economic considerations. This practice would be more appropriate for minor collector and local roads.

As the characteristics of Townline and Road 45 are in keeping with a rural local road classification, a design speed of 60 km/h or 70 km/h is considered appropriate.

Flexibility of Design Standard

Regarding flexibility of the design standard, the MTO *Geometric Design Standards for Ontario Highways* provides the following guidance:

Where a minor secondary highway has a generally substandard alignment and advisory and warning signs have proven ineffective, consider:

- a) *where no improvements are warranted - reducing the legal posted speed to be consistent with the overall highway design speed; or*
- b) *where improvements are warranted - selecting a design speed and corresponding legal posted speed commensurate with the topography and with a realistic balance between improvement costs and user benefits.*

Furthermore, the standards note:

Vertical curves that provide less than minimum stopping sight distance are hazardous only if the assumptions upon which the corresponding minimum curvature values were based apply. For example, in the case of a crest curve if the stopping sight distance is less than minimum, but there is no hazard in the path of an approaching vehicle, the curve is not hazardous

Isolated vertical curves might be tolerated where there is no evidence of any geometric deficiency as indicated by the accident record. Such curves should have minimum K values for design speeds preferably not more than 10 km/h less than design speed and, in any case, not more than 20 km/h less.

In other words, where necessary, correct existing deficiencies through a reduction in the speed limit. Vertical curves that correspond to 10 to 20 km/h less than the design speed can be tolerated.

The TAC *Geometric Design Guide* gives the following guidance on sight distance at driveways:

The sight distance required is determined in consideration of the design speed of the intersecting roadway and the sight triangle requirements described in Chapter 2.3 - Intersections.

For minimum use driveways along local roads, it is often difficult to provide the desired sight distance due to sight line restrictions created by parked cars, fencing and vegetation. Reduced sight distances are generally tolerable in these situations due to the low operating speeds and caution exercised by the drivers.

Summary

- As noted, the proposed development will generate 2 truck trips per day (1 to the site and 1 from the site), which is inconsequential from a traffic operations perspective. For all intents and purposes, traffic volume and composition will remain unchanged as compared to existing conditions. Other trucks and heavy vehicles (eg. school buses, garbage trucks, snow plows, fire trucks, septic trucks and propane trucks) currently operate on the road system with no known issues.
- In consideration of the existing road conditions (namely the vertical profile, width and gravel surface) and concerns expressed by the Municipality with respect to sight lines, a 60 km/h posted speed limit is recommended on both Townline and Road 45. This will ensure that the available

sight lines comply with the appropriate design standards and those travelling at the speed limit have sufficient sight lines to come to a stop if necessary.

- As noted in the relevant standards and guidelines, it is acceptable to tolerate isolated vertical curves with design speeds 10 or 20 kilometers per hour less than the prevailing design speed for the road unless the collision history at these locations indicates a geometric deficiency (which is not the case).
- The application of MTO commercial site access sight distance requirements does not apply to the site access in that the requirements are based on left turning vehicles. Trucks exiting the site will proceed easterly, thus turning right from the site.
- The application of the same standards to existing driveways is not considered necessary given the limited volume of traffic considered and the provision of stopping sight distances. This is consistent with the MTO and TAC guidelines. Vehicles otherwise entering and exiting the driveways (which will be limited) have sufficient sight lines as noted above. Furthermore, there will only be 1 additional truck per direction per day.
- Modifications to the existing road system (either width or road profile of Townline Road and Road 45) are not considered reasonable in context of the local nature of the roads, the limited traffic volumes that each serves and the limited number of trucks to be generated by the development. All deficiencies as noted by the Municipality relate to existing conditions and will not be exacerbated by the proposed development.
- To improve visibility along the roads, any overgrowth and trees within the road allowance should be removed. Again, this is an existing deficiency and should be addressed through routine maintenance.
- To further alert motorists, signs can be posted to indicate the presence of the site access and existing driveways.

Should you have any comments or questions on the above, please do not hesitate to contact us.

Yours truly,

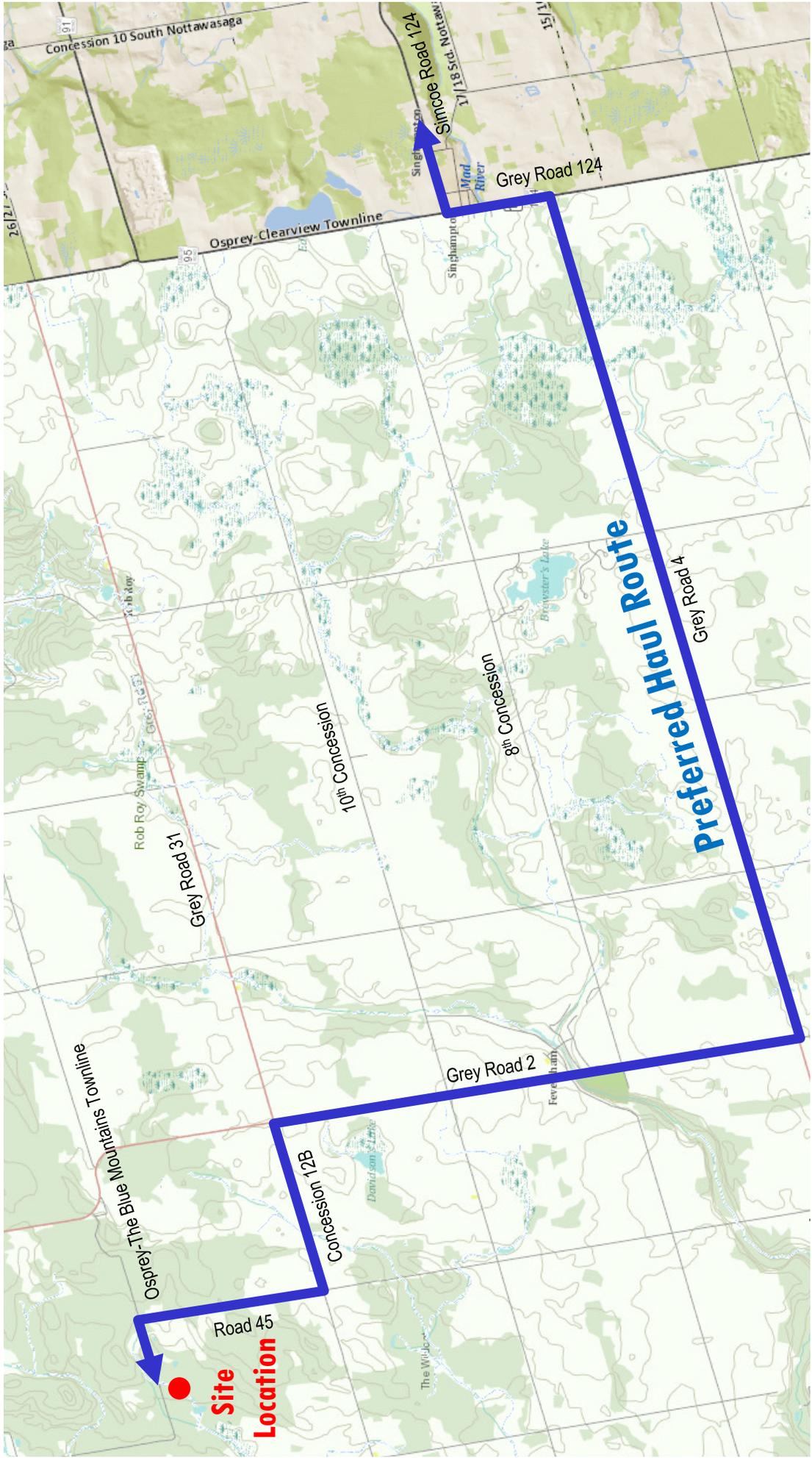
C.C. Tatham & Associates Ltd.



Michael Cullip, P.Eng.
Director, Manager - Transportation
MJC:mjc

copy: David Slade, D.C. Slade Consultants Inc. (via email dslade@dcslade.ca)

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source: Simcoe Maps



C.C. Tatham & Associates Ltd.
Consulting Engineers

Oro Ridge Springs

Site Location & Preferred Haul Route

Figure



Location 1. Driveway 454638 looking north & south on Road 45



Location 2. Driveway 454730 looking north & south on Road 45



Location 3. Driveway looking north & south on Road 45



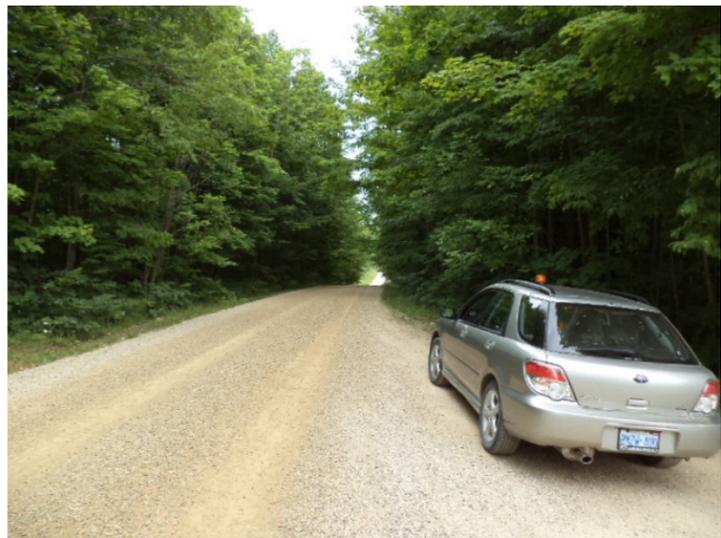
Location 4. Driveway 454773 looking north & south on Road 45



Location 5. Driveway 454824 looking north & south on Road 45



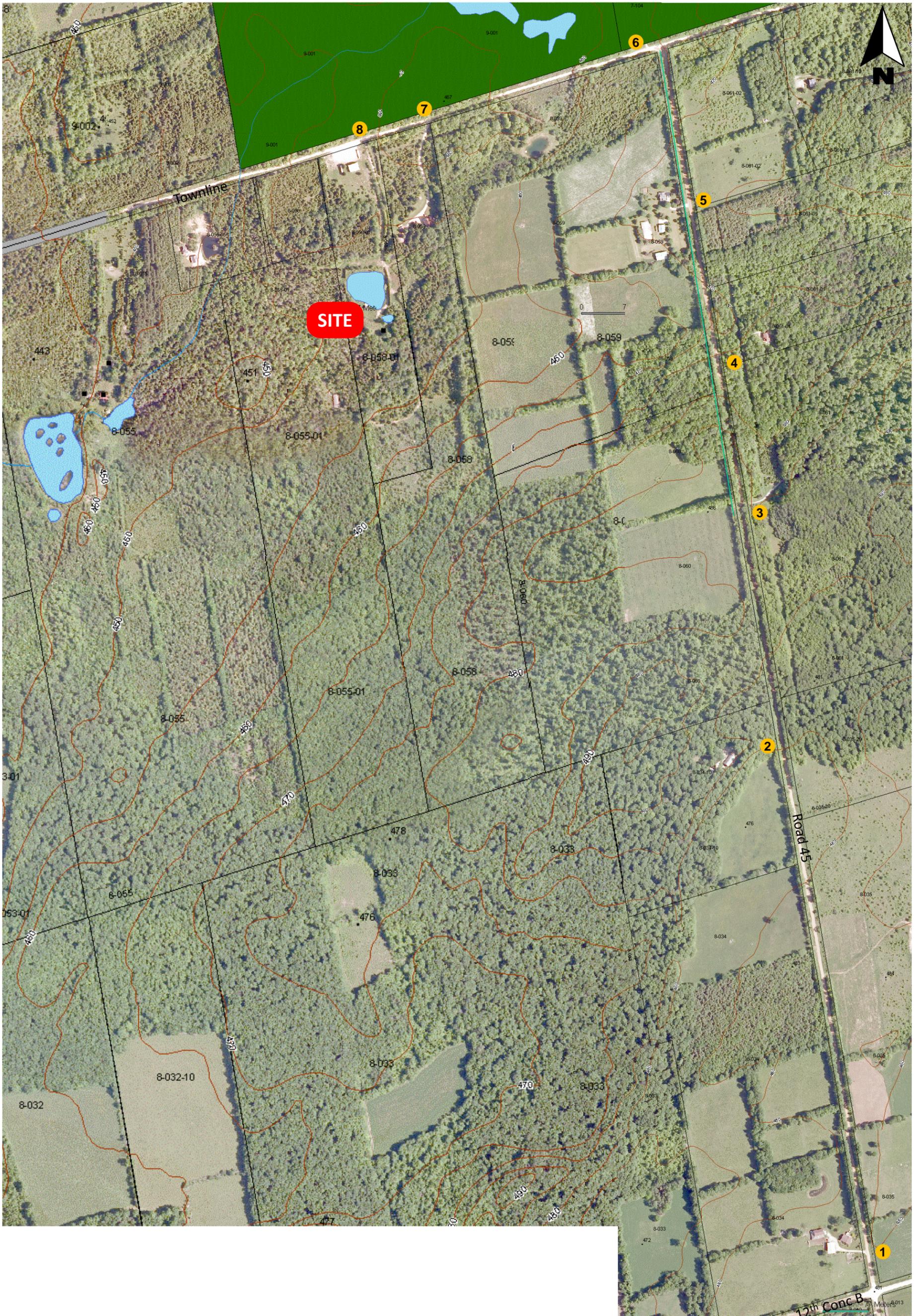
Location 6. Quarry driveway looking west & east on Townline



Location 7. Driveway 527682 looking west & east on Townline



Location 8. Site access looking west & east on Townline



**Speed Limit
Worksheets**



Automated Speed Limit Guidelines

FORM A - Automated Speed Limit Guidelines Spreadsheet

Version:
10-Apr-09

| | | | |
|--------------------------------|--------------------------------|--|--------------------------------|
| Name of Corridor: | Road 45 | | |
| Segment Evaluated: | Grey Road 31 | to | Osprey-Blue Mountains Townline |
| Geographic Region: | Municipality of Grey Highlands | | |
| Road Agency: | Municipality of Grey Highlands | | |
| Road Classification: | Local | Length of Corridor: | 2,180 m |
| Urban / Rural: | Rural | Design Speed: (Required for Freeway, Expressway, Highway) | km/h |
| Divided / Undivided: | Undivided | Current Posted Speed: (For information only) | 80 km/h |
| Major / Minor: | Minor | Prevailing Speed: (85th Percentile - for information only) | km/h |
| # Through Lanes Per Direction: | 1 lane | Policy: (Maximum Posted Speed) | No policy |

| | | RISK | Score |
|----|---|------------------------------|-------|
| A1 | GEOMETRY (Horizontal) | Lower | 2 |
| A2 | GEOMETRY (Vertical) | Medium | 4 |
| A3 | AVERAGE LANE WIDTH | Medium | 2 |
| B | ROADSIDE HAZARDS | Medium | 6 |
| C1 | PEDESTRIAN EXPOSURE | Lower | 1 |
| C2 | CYCLIST EXPOSURE | Lower | 1 |
| D | PAVEMENT SURFACE | Higher | 9 |
| E1 | NUMBER OF INTERSECTIONS WITH PUBLIC ROADS | <i>Number of Occurrences</i> | 1 |
| | STOP controlled intersection | 2 | |
| | Signalized intersection | | |
| | Roundabout or traffic circle | | |
| | Crosswalk | | |
| | Active, at-grade railroad crossing | | |
| E2 | NUMBER OF INTERSECTIONS WITH PRIVATE ACCESS DRIVEWAYS | <i>Number of Occurrences</i> | 1 |
| | Left turn movements permitted | 5 | |
| | Right-in / Right-out only | | |
| E3 | NUMBER OF INTERCHANGES | <i>Number of Occurrences</i> | 0 |
| | Number of interchanges along corridor | 0 | |
| F | ON-STREET PARKING | Lower | 1 |

Total Risk Score:

28

Recommended Posted Speed Limit (km/h):

As determined by road characteristics

60

As determined by policy

No policy

The recommended posted speed limit may be checked against the prevailing speeds of the roadway and the road's safety performance.

Comments:

No posted speed limit - 80km/h otherwise assumed given rural environment.



Automated Speed Limit Guidelines

FORM A - Automated Speed Limit Guidelines Spreadsheet

Version:
10-Apr-09

| | | | |
|--------------------------------|--------------------------------|--|-----------|
| Name of Corridor: | Townline | | |
| Segment Evaluated: | Site | to | Road 45 |
| Geographic Region: | Municipality of Grey Highlands | | |
| Road Agency: | Municipality of Grey Highlands | | |
| Road Classification: | Local | Length of Corridor: | 560 m |
| Urban / Rural: | Rural | Design Speed: (Required for Freeway, Expressway, Highway) | km/h |
| Divided / Undivided: | Undivided | Current Posted Speed: (For information only) | 80 km/h |
| Major / Minor: | Minor | Prevailing Speed: (85th Percentile - for information only) | km/h |
| # Through Lanes Per Direction: | 1 lane | Policy: (Maximum Posted Speed) | No policy |

| | | RISK | Score |
|----|--|------------------------------|-------|
| A1 | GEOMETRY (Horizontal) | Lower | 2 |
| A2 | GEOMETRY (Vertical) | Medium | 4 |
| A3 | AVERAGE LANE WIDTH | Medium | 2 |
| B | ROADSIDE HAZARDS | Medium | 6 |
| C1 | PEDESTRIAN EXPOSURE | Lower | 1 |
| C2 | CYCLIST EXPOSURE | Lower | 1 |
| D | PAVEMENT SURFACE | Higher | 9 |
| E1 | NUMBER OF INTERSECTIONS WITH PUBLIC ROADS | <i>Number of Occurrences</i> | 1 |
| | STOP controlled intersection | 1 | |
| | Signalized intersection | | |
| | Roundabout or traffic circle | | |
| | Crosswalk | | |
| | Active, at-grade railroad crossing | | |
| E2 | NUMBER OF INTERSECTIONS WITH PRIVATE ACCESS DRIVEWAYS | <i>Number of Occurrences</i> | 3 |
| | Left turn movements permitted | 3 | |
| | Right-in / Right-out only | | |
| E3 | NUMBER OF INTERCHANGES | <i>Number of Occurrences</i> | 0 |
| | Number of interchanges along corridor | 0 | |
| F | ON-STREET PARKING | Lower | 1 |

Total Risk Score:

30

Recommended Posted Speed Limit (km/h):

As determined by road characteristics

60

As determined by policy

No policy

The recommended posted speed limit may be checked against the prevailing speeds of the roadway and the road's safety performance.

Comments:

No posted speed limit - 80km/h otherwise assumed given rural environment.