

SENES Consultants Limited

MEMORANDUM



121 Granton Drive, Unit 12
Richmond Hill, Ontario
Canada L4B 3N4
Tel: (905) 764-9380
Fax: (905) 764-9386
E-mail: senes@senes.ca
Web Site: <http://www.senes.ca>

TO: Murray Thompson, URS 33900-92

FROM: Sandy Willis, M.Eng., P.Eng. June 4, 2009

SUBJ: Memo in Response to City of Windsor's Comments from May 29, 2009

This memo addresses the comments relating to air quality raised in Appendix A and B of the submission from Gowling Lafleur Henderson LLP (Gowlings) on behalf of the City of Windsor, which was provided to the MOE on May 29, 2009. In particular, the Gowlings submission suggests that SENES is stating that the Parkway is preferred over the Tunnel (Appendix A) and that the greenspaces within the Right of Way (ROW) are subject to very high pollutant levels (Appendix B).

It is important to note that SENES has consistently stated the following in the various reports¹ written by SENES on Air Quality:

- Air quality in Windsor is driven by transboundary pollution.
- Both the Tunnel and the Parkway are slightly preferred over the other alternatives for receptors within 50 m and that all alternatives are preferred over No Build for air quality beyond 100 m.
- None of the alternatives result in sufficient enough change to impact the Air Quality Index.
- All alternatives showed exceedances of the PM_{2.5} criteria using very conservative silt loading factors and all alternatives showed similar improvements for NO_x concentrations.
- The predicted modeled concentrations represent the maximum concentrations that occur once per year and are not indicative of concentrations that occur most of the time, nor do the predicted maximum concentrations occur simultaneously at all receptors.
- The predicted modeled concentrations that are presented in the reports use a conservative 90th percentile background concentration (i.e., typical background is lower 90% of the time) which artificially elevates predicted concentrations and exceedances.

¹ Reports referenced in this memo include the following:

- Air Quality Impact Assessment Supplementary Documentation, March 2009 (Bridging Document)
- Memorandum regarding Air Quality, response to Submission by City of Windsor, March 2009 (Memorandum)
- Air Quality Assessment: Technically and Environmentally Preferred Alternative, December 2008 (TEPA report)
- Practical Alternatives Evaluation Working Paper: Air Quality Impact Assessment, May 2008 (Practical Alternatives report)
- Air Quality Impact Assessment (August 2007) (August 2007 AQIA)

It is also probably worth repeating how the Parkway became an option for assessment. Consultations continued after identification of the initial list of Practical Alternatives, with growing interest around a concept which would be a combination of the below-grade and tunnel alternatives. The study team began developing a more “green” parkway-like alternative. The concept would include the best components of the practical alternatives based on the findings to date in a green corridor with tunneled sections, a grade separated recreational trail system, and extensive urban design of the green areas.

The modified access road alternative featured:

- A below-grade freeway from Howard Avenue to E.C. Row Expressway with 10 tunnel sections ranging from 120 to 240 m in length, located in areas to provide community connectivity;
- A separate service road for local traffic to maintain access to neighbourhoods and local businesses; and
- A widened right-of-way with buffer areas to reduce the potential nuisance effects of the roadway on adjacent neighbourhoods;

This alternative, developed as a new alternative based on the below-grade and tunnel alternatives, was identified as The Parkway

Appendix A – Points of Distinction Analysis

Appendix A of the Gowlings submission specifically focuses on SENES’ use of the comparison of maximum concentrations within a roadway segment (identified in Section 2.1.1 of the Bridging Document and in the Memorandum). SENES used this “Points of Distinction” (POD) analysis to illustrate that there is no appreciable difference between alternatives including the Tunnel and the Parkway. There are several statements in Appendix A that SENES feels warrant further discussion.

On Page A-2 the City of Windsor states:

“It is therefore completely misleading for the SENES/MTO report to conclude that, all things being equal, the Parkway is preferred, when, for the more specific POD analysis provided for the two road segments of Malden to Labelle and Labelle to Pulford, the clear and logical preference should be the tunnel.”

It is important to note that the SENES Bridging Document page 2-4 states that *“The Tunnel is preferred in Labelle to Pulford Road Segment for the 24 hr criteria at 50 and 100 m and for exceedances at 50 m with no clear distinction beyond those distances for both Plaza alignments.”* The City of Windsor’s comments appear to have misinterpreted this statement and have somehow translated it to SENES saying that the Parkway is the preferred alternative in this segment.

SENES does not state that the Parkway is preferred over the Tunnel overall, SENES simply states on page 2-5 of the Supplementary Documentation that “*the majority of the comparisons result in no difference between the Tunnel and Parkway with 246 points of distinction of No Difference, 77 points of the Parkway being preferred, and 37 points of the Tunnel being preferred.*”

SENES conclusion has always been that both the Tunnel and the Parkway are slightly preferred over other alternatives. Moreover, as indicated above there are no clear differences in air quality between all alternatives sufficient to warrant a definitive preference of one alternative to another, particularly given that these differences are based on predicted maximum concentrations and most of the time the differences would not be detectable. In each road segment there will be options that have advantages and disadvantages.

SENES disagrees with the Tunnel being preferred for the Malden to Labelle portion as it is likely that both options provide similar concentrations given the proximity and traffic density of EC Row and Huron Church and the distance from the main artery road with both the Tunnel and the Parkway. In any tunnel, including tunnels with proper ventilation, there will be emissions (leakage) from the ends of the tunnels. The SENES methodology assumed 5% leakage of the concentrations at tunnel portals based on feedback from the DRIC tunnel design experts. Therefore, the tunnel would have an impact in the Spring Garden Area and the lack of impact of the tunnel in the Bethlehem Labelle area would be overshadowed by the proximity to the other major thoroughfares that are closer to that neighbourhood than the tunnel.

The City of Windsor’s comments on page A-2 “*The Tunnel is the only alternative that can be engineered to ensure that houses and residences along the travelled portion of the roadway would be protected by air quality that meets the National and Provincial standards*” appear to imply that residents near tunneled areas will be fully protected from poor air quality. This is simply not the case as air quality in Windsor is primarily driven by sources outside of Windsor (i.e., long range transport).

Pages A-3 and A-4 of the City of Windsor’s comments deal with whether the method of assessing exposure at set distances from the ROW is appropriate for comparisons of one alternative to another. The use of distances from the ROW for analysis was established in the August 2007 Air Quality Impact Assessment (AQIA) which predates the concept of the Parkway and includes the analysis of all alternatives other than the Parkway. Tables were rearranged for easier reading in the May 2008 Practical Alternatives Report but the data contained within the tables was not modified except for the inclusion of the Parkway.

SENES disagrees that the expanded ROW changes the conclusions of the reports as the reports state that both the Tunnel and the Parkway are slightly preferred relative to the other alternatives. As stated in the Air Quality Impact Assessment reports of August 2007, May 2008, and repeated in the Bridging Document of March 2009, the maximum concentration at any location at 50 m, 100 m, and

250 m from the ROW was reported for each alternative. The ROW width along the Parkway varies and in many cases the ROW is very close to the road. In the specific example cited by the City of Windsor on Page A-3, the maximum concentrations occurred for all alternatives (including No Build) near Huron Church and Labelle on the east side. The expanded ROW did not change these conclusions. As previously indicated, *“the majority of the comparisons result in no difference between the Tunnel and Parkway with 246 points of distinction of No Difference”* even in the tunneled portions.

On Page A-4, the City of Windsor’s comments seem to suggest that the SENES POD comparison was done using a poorly designed tunnel ventilation system, therefore biasing the results against the Tunnel. In fact, the SENES POD comparison was performed using the VB1A alternative which was included ventilation buildings, tall stacks, and other features to enhance dispersion and did not consider the jet fan option which had previously been eliminated from consideration in the Practical Alternatives Report and the August 2007 AQIA. However, surface roads still exist with all practical alternatives including the tunnel, and some of the traffic on the surface roads has more of an impact than the free-flow situations that occur with both the tunnel and the Parkway, particularly as distances increase from the proposed roadway.

Page A-5 states that SENES biased the analysis towards the Parkway by including the different Plaza Alignments, which, in a sense, double counts the Parkway numbers as only one Plaza Alignment would be considered at a time. If only Plaza B were considered, the number of times the Parkway is preferred drops by four instances for PM_{2.5} in 2035 (i.e., in Table 2.2 of the Bridging Document instead of 10 instances of the Parkway being preferred there would be six instances) but if that logic were to also apply to the Tunnel (in the Labelle to Pulford area), the number of times the Tunnel is preferred would also drop by 3 (from 18 to 15) instances and the “No Difference” instances drop from 44 to 32.

On Page A-5 the City of Windsor also appears to imply that the degree of improvement from the Tunnel relative to No Build is considerably greater than that of the Parkway by using the statement *“...In reality, it becomes very important to the people who are living, working and playing in the area of the Preferred Alternative to whether air quality will worsen by 12% or 82%.”* Magnitudes of this range are simply not seen in the Practical Alternatives Report with most differences between the Parkway and the Tunnel in the 10% - 20% range. These differences of 10 to 20% are themselves considered magnified given the extremely conservative nature of the modelling in which a high silt loading content and a 90th percentile background were assumed and that the concentrations used for the assessment occur only once per year.

As stated previously in this memo, the conclusions of all reports have been that in general there is no difference in the alternatives with the Tunnel and the Parkway being only slightly preferred. This is

consistent with MOE published literature² which also concludes that under free-flow conditions the impacts from the roads are generally not detectable.

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- Ontario Ministry of the Environment (MOE 2004). Preliminary Air Quality Assessment Related to Traffic Congestion at Windsor's Ambassador Bridge.
- Ontario Ministry of the Environment (MOE 2004). Air Quality Assessment Related to Traffic Congestion at Sarnia's Blue Water Bridge.
- Ontario Ministry of the Environment (MOE 2005a) Modelling Traffic Influences on Particulate Concentration.

Appendix B Notes – Air Quality within the Right of Way

In Appendix B of the Gowlings submission, the following statement is found in the first paragraph. “*What MTO and MOE have continued to ignore, however, is the fact that **almost all** the newly created parkland and greenspace proposed for the W-E Parkway, including almost the entire length of the newly created recreational trail system, falls directly inside the W-E Parkway’s ROW where toxic levels of contaminants make **most** of this much heralded greenspace and trail system unusable*”. [emphasis added]

SENES strongly disagrees with this statement.

It is important to note that the space within the ROW is not all greenspace, as the ROW contains the 6-lane freeway, service roads, intersections, ramps, and medians. Some locations may have some green space but some of the greenspace may be located in an inaccessible location due to the placement of noise barriers or other structures that would restrict access for safety reasons (such as locations within 10 m of a tunnel portal). Therefore a large portion of the area within the ROW is inherently unusable for pedestrian and recreational activity, but not because of air quality considerations.

SENES has provided documentation in the Bridging Document that illustrates that even under maximum conditions most contaminants with health-based effects are well below the applicable criteria even when a conservative 90th percentile background is added. PM_{2.5} and acrolein are the two health-based contaminants that exceed criteria when a background is considered. Table 5.1 from the Bridging Document has been repeated here to illustrate this information. It is important to note that Table 5.1 presents maximum concentrations that are only predicted to occur once per year at a single receptor within the ROW even when a 90th percentile background is included. **That is, at all other times and at all other receptors, the concentrations will be lower.** This table includes a column showing maximum concentrations within the ROW, and a separate column showing the maximum concentrations in the useable spaces within the ROW.

Maximum concentrations are not indicators of typical air quality. Therefore, the statement in the Gowlings submission that that much of the greenspace and trail system is subject to toxic levels of contaminants and therefore unusable, is erroneous (even when the maximum concentrations are considered). In addition, plots presented in the Bridging Document for PM_{2.5} as Figure 5.2, Figure 5.3 and Appendix E indicate that maximum predicted PM_{2.5} concentrations are often below criteria within a few metres of the roadways.

Table 5.1 Maximum Modelled Concentrations of Contaminants within ROW for the Horizon Year 2035

Contaminant	Averaging time	MOE AAQC, $\mu\text{g}/\text{m}^3$	Environment Canada, $\mu\text{g}/\text{m}^3$	90 th Percentile Background, $\mu\text{g}/\text{m}^3$	Maximum concentration within ROW, $\mu\text{g}/\text{m}^3$	Max within Usable Spaces, $\mu\text{g}/\text{m}^3$	Usable space Percent of Criteria
NO _x (as NO ₂)	1 h	400	400	64	235	173	43%
	24 h	200	200	56	90	79	39%
PM _{2.5}	24 h	30	30	21	53.8	32.3	108%
Acrolein	24 h	0.08	-	0.160	0.21	0.19	240%
SO ₂	1 hr	690	900	43	46	45	7%
Carbon Monoxide	1 hr	36,200	36,200	897	3109	2815	8%
VOC	24 hr	-	-	147	169	164	
1,3 Butadiene	24 hr	-	-	0.17	0.27	0.24	
Benzene	24 hr	-	-	2.7	3.3	3.2	
Acetaldehyde	½ hr	500	-	2.4	3.7	3.2	1%
Formaldehyde	24 hr	65	-	4.1	4.8	4.5	7%

The Windsor comments on Page B-3 appear to imply that Ministry of Labour exposure criteria were the only criteria used as the criteria for comparison by DRIC and that no attempt was made to assess exposure using conventional AAQC criteria as the comparison basis. The reference to Ministry of Labour exposure criteria was made in the TEPA report to provide additional context to the values presented in the TEPA report. No references to Ministry of Labour exposures were included in the more detailed discussion of air quality within the ROW in the Bridging Document, nor was it made in the toxicological assessment of the spaces within the ROW conducted in the Human Health Risk Assessment (HHRA), which was updated on March 31, 2009.

The City of Windsor's comments state in bold print on Page B-4 that DRIC has not examined the health impacts upon the actual users of the green space. The HHRA (March 31, 2009) does include a section on the air quality impacts on users within the ROW.

In addition, the Bridging Document provides supplementary discussion and a larger number of receptors (including receptors 192 and 193) than previously discussed in the TEPA.

The MOE interim 24-hr guideline (with no effects listed) for PM₁₀ is 50 $\mu\text{g}/\text{m}^3$. The Gowlings submission includes a letter from Dr. George Thurston, on the subject of human health effects. Dr. Thurston's letter indicates that the US EPA in 2005 proposed a 24-hr health based criteria for PM₁₀

of $70 \mu\text{g}/\text{m}^3$. However, the letter fails to acknowledge that this proposal was rejected in 2006 by the US EPA in favour of keeping the existing 24-hr health based criteria of $150 \mu\text{g}/\text{m}^3$. If the final EPA health based criteria and the MOE guideline are applied to the background conditions used by SENES in the modelling, using variable background (as discussed in the Bridging Document) there are no exceedances of the $150 \mu\text{g}/\text{m}^3$. The $50 \mu\text{g}/\text{m}^3$ is exceeded 7% of the time, or for 24 days of the year just due to ambient conditions with no input from the roadway. Therefore all of Windsor is exposed to greater than guideline values for almost a month of the year but there are no exceedances of the EPA health-based criteria of $150 \mu\text{g}/\text{m}^3$. While SENES did not analyze for a 93rd percentile (the percent of time that there would be no exceedances of the $50 \mu\text{g}/\text{m}^3$ interim guideline due to background) a 95th and a 90th percentile were assessed. Most of the time (i.e., at least 99% of the time) 90 of the 91 receptors within usable spaces do not exceed the EPA PM_{10} health-based criteria of $150 \mu\text{g}/\text{m}^3$. Only 5 of the receptors located within the ROW on potentially accessible spaces exceed the criteria of $150 \mu\text{g}/\text{m}^3$.

When a comparable variable background assessment is performed for $\text{PM}_{2.5}$ using the Canada Wide Standard (CWS) of $30 \mu\text{g}/\text{m}^3$ (24-hr basis), at least 95% of the time all receptors within the ROW that are not on the road are below the applicable criteria and 98% of the time most of these receptors are below the applicable criteria despite a background concentration of $29.6 \mu\text{g}/\text{m}^3$.

Therefore, for most of the time, most of the areas within the ROW are below the US EPA health based criteria for PM_{10} and the Canada Wide Standard of $\text{PM}_{2.5}$. As shown in the previous table, other contaminants are either well below criteria and/or the exposure is driven by background concentrations.