

SENES Consultants Limited



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>

MEMORANDUM

TO: Murray Thompson, URS 33900-96

FROM: Harriet Phillips, PhD 12 June 2009

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

This memo addresses the comments by George D. Thurston, in a letter appended to the submission from Gowling Lafleur Henderson. Dr. Thurston provided an expert opinion in relation to human health effects of the air pollution levels modelled in the TEPA Air Quality Impact Assessment (December 2008) and the conclusions set out in this regard within the DRIC TEPA Human Health Risk Assessment, with a particular focus on particulate matter exposure.

1. The first comments were related to the Memorandum from Diana Piche of the MOE dated March 5, 2009. George Thurston states that *"I concur with this specific Ontario Environment critique of the DRIC report, in that the DRIC report acknowledges a health threat from PM₁₀ (on page 30-33 of the Dec. 2008 DRIC Report), but then never evaluates the size of the concentration or health impacts from the proposed roadway. The December DRIC report also fails to evaluate those most sensitive to the effects (e.g., children with asthma) or those most exposed (e.g., those breathing air within 50 meters of the roadway, and/or those visiting the parks above the proposed roadway)"*

SENES Response: As indicated in our responses to the MOE, residential receptors were evaluated since they represent the most exposed individuals along the roadways as they are assumed to be exposed 24 hrs per day, 7 days per week for 365 days per year for a 75 year lifetime. Recreational users will be exposed for a much shorter time and are thus encompassed by the residential receptors. However, additional calculations and discussion were provided for recreational users of the trails on the green space in the updated Risk Assessment document (March 31, 2009). While the concentrations within these green spaces are higher than concentrations in the residential receptor locations, background concentrations still account for a substantial fraction of the exposure for fine particulate matter since for PM_{2.5} background accounts for 50% to 92% of the exposure. The following Table provides the results for PM₁₀ within the green spaces (i.e. within the right-of-way and near to the tunnels) on a 24 hr basis using the variable background concentrations to which the traffic increment has been added.

As seen from the table, with the exception of the tunnel location at Receptor 722 (Oliver Estates), the incremental concentration associated with the Parkway is generally less than 10% of the

background PM₁₀ concentration. It should be noted that the concentrations presented in this table occur once per year and are based on the highest traffic volume and the worst meteorological conditions. In reality, the PM₁₀ concentrations in these locations would be much lower for the vast majority of the year. The U.S. EPA has a 24-hour standard of 150 µg/m³ to provide increased protection of public health and welfare (U.S. EPA 2008). If the maximum predicted 24-hour PM₁₀ concentrations within the right-of-way are compared to this value it can be seen that all of the concentrations are below the U.S. EPA standard; therefore the greenspaces provide protection of public health and welfare from exposures to PM₁₀.

Maximum Predicted 24-hour PM₁₀ Concentrations Within the Right-of-Way

Receptor ID Number	Receptor Location	Usable Space?	Maximum PM ₁₀ Concentration (µg/m ³) (Background + Increment)	Maximum Incremental PM ₁₀ Concentration from Parkway (µg/m ³)
68	Right-of-way	yes	115.4	18.1
72	tunnel	yes	97.5	0.2
78	Right-of-way	yes	105.3	8
168	Right-of-way	yes	104.5	7.2
178	Right-of-way	yes	97.3	0
685	Right-of-way	yes	107.2	9.9
710	Right-of-way	yes	98.3	1
721	Right-of-way	yes	100	2.7
722	tunnel	yes	143.7	46.4
740	Right-of-way	yes	97.3	0
774	Right-of-way	yes	97.3	0
861	Right-of-way	yes	98.2	0.9
1235	Right-of-way	yes	98.1	0.8
2068	Right-of-way	yes	102.2	4.9
Maximum Variable Background Concentration			97.3	

In addition it should be noted that the DRIC report does evaluate sensitive receptors such as children with asthma as the toxicity reference values selected for the assessment are based on the protection of the most sensitive receptors.

2. In his second comment on the Memorandum from Diana Piche George Thurston states that “I also agree with this OE statement that these pollutants should not have been eliminated from the quantitative analyses of exposures and effects in the report, most notably PM₁₀. By doing so, the DRIC Report understates the actual air pollution and health impacts of their proposed plan”.

SENES Response: This statement related to CO, ammonia and PM₁₀. The updated March 2009 risk assessment document provides the selection of the COPC as well as rationale for why some chemicals that are associated with vehicular emissions are not considered further. For example,

although the carbon monoxide concentrations were modelled in the AQIA, the results showed that the background concentration of CO overwhelms the contribution from tailpipe emissions, and so the incremental increase over background concentrations was negligible. As such, CO was not selected as a COC for the HHRA. Particulate matter less than or equal to 10 microns (μm) in diameter (PM_{10}) is generally associated with the breakdown of tires as they move along roadways and was not considered further since the emphasis on particulate matter has been moving to the finer fractions of PM over the last 30 years as health studies and monitoring equipment have advanced to be able to detect differences in the particulate matter fractions. In the last five to ten years health impact studies have been focusing on the impacts of $\text{PM}_{2.5}$ and finer fractions. The Canadian Federal government has not developed a PM_{10} Canada Wide Standard due to insufficient knowledge on the appropriateness of the standard. The federal government also recognizes that initiatives to reduce $\text{PM}_{2.5}$ will also likely reduce PM_{10} concentrations. In keeping with the both the Canadian governments position on PM_{10} , the HHRA focused on the potential effects associated with $\text{PM}_{2.5}$ exposure. Nonetheless, the Table in the response above provides the evaluation of potential effects of PM_{10} within the right-of way and the following table provides the evaluation of PM_{10} for the receptor locations along The Windsor-Essex Parkway. As seen from the table, sensitive receptors were considered in the assessment (LaSalle Home for the Aged, the Ballpark and the residential receptor location 2478 is a park). The table also demonstrates that the maximum predicted 24-hour PM_{10} concentrations (which include background) are below the standard; therefore the residential and other sensitive locations along The Windsor-Essex Parkway provide protection of public health and welfare from exposures to PM_{10} .

Maximum Predicted 24-hour PM_{10} Concentrations Along The Windsor-Essex Parkway

Receptor Location	Receptor ID	No Build ($\mu\text{g}/\text{m}^3$)	Parkway ($\mu\text{g}/\text{m}^3$)
Ball Field	2479	65.1	63.7
Bellwood Estates	58	93.0	77.9
	403	55.5	61.1
Grand Marais Roads	74	89.4	74.9
	186	71.9	64.3
Heritage Estates	910	50.3	51.3
Home for Aged LaSalle	944	49.6	50.2
	945	50.2	50.3
Huron Estates	295	59.5	60.4
	410	55.5	54.8
Kendleton Court	781	64.2	68.8
Oliver Estates	858	51.5	65.5
	1997	56.5	67.8
Reddock	423	56.0	57.2
Residential	2478	50.9	51.4
Southwood Lakes	867	51.5	55.6
Spring Garden	1513	52.7	60.5
	1644	52.7	55.3
St. Clair College	2480	54.0	53.9
Villa Borghese	828	56.5	54.6
Villa Paradiso Cres.	848	56.0	61.5
<i>Background value</i>		42	
<i>U.S.EPA 24-hour Standard</i>		150	

The following responses relate to Dr. Thurston's comments on the Memorandum from SENES dated March 12, 2009.

Thurston Comment:

3. On page 1, paragraph 4, the SENES memorandum concludes:

“Considering the 14 contaminants that were assessed, the overall conclusion was that the Parkway would not cause any additional impact in comparison to the future ‘No Build’ alternative, particularly as it relates to health impacts.”

This statement is very narrow in its scope, and the qualifications in this statement are the essence of what is wrong with the original DRIC report. First, the things they did not consider, particularly PM₁₀, are the focus of my report, and are also raised as problematic by the OME (see above). Second, SENES concludes that it is no worse than the Do Nothing (“No Build”) option, which is a very low bar by which to compare the plan. This new road represents an opportunity to improve on a presently bad air quality situation, and the DRIC plan fails to seize this opportunity, planning to only not make it any worse. As I stated in my original submission, both PM₁₀ and the “end-to-end” tunnel option needs to be considered in the health effects, as this option can result in much lower population exposures to PM₁₀, which is presently a serious problem in the Windsor area (as documented in my report dated February 25, 2009).

SENES Response: The choice of the contaminants used in the Assessment of the Practical Alternatives was delineated in the Air Quality Work Plan published in February 2006. The AQ Work Plan was circulated for review to regulatory authorities and interested parties. PM_{2.5} was chosen as the indicator particulate matter fraction due to its known association with health impacts. The choice of the distances used in the assessment was published in the August 2007 Draft Practical Alternative Working Paper, Air Quality Impact Assessment and was used for all alternatives. There were a number of criteria used to evaluate the various alternatives with Air Quality being a criterion. Once the Technically and Environmental Preferred Alternative (TEPA) was selected then a Human Health Risk Assessment (HHRA) was carried out for the TEPA in response to the requirement of the federal (CEAA) process requirement to address human health effects. It should be noted that there is an existing road network for vehicles destined from Highway 401 to the Ambassador Bridge. Vehicles are currently directed from the 401 onto the 4-lane Highway 3/Talbot Road, followed by the 6-lane Huron Church Road. There are 17 signalized intersections on Huron Church Road and Highway 3/Talbot Road between Highway 401 and the Ambassador Bridge. This scenario represents the “No Build” scenario since this is an existing road network. Thus, this is the scenario that is used to in comparison to the TEPA. It should also be noted that transboundary pollution is the driver of air quality in Windsor as has been recognized by the Ministry of the Environment (MOE) in their publication “*Preliminary Air Quality Assessment Related to Traffic Congestion at Windsor’s Ambassador Bridge, 2004*”, “*Transboundary Air Pollution in Ontario, 2005*”, and the annual Air Quality in Ontario publications. The Preliminary Air Quality Assessment Related to Traffic Congestion at Windsor’s Ambassador Bridge states: “*Transboundary air pollutants from the United States account for up to 50 per cent of smog in Southwestern Ontario. In*

Windsor, this value may be as high as 90 per cent.” Therefore, no road configuration (tunnel or otherwise) can improve or alter the fact that 90% of the background air quality in Windsor is a result of activities in the United States.

Thurston Comment:

4. On page 2, paragraph 3, the SENES memorandum concludes:

“As indicated, the analysis showed no clear preference amongst the alternatives, as all alternatives would provide similar contaminant loading. The conclusion was that the mass of contaminants released to the air is the same for any alternative”

This statement again misses the point that it is not the amount of emissions from a given volume of vehicles, but where the emissions will be released. In the case of the Parkway, there will be multiple tunnel exits with concentrated emissions at each, and with people using the park above very nearby these pollution emission points. In contrast, with an “end-to-end” tunnel, these emissions would be vented elsewhere, logically well away from populated areas. In addition, if the pollution is vented elsewhere, it would be possible that coarser particles would coagulate and settle out before emission, and so might lower the PM₁₀ emissions before being vented, but the DRIC December Report has not investigated this option at all.

SENES Response: The DRIC study team found no significant overall differences between the Windsor-Essex Parkway and alternatives with longer tunnel sections, particularly related to health-based contaminant criteria. It is important to note that longer tunnels do not change the overall loading of the quantities of the contaminants to the airshed, they simply change the locations of that loading. The responses to comments 1 and 2 above show that maximum predicted 24-hour PM₁₀ concentrations (including background) within the right-of-way (i.e. greenspaces) and along The Windsor-Essex Parkway are below the U.S. EPA criterion of 150 µg/m³ which provides protection of public health and welfare from exposures to PM₁₀.

Thurston Comment:

5. On page 2, paragraph 4, the SENES memorandum states:

The analysis of practical alternatives showed that there is effectively no difference in air quality between the below-grade alternatives and the end-to-end tunnel alternative beyond 100 metres from the roadway, and only minor differences between 50 and 100 metres. Thus, tunnels may provide means of moving emissions from one location to another (i.e., from one adjoining neighbourhood to another). This could affect very localized concentrations at some points along the roadway i.e. within 50-100m, but does not impact overall air quality in the Windsor air shed. Longer tunnels could in fact result in increased emissions near tunnel portals.

The reason that the DRIC report finds no difference between the two is that they do not look at the right pollutant, and they do not look close enough to the roadway. They instead limit their

investigation to well away from the roadway, where impacts are less. As shown in the below figure, roadway particulate matter concentration impacts are far greater within 50 meters of a roadway than they are further out. Thus, by only considering receptors well away from the roadway, the DRIC analysis has turned a “blind eye” to the worst of the roadway impacts that occur very near to the roadways themselves, where people travel, and will even recreate under the DRIC plan. Moreover, if ventilation is handled properly, the end-to-end option should result in higher exit emissions, but more importantly, it will result in far fewer of these tunnel exits, greatly reducing the localized traffic-related exposures to populations living, working, and/or recreating near the proposed new roadway.

SENES Response: The choice of the contaminants used in the Assessment of the Practical Alternatives was delineated in the Air Quality Work Plan published in February 2006. The AQ Work Plan was circulated for review to regulatory authorities and interested parties. PM_{2.5} was chosen as the indicator particulate matter fraction due to its known association with health impacts. The choice of the distances used in the assessment was published in the August 2007 Draft Practical Alternative Working Paper, Air Quality Impact Assessment and was used for all alternatives. There were seven factors used to evaluate the various alternatives with Air Quality being one.. The DRIC study team found no significant overall differences between the Windsor-Essex Parkway and alternatives with longer tunnel sections, particularly related to health-based contaminant criteria. It is important to note that longer tunnels do not change the overall loading of the quantities of the contaminants to the airshed, they simply change the locations of that loading. The responses to comments 1 and 2 above show that maximum predicted 24-hour PM₁₀ concentrations (including background) within the right-of-way (i.e. greenspaces within 50 m of the roadway) and along The Windsor-Essex Parkway are below the U.S. EPA criterion of 150 µg/m³ which provides protection of public health and welfare from exposures to PM₁₀.

Thurston Comment:

6. On page 3, first response, the SENES memorandum states:

Response: The human health risk assessment did evaluate the effects due to particulate matter. Pages 27 to 34 of the Human Health Risk Assessment provided a discussion of the health effects of both PM_{2.5} and P10 and Section 5.2 of the report provides an evaluation of the effects due to particulate matter arising from the Parkway.

However, while the report acknowledges the adverse health effects of PM₁₀ on pages 27-34, it then inexplicably fails to quantitatively assess this PM₁₀ particulate matter pollution component in its quantitative analysis in Section 5.2. An examination of pages 151-155 of the May, 2008 DRIC “Practical Alternatives Evaluation Working Paper”(Appendix 2) reveals that the PM₁₀ tailpipe emissions are double those for PM_{2.5}, and the PM₁₀ road dust emission rates are more than 5 times those for PM_{2.5}. Had they DRIC report considered concentrations within 50 meters of the roadway, and considered PM₁₀ in a quantitative way, they would have presented a very different picture of the proposed roadway’s impacts, especially as compared to the “end-to-end” tunnel

option they failed to consider in the December DRIC analyses.

SENES Response: The responses to comments 1 and 2 above show that maximum predicted 24-hour PM₁₀ concentrations (including background) within the right-of-way (i.e. greenspaces within 50 m of the roadway) and along The Windsor-Essex Parkway are below the U.S. EPA criterion of 150 µg/m³ which provides protection of public health and welfare from exposures to PM₁₀. Therefore the conclusions of the risk assessment remain unchanged.

Thurston Comment:

7. On page 3, second response, the SENES memorandum states:

Response: The human health risk assessment did evaluate the effects due to particulate matter. Pages 27 to 34 of the Human Health Risk Assessment provided a discussion of the health effects of both PM₂₅ and PM₁₀.

Again, this points out that they have acknowledged PM₁₀'s effects in the discussion, but fails to note that have not actually conducted a quantitative analysis of PM₁₀ for the December, 2008 DRIC report.

SENES Response: The responses to comments 1 and 2 above show that maximum predicted 24-hour PM₁₀ concentrations (including background) within the right-of-way (i.e. greenspaces within 50 m of the roadway) and along The Windsor-Essex Parkway are below the U.S. EPA criterion of 150 µg/m³ which provides protection of public health and welfare from exposures to PM₁₀.

Thurston Comment:

8. On page 5, second paragraph, the SENES memorandum states:

At a receptor closer to the road, the traffic increment is more obvious than for the receptor located further away. Thus any health effects are as a result of the background concentration in Windsor to which a relatively small increments due traffic are added and no road configuration will change this conclusion.

This acknowledges my point that the traffic impact is much greater closer to the roadway, where their air quality impact analysis has failed to look in the December 2008 DRIC report. Moreover, this statement appears to use the fact that the residents of Windsor are subjected to transported pollution as an excuse to do nothing to improve the component that is due to local emissions. The opposite is true: if the residents of a population are subjected to high transport pollution, over which they have little control, then efforts should be redoubled to control the local pollution contributions over which they *do* have control. The addition of transported air pollution increases the imperative for greater local reductions, not the opposite, as the memorandum seems to be arguing.

SENES Response: While the concentrations close to the road within the right-of-way are higher than concentrations in the residential receptor locations, background concentrations still account for a substantial fraction of the exposure for fine particulate matter since for PM_{2.5} background accounts for 50% to 92% of the exposure. The following table shows the incremental contribution from The Windsor-Essex Park for PM₁₀ within the right-of-way and the tunnels on a 24 hr basis. As seen from the table, with the exception of the tunnel location at Receptor 722 (Oliver Estates), the incremental concentration associated with the Parkway is generally less than 10% of the background PM₁₀ concentration. It should be noted that the concentrations presented in this table occur once per year and are based on the highest traffic volume and the worst meteorological conditions. In reality, the PM₁₀ concentrations in these locations would be much lower for the vast majority of the year. Therefore, no road configuration (tunnel or otherwise) can improve the background air quality in Windsor.

Maximum Predicted 24-hour PM₁₀ Concentrations Within the Right-of-Way

Receptor ID Number	Receptor Location	Usable Space?	Maximum PM ₁₀ Concentration (µg/m ³) (Background + Increment)	Maximum Incremental PM ₁₀ Concentration from Parkway (µg/m ³)
68	Right-of-way	yes	115.4	18.1
72	tunnel	yes	97.5	0.2
78	Right-of-way	yes	105.3	8
168	Right-of-way	yes	104.5	7.2
178	Right-of-way	yes	97.3	0
685	Right-of-way	yes	107.2	9.9
710	Right-of-way	yes	98.3	1
721	Right-of-way	yes	100	2.7
722	tunnel	yes	143.7	46.4
740	Right-of-way	yes	97.3	0
774	Right-of-way	yes	97.3	0
861	Right-of-way	yes	98.2	0.9
1235	Right-of-way	yes	98.1	0.8
2068	Right-of-way	yes	102.2	4.9
Maximum Variable Background Concentration			97.3	

Thurston Comment:

- On page 6, second paragraph from the bottom of the page, the SENES memorandum states:

“In the last five to ten years health impact studies have been focussing on the impacts of PM_{2.5} and finer fractions. The US EPA has revoked their PM₁₀ standard due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution.”

These statements are just incorrect. First, the EPA has not revoked its short-term PM₁₀ standard. As summarized on page 1-5 of the most recent version of the U.S. EPA Integrated Science ~ (U.S. EPA, EPA/600/R-08/139 February, 2009), there is presently still in place a short-term 24-hr limit on PM₁₀ exposure in the U.S. Indeed, as recently as 2005, this EPA report notes that: *“The EPA proposed to set a 24-h PM_{10-2.5} standard at a level of 70 µg/m³ to continue to provide a level of protection against health effects associated with short-term exposure (including hospital admissions for cardiopulmonary diseases, increased respiratory symptoms and possibly premature mortality).”* Furthermore, this EPA health effects assessment document takes coarse PM (PM_{10-2.5}) very seriously, and does conclude (as also acknowledged in the DRIC report) that exposure PM₁₀ has very serious health consequences. On page 2-13 it states that *“Overall, consistent and coherent evidence exists across recent toxicological and epidemiologic studies, which supports the conclusion that short-term exposure to PM₁₀ is associated with an increased risk of cardiovascular morbidity. “And “The epidemiologic literature indicates consistent positive associations between short-term exposure to PM₁₀ and all-ca use mortality.”*

SENES Response: The statement on the revoking of the PM₁₀ standard is correct. It should have been explicit to the annual PM₁₀ standard. As indicated on Page 1-3 of the above document cited by George Thurston *“Specifically, EPA retained the 24-hour PM₁₀ standard at 150 µg/m³ and revoked the annual PM₁₀ standard because available evidence generally did not suggest a link between long-term exposure to current ambient levels of thoracic coarse particles and health or welfare effects.”* (U.S.EPA 2009). Therefore the SENES statement is correct. In addition it should be noted that while there was a proposal to change the PM₁₀ standard to 70 µg/m³, on September 21 2006, the EPA revised the 24-hour PM_{2.5} standard to a lower value but retained the 24-hour PM₁₀ standard at 150 µg/m³ (U.S.EPA 2008). Dr Thurston failed to include this in his comments. The move by the U.S.EPA to lower the PM_{2.5} value supports the statements in the SENES memorandum that *“In the last five to ten years health impact studies have been focussing on the impacts of PM_{2.5} and finer fractions.”*

Thurston Comment:

10. On page 7, first response, the SENES memorandum states:

“the focus of the report was on the assessment of locations of permanent sensitive receptors such as residential areas, hence the Human Health Risk Assessment report evaluates receptors beyond the Parkway’s trails.”

This statement acknowledges that visitors to the Park area have not been evaluated. This could well include older adults with pre-existing disease conditions, and children with asthma who may potentially be in the vicinity of the Parkway’s many tunnel entrances and exits (where concentrations will be highest) for hours. As documented in my report, published studies have shown that this long an exposure to elevated PM₁₀ is enough to significantly raise an individual’s risk of severe acute health effects, potentially including death for people with pre-existing cardiac disease.

SENES Response: As indicated in Response 1, additional calculations and discussion were provided for recreational users of the trails on the green space in the updated Risk Assessment document (March 31, 2009). The responses to comments 1 and 2 above show that maximum predicted 24-hour PM₁₀ concentrations (including background) within the right-of-way (i.e. greenspaces within 50 m of the roadway) and along The Windsor-Essex Parkway are below the U.S. EPA criterion of 150 µg/m³ which provides protection of public health and welfare from exposures to PM₁₀.

Thurston Comment:

11. On page 7, Table I is presented, which ignores PM₁₀, the issue under discussion.

This lapse is consistent with the rest of the DRIC December Report's analysis, which is deficient by its lack of consideration of PM₁₀, and does not evaluate traffic impacts nearest the roadway, where they would be greatest.

SENES Response: As indicated in Response 1, additional calculations and discussion were provided for recreational users of the trails on the green space in the March 2009 Risk Assessment document. The responses to comments 1 and 2 above show that maximum predicted 24-hour PM₁₀ concentrations (including background) within the right-of-way (i.e. greenspaces within 50 m of the roadway) and along The Windsor-Essex Parkway are below the U.S. EPA criterion of 150 µg/m³ which provides protection of public health and welfare from exposures to PM₁₀.

Thurston Comment:

12. On page 8, second response, it is stated that:

"the Practical Alternatives Report demonstrated that tunnels, regardless of length, only provide a means of moving emissions from one location to another (i.e., from one neighbourhood to another)."

This is not a correct representation of the Practical Alternatives Report results. In fact, on page 77 of that report (Section 5.1.1.3), it notes that *"The results presented in Table 5.1 show that there are generally appreciable or close to appreciable differences (i.e., >20%) in the relative maximum PM_{2.5} concentrations between the below grade alternatives (1B, 2B, and Parkway) in comparison with the tunneled alternative"*. It goes on to say that: *"When compared to both Alternatives 1B and 2B, a tunneled alternative would result in reductions in the number of days predicted to exceed the CWS PM_{2.5} 24-hour standard"* And this doesn't even consider PM₁₀, for which the differences would be much larger. Also, this analysis failed to consider closer than 50 meters from the roadway, for which the advantages of the tunneled option would be even greater. Moreover, since the tunneled emissions could be ducted away from populated areas, it would lead to less exposure, not just a switch *"from one neighbourhood to another"*, as posited by the memorandum.

SENES Response: The DRIC study team found no significant overall differences between the Windsor-Essex Parkway and alternatives with longer tunnel sections, particularly related to health-based contaminant criteria. This is consistent with MOE published literature¹ which also concludes that under free-flow conditions the impacts from the roads are generally not detectable. It is important to note that longer tunnels do not change the overall loading of the quantities of the contaminants to the airshed, they simply change the locations of that loading. As indicated in Response 1, additional calculations and discussion were provided for recreational users of the trails on the green space in the updated Risk Assessment document (March 31, 2009). 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. The responses to comments 1 and 2 above show that maximum predicted 24-hour PM₁₀ concentrations (including background) within the right-of-way (i.e. greenspaces within 50 m of the roadway) and along The Windsor-Essex Parkway are below the U.S. EPA criterion of 150 µg/m³ which provides protection of public health and welfare from exposures to PM₁₀.

The following responses relate to comments on the Memorandum from SENES dated March 13, 2009.

Thurston Comment:

13. **On** page 5, #9, SENES says: *“Recreational users will be exposed for a much shorter time and are thus encompassed by the residential receptors.”*

This statement ignores the fact that there are both acute and chronic exposure effects of PM exposure, and that the acute (short-term) high exposures that visitors to the park will be exposed to are very different from the lower but longer-term resident exposures. Both need to be addressed.

SENES Response: As indicated in Response 1, additional calculations and discussion were provided for recreational users of the trails on the green space in the updated Risk Assessment document (March 31, 2009). While the concentrations within these green spaces are higher than concentrations in the residential receptor locations, background concentrations still account for a

1

- 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.

substantial fraction of the exposure and no adverse effects are predicted as a result of exposure within the right-of-way.

Thurston Comment:

14. On page 6, #13, SENES says: “A number of chemicals were considered in the development of the COC’s. The AQIA document contains a discussion of these chemicals.”

While the document does contain a discussion of these compounds, they have only been selectively evaluated in the risk assessment. PM₁₀, for example, is not considered in the quantitative health effects analyses in the December 2008 DRIC Human Health Risk Assessment. It was also not quantitatively evaluated in the May DRIC report, which focused on PM₂₅ and NO_x. These results were apparently used to choose the “Preferred Alternative”, and consideration of PM₁₀ at close in receptors might well have resulted in a different choice for preferred option. So some pollutants have been “considered” more than others, and there is a lack of comprehensiveness in the approach taken here, resulting in many “holes” in the overall evaluation process.

SENES Response: The updated Risk Assessment document (March 31, 2009) provides a rationale for the selection of the COC’s selected in the assessment. As indicated in Response 1, additional calculations and discussion were provided for recreational users of the trails on the green space in the updated Risk Assessment document (March 31, 2009). The responses to comments 1 and 2 above show that maximum predicted 24-hour PM₁₀ concentrations (including background) within the right-of-way (i.e. greenspaces within 50 m of the roadway) and along The Windsor-Essex Parkway are below the U.S. EPA criterion of 150 µg/m³ which provides protection of public health and welfare from exposures to PM₁₀.

Thurston Comment:

15. On page 10, #19, SENES again says: “Recreational users will be exposed for a much shorter time and are thus encompassed by the residential receptors.”

As noted above, this is not correct. This comment also says: “However, additional calculations will be provided for recreational users of the trails on the green space”

When these are provided, it will be important to consider both PM₂₅ and PM₁₀, as, though they overlap, PM₁₀ has health consequences in addition to PM_{2.5} (and much higher emission rates per vehicle). The potential toxicity of the larger PM₁₀ particles (i.e., larger than PM_{2.5}) is acknowledged on Page 29 of the December DRIC health risk report, which quotes the U.S. EPA as concluding: “Evidence suggests that not only PM_{2.5} but coarse thoracic particles (e.g., PM_{10-2.5}) may contribute in exacerbating various respiratory conditions (e.g., asthma).”

SENES Response: The updated Risk Assessment document (March 31, 2009) provides a rationale for the selection of the COC’s selected in the assessment. As indicated in Response 1, additional calculations and discussion were provided for recreational users of the trails on the

green space in the March 2009 Risk Assessment document. The responses to comments 1 and 2 above show that maximum predicted 24-hour PM₁₀ concentrations (including background) within the right-of-way (i.e. greenspaces within 50 m of the roadway) and along The Windsor-Essex Parkway are below the U.S. EPA criterion of 150 µg/m³ which provides protection of public health and welfare from exposures to PM₁₀.

Thurston Comment:

Overall, considering all of these documents, the conclusions in my original report remain unaltered by the comments from SENES, and I conclude that the proposed Parkway design will result in significant needless acute and chronic adverse risks to the public health of those living, working, or recreating adjacent to the Parkway as a result of their exposures to PM_{2.5} and PM₁₀ over and above what would be the case with an end-to-end tunnel. These negative impacts could be minimized by the choice of real end-to-end tunneling to more effectively shield the public from continued exposure to these contaminants, This full-tunnel design is the case to which all other options should be compared (not the do nothing “No Build” option), and PM₁₀ near the Parkway (e.g., at parks adjacent to and above the roadway) should be considered in these health risk comparisons.

SENES Response: The responses to comments 1 and 2 above show that maximum predicted 24-hour PM₁₀ concentrations (including background) within the right-of-way (i.e. greenspaces within 50 m of the roadway) and along The Windsor-Essex Parkway are below the U.S. EPA criterion of 150 µg/m³ which provides protection of public health and welfare from exposures to PM₁₀. Thus there are no “*significant needless acute and chronic adverse risks to public health of those living, working, or recreating adjacent to the Parkway as a result of their exposures to PM_{2.5} and PM₁₀*”. In addition, the DRIC study team found no significant overall differences between the Windsor-Essex Parkway and alternatives with longer tunnel sections, particularly related to health-based contaminant criteria. It is important to note that longer tunnels do not change the overall loading of the quantities of the contaminants to the airshed, they simply change the locations of that loading. Finally, as indicated previously, there exists a current road network for vehicles to get to the Ambassador Bridge crossing; The Windsor-Essex Parkway will be constructed within this corridor and thus it is appropriate to use a comparison to the current road network within the Environmental Assessment.

References:

U.S.EPA 2008 *Integrated Review Plan for National Ambient Air Quality Standards for Particulate Matter* March. EPA-452/R-08-004.

U.S.EPA 2009 *Particulate Matter National Ambient Air Quality Standards: Scope and Methods Plan for Health Risk and Exposure Assessment*. February. EPA-452/P-09-002.