MEMORANDUM

To: Stewart Brown – PGL Environmental Consultants
cc: Anna Henolson – Trinity Consultants
From: Gary Rubenstein and Allan Daly – Sierra Research
Date: January 20, 2017
RE: DRAFT - Qualitative Near-Roadway Air Quality Analysis for Highway 1 and 216th Street Interchange

Introduction

Sierra Research conducted a qualitative analysis comparing potential air quality impacts at nearby residences and the École des Voyageurs School of the existing traffic on Highway 1 and 216th Street to the impacts for the proposed 216th St Interchange project configuration. The analysis is based, in part, on Sierra's draft whitepaper: *Review of Land Use and Mitigation Guidance for Near-Roadway Land Uses,* which was prepared for the British Columbia Ministry of Transportation and Infrastructure (MOTI) (attached).

Review of Port Mann/Highway 1 Project *Environmental Assessment Certificate Application, Local Air Quality and Human Health Impact Assessment*

Sierra reviewed the *Highway 1 at 216 Street Interchange Project Environmental Overview Assessment* and the *Port Mann/Highway 1 Project Environmental Assessment Certificate Application Local Air Quality and Human Health Impact Assessment* (PMH1 EA). The PMH1 EA contained a local air quality assessment of human health impacts along the entire length of the project using the CALINE3 dispersion model supported by EMME/2 traffic modeling. The assessment compared baseline operational impacts under existing conditions (in 2003) to future operational impacts in 2021 for scenarios including the new PMH1 components and excluding the new PMH1 components.

In general, local air quality assessment modeled substantially lower concentrations of criteria and hazardous air contaminants (and hence acute, chronic, and cancer-related health impacts) for both 2021 scenarios compared to the 2003 baseline scenario. This result is expected due to increased penetration of newer, cleaner vehicles into the fleet, which more than compensates for traffic volume increases occurring over the same period. Additionally, a comparison of the two 2021 scenarios showed very similar results (including and excluding the PMH1 components), with the scenario including the PMH1 components showing slightly higher impacts in specific areas.

Sierra specifically reviewed the results of the local air quality assessment focusing on the segment including the 216th Street Interchange Project. Key elements of our assessment included the following:

- As was the case for the entire project, in the vicinity of the 216th Street Interchange Project, the two 2021 scenarios (including PMH1 and excluding PMH1 components) exhibit substantially lower concentrations of criteria air contaminants compared to the 2003 baseline scenario. The same conclusion would hold true for toxic air contaminants from vehicle traffic.

- The 216th Street interchange is not one of the areas identified as remaining susceptible to pollutant concentrations above ambient objectives in 2021 (whether including or excluding the PMH1 components).

1801 J Street | Sacramento, CA 95811
P (916) 444-6666 | F (916) 444-8373
Trinity Consultants

- In 2021, the maximum acute hazard index experienced along the segment of Highway 1 containing the 216th Street interchange is higher by a value of 0.2 for the "including PMH1" scenario compared to the "excluding PMH1" scenario (1.22 versus 1.02). In 2003, the highest acute hazard index for this segment was 2.25.

- In 2021, the maximum chronic hazard index experienced along the segment of Highway 1 containing the 216th Street interchange is higher by a value of 0.05 for the "including PMH1" scenario compared to the "excluding PMH1" scenario (0.41 versus 0.36). In 2003, the highest chronic hazard index for this segment was 0.83.

- In 2021, the maximum incremental cancer risk attributable to Highway 1 near the 216th Street Interchange project is virtually identical for the "including PMH1" scenario compared to the "excluding PMH1" scenario at levels less than 100 in one million. In 2003, the maximum incremental cancer risk attribute to Highway 1 near the proposed 216th Street Interchange was more than double the expected future levels (i.e., greater than 200 in one million).

Review of *Highway 1 at 216 Street Interchange Project, Environmental Overview Assessment*

Sierra reviewed the air quality chapter of the Highway 1 at 216 Street Interchange Project Environmental Overview Assessment. The air quality chapter contains a review of the PMH1 EA (similar to the above). The conclusion of the Overview Assessment was that, "Overall, the impact of the PMH1 project on local air quality is assessed as being low."

Review of Land Use and Mitigation Guidance for Near-Roadway Land Uses

Sierra reviewed the design of near-road vegetative barriers (including existing vegetation) for the 216 Street Interchange Project for consistency with the principles outline in our whitepaper, *Review of Land Use and Mitigation Guidance for Near-Roadway Land Uses*.

To the north of the interchange, along 216th Street, the landscaping plan calls for the planting of a mix of *Ginko biloba*, *Quercus shumardii, Acer griseum*, and *Robinia pseudoacacia* along the verges and median of the street. Initial spacing is 10 meters on center, with a 2 meter by 5 meter planting pocket at the base of each tree. To the south of the interchange along 216th Street, the landscaping plan calls for the same mix of trees, except only along the verges.

To the north of the interchange, the design project cross sections of 216th Street show that beyond the line of trees on the western verge, an approximately 3-meter sound wall will be constructed as per direction from the Township of Langley. The combination of the vegetative barrier and the sound wall would conform to the maximum mitigation requirements described in Sierra's *Review of Land Use and Mitigation Guidance for Near-Roadway Land Uses*, although it is noted that Metro Vancouver's report, *Reducing Exposure to Traffic Emissions*, assessed this design strategy as having high practicality, but low effectiveness.

The B.C. Ministry of Environment *Develop with Care 2014* guidelines were found to be largely inapplicable to the Highway 1 and 216th project as they pertain mainly to the siting of new buildings that will house susceptible populations (e.g., infants, children, pregnant women, the elderly and those with heart or lung disease), and

1801 J Street | Sacramento, CA 95811
P (916) 444-6666 | F (916) 444-8373
Trinity Consultants

certain design features of such buildings. In contrast, the project involves improvements to an existing roadway in an area where surrounding land uses are well established.

Based on the local air quality assessment contained in the Port Mann/Highway 1 Project Environmental Assessment Certificate Application, Local Air Quality and Human Health Impact Assessment, the health risk resultant from Highway 1 at the 216th Street Interchange is forecast to be below 100 in a million in 2021. At this level, the health risk would be below the SMAQMD[1] screening threshold of 276 in a million, which would be acceptable without the application of any additional mitigation.

Review of Existing and Forecasted Traffic Volumes along 216th Street.

Sierra reviewed the traffic volume data provided by MOTI and contained in the attached Memorandum prepared by R.F. Binnie & Associates Ltd. dated January 19, 2017. The memorandum estimates the traffic volumes (including the new interchange) on opening day and for a horizon year of 2045 based on existing traffic counts and historical turning movement count data collected at the 88th Avenue and 216th Street intersection.

Future traffic volumes were estimated for three segments of 216th Street—from the new interchange to Telegraph Trail, from Telegraph Trail to 88th Avenue, and North of 88th Avenue. Peak hourly volumes are shown in Table 1 and average daily traffic (ADT) values are shown in Table 2.

Table 1. Peak Hourly Traffic Volumes along 216th Street

216th Street Segment	Opening Day		2045 Horizon Year	
	AM	PM	AM	PM
Interchange to Telegraph Tr.	1,010	1,165	1,530	1,735
Telegraph Tr. To 88th Ave.	585	710	715	895
North of 88th Ave	300	335	395	420

Table 2. Average Daily Traffic Volumes along 216th Street

216th Street Segment	Existing	Opening Day	2045 Horizon Year
Interchange to Telegraph Tr.	100	11,650	17,350
Telegraph Tr. To 88th Ave.	4,200	7,100	8,950
North of 88th Ave	4,000	4,000	4,200

The forecasted increase in traffic along 216th Street is most pronounced along the segment of 216th Street from the new interchange to Telegraph Trail. This is expected as this segment currently experiences extremely low volumes as it is essentially a "dead-end." On opening day of the new interchange, this segment would see a marked increase in traffic volume, but not to the degree that the daily volume would exceed the threshold as a "busy road" as specified in the B.C. Ministry of Environment's publication, *Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia*. This threshold is predicted to eventually be exceeded by approximately 16% in the horizon year of 2045.

The forecasted increases in traffic between 88th Avenue and Telegraph Trail, and north of 88th Avenue, are well below the "busy road" thresholds on both opening day and in the horizon year of 2045.

[1] Sacramento Metropolitan Air Quality Management District

1801 J Street | Sacramento, CA 95811
P (916) 444-6666 | F (916) 444-8373
Trinity Consultants

The "opening day" increase is the result of the rerouting of traffic that will use the new 216th Interchange to access Highway 1. Without the new interchange, the logical travel route to Highway 1 is via 88th Avenue to the 200th Street interchange. This segment of 88th Avenue is approximately two miles in length and passes through existing residential neighborhoods lying to the north and south of the roadway. Although traffic volume data along 88th Avenue west of 216th Street for the same years was not available, it is expected that the traffic on this segment will decrease as a result of the new interchange. The change in traffic volume from opening day to the horizon year of 2045 is the result of long-term regional growth.

The overall impact of the 216th Street Interchange Project will be to divert local traffic onto Highway 1 in a more efficient manner by providing an additional access point. The new interchange can be expected to decrease the traffic volumes along 88th Avenue originating from the residential neighborhoods near the new interchange that must currently travel this route to access Highway 1.

As discussed in Sierra's whitepaper *Review*, free flowing traffic along a highway exhibits substantially lower emission rates on a per-mile basis than local traffic traveling under a stop-and-go driving cycle. Therefore, measures aimed at diverting local traffic to highways both reduce vehicle miles traveled, and emission rates on a per-mile basis.

Conclusion

Based on a review of the PMH1 EA, the proposed Highway 1 and 216th Street interchange is not expected to result in significant air quality impacts due to near-roadway proximity. This conclusion is based mainly on the dispersion modeling contained in the PMH1 EA, which shows that the subject interchange is not susceptible to exceeding pollutant concentrations above ambient objectives.

Likewise, the potential air quality-related health impacts along Highway 1 at the 216 interchange were modeled to be near-de minimis levels for acute health impacts, less than de minimis levels for chronic health impacts, and less than 100 in a million for cancer risk.

Furthermore, the project includes a landscaping plan both north and south of the interchange, and sound walls to the north of the interchange along the western verge of 216th Street. This mitigation would serve to reduce the potential impacts of existing traffic on 216th Street and Highway 1 in addition to mitigating the impacts of increased traffic volumes.

Finally, Sierra reviewed the location of the École des Voyageurs school in proximity to the proposed interchange of 216th Street and Highway 1. The school lies approximately 900 m north of Highway 1, on the southeast corner of 216th Street and 88th Avenue. At this location, the school is well outside of the zone of influence of Highway 1, and likewise would be approximately six times removed from the 150 m "exclusion zone" listed in the California Air Resources Board's 2005 *Air Quality and Land Use Handbook: A Community Health Perspective*. Further, the anticipated increase in traffic along 216th Street near the school is well below the "busy road" threshold in the *Develop with Care* guideline. Therefore, the effects of near-roadway air pollution should not be a concern at this school site.

1801 J Street | Sacramento, CA 95811
P (916) 444-6666 | F (916) 444-8373
Trinity Consultants