

## **Appendix L    ASSESSMENT OF POTENTIAL AIR QUALITY IMPACTS MEMORANDUM**

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Date: October 26, 2017

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**Reference: Assessment of Potential Air Quality Impacts  
Living Arts Drive Extension Class EA, Mississauga, Ontario**

## **Introduction**

Stantec Consulting Ltd. (Stantec) was retained by the City of Mississauga (the City) to provide an air quality impact evaluation for the proposed extension of Living Arts Drive, from Rathburn Road West to Centre View Drive, in Mississauga, Ontario, as part of the Municipal Class Environmental Assessment (the Project). An opinion related to the potential impact of the Project on the atmospheric environment is provided based on the preliminary design information completed to date. Existing air quality (AQ) in the Study Area and potential impacts on future air quality within and adjacent to the Study Area due to the Project are discussed based on projected traffic data.

## **Project Description and Study Area**

In general, the Study Area for the Project (the Study Area) is approximately 200 m in length and 75 m wide, and located between Rathburn Road West and Centre View Drive (please refer to Figure 1). The Study Area is predominantly occupied by a paved roadway and parking areas for the existing Cineplex Cinemas Mississauga (Cineplex), as well as Centre View Drive and Rathburn Road West. There is a small vegetated area of land located within the north portion of the Study Area, between the Cineplex parking lot and Centre View Drive. The area to the southwest of the intersection of Living Arts Drive with Rathburn Road West is also unpaved. The existing Living Arts Drive, located south of the Study Area, is a 2-lane, north-south roadway with dedicated turning lanes. It has a posted speed limit of 50 km/h.

Land uses surrounding the Study Area generally consist of commercial (to the east and west), institutional (to the southeast), vacant (to the southwest), as well as Centre View Drive and Highway 403 to the north. The Project location, Study Area and the existing conditions in the proximity of the Project are provided in the attached Figure 2. The area depicted in Figure 2 is considered to be the local area associated with the Project for the purposes of the air quality .

The Project builds upon the City's Downtown21 Master Plan by developing compact communities, providing opportunities for inter-modal linkages and integrating vehicular and active transportation modes to support urban growth. The Project may include the following primary configurations:

- Living Arts Drive, from Rathburn Road West to Centre View Drive: construction of the extension of Living Arts Drive as a 2-lane cross-section (except at intersections), with sidewalks and bike lanes;
- Living Arts Drive/Rathburn Road West: reconfiguration of the existing signalized intersection, with auxiliary turn lanes (as required);

## **Design with community in mind**

**Reference: Assessment of Potential Air Quality Impacts  
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- Living Arts Drive/Cineplex Access: construction of a new mid-block intersection (modelled as a single-lane roundabout, for the purposes of this air quality assessment); and
- Living Arts Drive/Centre View Drive: construction of a new signalized intersection with auxiliary turn lanes, including an advanced left turn phase to accommodate the higher volumes for the westbound left-turn movement.

The precise configuration of the proposed extension of Living Arts Drive and associated intersection designs will be confirmed during detailed design.

**Existing Air Quality Condition in the Study Area:**

The air contaminant emission sources expected from the Project are mobile sources that emit combustion gases from burning fossil fuels (e.g., gasoline and diesel) and fugitive dust by road traffic during the movement of mobile sources (e.g., cars and trucks). The expected contaminants of concern that would likely be emitted during the Project operation are primarily Criteria Air Contaminants (CACs), volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs). CACs include nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), particulate matter less than 10 µm in diameter (PM<sub>10</sub>) and particulate matter less than 2.5 µm in diameter (PM<sub>2.5</sub>). Key toxic VOCs from fuel combustion processes included in the evaluation are benzene and 1,3-butadiene. Other VOCs are considered less significant, when compared to benzene and 1,3-butadiene. The key representative substance of PAHs is benzo(a)pyrene (B(a)P), which is considered a surrogate of total PAH.

Ambient air quality in the Study Area is influenced by emissions from local commercial sources and vehicular traffic. Air quality measurement data from ambient air monitoring conducted by the National Air Pollution Surveillance Program (NAPS) operated by Environment Canada was reviewed. The NAPS program continuously measures NO<sub>2</sub>, CO, SO<sub>2</sub>, ozone (O<sub>3</sub>), and PM<sub>2.5</sub>. The NAPS network data for the most recent five years (2011 to 2015) from the nearest Mississauga station (NAPS ID 60434, located at 3359 Mississauga Road North) were used to characterize existing air quality in the Study Area. PM<sub>10</sub>, CO, B(a)P, 1,3-Butadiene and Benzene were not monitored at this station. Monitoring data from five other nearby, representative NAPS and one AQHI (Air Quality Health Index) monitoring stations in Toronto, Hamilton, Brampton were reviewed to determine background concentrations for these contaminants. These monitoring stations were selected for the evaluation based on its proximity to the Study Area.

The maximum 90<sup>th</sup> percentile concentrations over all five years at the selected stations were assessed and compared with regulatory requirements, and used for characterizing the existing air quality for the local area including the Study Area. The use of the 90<sup>th</sup> percentile to represent the background concentration is consistent with the MTO (Ontario Ministry of Transportation) guidance document (*Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions of Provincial Transportation Projects*, June 2012, MTO). The 90<sup>th</sup> percentile concentrations for applicable time period are listed below in Table 1. The applicable provincial or federal limits for each of the contaminants are also listed in the table for comparison.

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**Table 1: Summary of Background Air Quality Data**

Primary Contaminant of Concern	CAS	Background - 90th Percentile Concentration <sup>1</sup>	Averaging Time <sup>2</sup>	Applicable Limit		Percentage of Limit
		(mg/m <sup>3</sup> )		(mg/m <sup>3</sup> )	Reference <sup>3</sup>	
NO <sub>2</sub>	10102-44-0	40.2	1-hour	400	NAAQO	10%
		33.4	24-hour	200		17%
		21.7	Annual	100		22%
SO <sub>2</sub>	7446-09-5	6.9	1-hour	900	Ontario AAQC	1%
		5.8	24-hour	300		2%
		3.8	Annual	60		6%
CO	630-08-0	474.7	1-hour	35,000	Ontario AAQC	1%
		461.3	8-hour	15,000		3%
PM <sub>10</sub>	N/A (PM <sub>10</sub> )	30.6	24-hour	50	Ontario AAQC	61%
PM <sub>2.5</sub>	N/A (PM <sub>2.5</sub> )	13.8	24-hour	27	CAAQS	51%
		8.7	Annual	8.8		99%
Benzene	71-43-2	1.1	24-hour	2.3	Ontario AAQC	48%
		1.03	Annual	0.45		229%
1,3-Butadiene	106-99-0	0.08	24-hour	10	Ontario AAQC	1%
		0.05	Annual	2		3%
Benzo(a)pyrene	50-32-8	0.00048	24-hour	0.00005	Ontario AAQC	960%
		0.00055	Annual	0.00001		5500%

**Notes:**

1. Based on the five years' data from the nearest NAPS stations.
2. Data was processed based on averaging time, which is specified by the relevant provincial or federal standards.
3. NAAQO - National Ambient Air Quality Objectives; AAQC - ambient air quality criteria; CAAQS - Canadian Ambient Air Quality Standards.

It is shown in the table that the background levels of these primary contaminants of concern at the local area are below their applicable ambient air quality criteria except, for benzene (annual average) and B(a)P (both 24-hour and annual).

- Benzene: Based on the review of 14 NAPS stations in Ontario which monitored benzene, 9 of these stations measured benzene concentrations higher than the relevant annual criteria. It

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is common that the background concentration of benzene in urban areas of Ontario is currently measured to be above the relevant criteria.

- B(a)P: The background concentration of B(a)P in Ontario is higher than the relevant criteria. This trend is common across Ontario at all NAPS stations, where B (a)P was monitored since 2010.

**Nearby Receptors**

According to the City of Mississauga Zoning By-Law, the Study Area is zoned commercial. As previously noted, areas immediately surrounding the Study Area are commercial, institutional, vacant land, and roadways. The proximity of the nearest residential areas to the Project are described as follows:

- Multi-tenant condominium buildings occupy the block southwest of the Living Arts Drive & Square One Drive intersection, with a separation distance approximately 100 m from the Project (refer to Figure 2).
- Two condominium buildings to the west of the Project, west of Confederation Parkway, with a separation distance approximately 140 m.
- residential houses to the north of the Project, north of Highway 403, with a separation distance of approximately 240 m.

Other future residential development areas are planned southeast of the Study Area, as shown in Figure 2.

**Traffic Change and Potential Impact on the Local Air Quality**

Living Arts Drive is classified as a Minor Collector in the City's Official Plan. These types of roadways are designed to accommodate low levels of traffic. The future extension of Living Arts Drive as a Minor Collector is indicated as part of planning for the City's long term road network. Rathburn Road West and Centre View Drive are both classified as Major Collector roadways, intended to serve a moderate volume of business and goods movement traffic. The policies of the City's Official Plan recognize that the creation of new roads will be required to support more compact development and the increased traffic volumes associated with future urban growth.

In the future, traffic patterns within and near the study area are expected to increase due to an increase in the number of people living and/or working in downtown Mississauga. Other changes, such as construction/operation of the Hurontario LRT and modifications to the City's roadway network that are currently under consideration, may also affect the future local traffic in the Study Area.

Traffic data for the existing "no-build" (i.e. do nothing) and "build with extension" scenarios in future horizon years (2021, 2031 and 2041) have been compared to check the related traffic volumes and evaluate the potential impact on future AQ in the Study Area due to the Project.

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Current and predicted future Annual Average Daily Traffic (AADT) data, including percentages of heavy vehicles (HV%), for the subject and nearby local roads are listed in Tables 2 and 3. A comparison of existing to future AADT is presented in Table 4.

**Table 2: Existing 2017 AADT and HV% at the Project Nearby Roads**

Road Segment		2017 Year	
		AADT	HV%
Centre View Drive:	W of Duke of York Boulevard	24000	5%
Confederation Parkway:	N of Rathburn Road West	27000	2%
Rathburn Road West:	W of Duke of York Boulevard	22500	4%
Rathburn Road West:	W of Living Arts Drive	21000	3%
Living Arts Drive:	N of Rathburn Road West	1500	1%
Living Arts Drive:	S of Rathburn Road West	3500	5%

**Table 3: Forecast AADT and HV% in Future Years**

Road Segment		2021 Year		2031 Year		2041 Year	
		AADT	HV%	AADT	HV%	AADT	HV%
Centre View Drive:	W of Duke of York Boulevard	24500	5%	28500	5%	28000	5%
Confederation Parkway:	N of Rathburn Road West	37000	2%	40500	2%	39000	2%
Rathburn Road West:	W of Duke of York Boulevard	23000	4%	25500	4%	38500	4%
Rathburn Road West:	W of Living Arts Drive	25500	3%	28000	3%	30500	3%
Living Arts Drive:	N of Rathburn Road West	8000	6%	10500	6%	24000	6%
Living Arts Drive:	S of Rathburn Road West	10000	4%	12000	4%	17500	4%
Cineplex Access:	W of Duke of York Boulevard	1000	1%	1000	1%	1000	1%
Cineplex Access:	W of Living Arts Drive	1000	1%	1000	1%	1000	1%
Centre View Drive:	W of Living Arts Drive	27500	5%	32000	5%	36500	5%
Living Arts Drive:	S of Centre View Drive	7000	6%	10000	6%	23500	6%

\*Access road is not available in 2017.

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**Table 4: Comparison of AADT Relative to Current Year**

Road Segment		Percentage of 2017 AADT		
		2021	2031	2041
Centre View Drive:	W of Duke of York Boulevard	102%	119%	117%
Confederation Parkway:	N of Rathburn Road West	137%	150%	144%
Rathburn Road West:	W of Duke of York Boulevard	102%	113%	171%
Rathburn Road West:	W of Living Arts Drive	121%	133%	145%
Living Arts Drive:	N of Rathburn Road West	533%	700%	1600%
Living Arts Drive:	S of Rathburn Road West	286%	343%	500%

Table 3 indicates that the AADT on Centre View Drive, Confederation Parkway, and Rathburn Road West will gradually increase at a stable rate from 2017 to 2041 due to ongoing urban development. The maximum percentage of the AADT in 2041 relative to 2017 at these four segments is predicted to be 171%.

Considering the implementation of cleaner fuels and advanced emissions control technology for onroad vehicles and the separation distance to the nearest residential receptors, these traffic volume increases are not expected to have greater emission effect than the existing condition. The range of percentages of heavy vehicle, which generate greater emissions than light passenger vehicles, does not change in these comparing years.

The AADTs of Living Arts Drive (two segments - north and south of Rathburn Road West) are estimated to increase significantly in future years, up to 1600% of the current 2017 volume. This is mainly due to growth expected in downtown Mississauga. However, the increased traffic volumes are comparable to the Rathburn Road West segments (shown in Table 3) and lower than the Confederation Parkway segment (north of Rathburn Road West). Since the Confederation Parkway segment is immediately adjacent to the residential area to the west, while the separation distance from the subject Living Arts Drive segment is approximately 100 m to the same residential area, the emission effect on the nearby residential receptors from the Project is not expected to be greater than that of the existing segment of Confederation Parkway.

In addition to the AADT data, the estimated future horizon years' AM and PM peak hour traffic data for "no-build" scenarios and "build with extension" scenarios at the Rathburn Road West & Living Arts Drive intersection are presented in Table 5. As shown in this table, the peak hourly traffic volumes on the related road sections will not increase substantially in the "with extension" scenarios, when compared to the "no-build" scenario. This indicates that the increased AADT values resulting from the Project are likely spread over the course of the day, rather than concentrated during the AM and PM peak periods.

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**Table 5: Traffic Volume for "No-build" and "Build With Extension" Scenarios**

Intersection/Year	"No-Build" Traffic Volume*		"Build With Extension" Traffic Volume*		Volume Percentage of ("No-build")/("Build With Extension")	
	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Rathburn Road West/ Living Arts Drive						
2021	2,062	2,414	2,159	2,750	96%	88%
2031	2,263	2,870	2,480	3,159	91%	91%
2041	2,813	3,307	3,324	4,623	85%	72%

\*Traffic data are from Transportation and Traffic Analysis Report prepared by Stantec for the Project.

The extension of Living Arts Drive from Rathburn Road West to Centre View Drive would attract some traffic from roadways (such as Rathburn Road West/Duke of York Boulevard, and the intersections of Station Gate Road with Centre View Drive and Rathburn Road West) and alleviate some of the congestion experienced within the adjacent Study Area network. Although traffic volumes would increase under the "build with extension" scenario, local traffic is expected to be moving more smoothly and efficiently due to the implementation of the Project. Vehicle engines would thereby generate fewer emissions as a result of these improved fuel combustion conditions, and would generally be subject to less idling time while travelling through the local traffic network as compared to future "no-build" scenarios. Additionally, as older vehicles are gradually replaced by newer and lower emission vehicles, ongoing improvement in average tailpipe emissions per vehicle between now and 2041 would further reduce traffic emissions.

Furthermore, it should be noted that the existing background air quality both within and adjacent to the local area is not only affected by the nearby road traffic emission sources; other human activities (e.g., commercial activities) and natural sources would also contribute to the background air quality level. Therefore, the increase in traffic volumes expected in association with the Project is not expected to produce notable change in the air quality within the Local Area. A more detailed modelling approach to evaluate the nearby receptor air quality effect is not necessary for the Project.

### **Construction Emissions and Future Vehicle Emission Trend**

During construction of the Project, the sources of related emissions expected will be primarily from non-road construction equipment engines and onroad truck engines. Fugitive dust from vehicle traffic over temporary unpaved surfaces will also be generated. Total construction related air emissions will be temporary, anticipated over several weeks to potentially months. Project construction emissions can be mitigated by ensuring that well-tuned and maintained engines are provided with construction equipment, and that proper project planning and management ensures



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a short duration for potential unpaved vehicle traffic surfaces. If necessary, temperature barrier and/or road wet suppression can be applied to control fugitive dust emissions during the construction period.

Vehicle emission reduction strategies have been a focus of primarily federal but also provincial initiatives over the past 20 to 30 years. Increasingly stringent new vehicle emissions standards have been adopted, and augmented with programs such as vehicle maintenance related to emissions reduction, and requirements for emissions for other engine types. These increasingly stringent policies focused on vehicle emissions reduction should consistently reduce the combustion emissions components in air quality.

## **Conclusion**

The following conclusions can be drawn from the air quality assessment:

- The background air quality levels for the primary air contaminants in the Study Area are estimated to be lower than their related criteria, with the exception of benzene (annual average) and B(a)P (both 24-hour and annual), which baseline concentrations are over their respective criteria. These exceedances are common in southern Ontario, and are not unique to the Study Area.
- In providing an additional north-south link between Centre View Drive and Rathburn Road West, the Project serves as an alternate link to accommodate the projected volume of north-south trips along Duke of York Boulevard and Station Gate Road. It is understood that the extension of Living Arts Drive would be beneficial to the performance of the local road network. Emissions from vehicle engines are expected to decrease, given improved fuel combustion conditions and generally less idling times within the local traffic network, when compared to future "no-build" scenarios.
- Even though future traffic on the proposed extension of Living Arts Drive is expected to increase due to the Project, the potential change in air quality on the nearby residential receptors is expected to be low, and the increase of the traffic due to the Project is not expected to change the baseline air quality compliance status of the surrounding area.
- Emissions associated with construction of the Project will be temporary in nature and manageable.
- With the implementation of new vehicle emissions standards, further reduction in vehicle combustion emissions are expected in the future. This would lower the contribution from road traffic to the ambient air quality concentrations.

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Attachment: Figure 1 – Study Area of the Project  
Figure 2 – Existing Condition of Surrounding Area





Legend  
 Study Area

0 100 200 metres  
 1:7,500 (at original document size of 8.5x11)



Project Location  
 City Of Mississauga  
 165011016 REV A  
 Prepared by SPE on 2017-10-26  
 Technical Review by BCC on 2017-06-02

Client/Project  
 CITY OF MISSISSAUGA  
 CLASS EA STUDY-LIVING ARTS DRIVE  
 ASSESSMENT OF POTENTIAL AIR QUALITY

Figure No.  
 1

Title  
**Study Area**

Notes  
 1. Coordinate System: NAD 1983 UTM Zone 17N  
 2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2016.  
 3. Orthoimagery © First Base Solutions, 2017.  
 Imagery Date, 2016.

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Legend	
	Study Area
	Signalized Intersection
	Unsignalized Intersection
	Roundabout
	Existing Residential
	Parks
	Institutional
	Commercial
	Hydro Transmission Corridor
	Vacant Land
	Future Light Rail Transit (LRT)



Notes  
1. Not to scale.



Project Location  
City Of Mississauga  
165011016 REV-A  
Prepared by SPE on 2017-10-26  
Technical Review by BCC on 2017-06-02

Client/Project  
CITY OF MISSISSAUGA  
CLASS EA STUDY-LIVING ARTS DRIVE  
ASSESSMENT OF POTENTIAL AIR QUALITY

Figure No.

2

Title

Existing Condition of Surrounding  
Area of the Project

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