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Ontario Line | Pape Avenue Junior Public School | Health and Safety Plan

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1.0 INTRODUCTION

A portion of the new Ontario Line will be delivered through a series of construction activities, and to support the implementation of the Ontario Line work Metrolinx has developed this Health and Safety Plan to outline how Ontario Line work will be managed near the Pape Avenue Junior Public School (the "School"). Each of these activities vary in nature and will be undertaken in stages over the course of a number of years' time. Each of these activities is contracted in a different way through different contracting authorities depending upon the nature of the work. Each of these activities is within the jurisdiction of, with limitations placed upon the work, through permits issued by, the City of Toronto and governing legislation, codes and standards. Activities which will potentially impact schools also fall under the oversight of the Toronto District School Board (TDSB).

During all construction activities, Metrolinx will take appropriate measures to protect the health and safety of those potentially affected by the work, whether that work is being managed directly by Metrolinx or by a third-party utility company. To maintain consistency in how potential hazards are identified and the associated risks are managed, Metrolinx has prepared this Pape Avenue Junior Public School Ontario Line Health and Safety Plan ("the Plan") to collect and communicate to all interested parties the measures which will be taken to mitigate the project's key health and safety risks. Metrolinx will communicate the requirements of this Plan to the City of Toronto, TDSB and those utility companies that will be performing modification work to their own assets to enable future Ontario Line construction. Metrolinx will incorporate the requirements of this Plan into its contract documents for work being performed by Metrolinx contractors.

The works to be accomplished in close proximity to the School include the following three categories of work:

- Work to be performed by the responsible utility companies (Bell, Toronto Hydro, Enbridge and Rogers/Beanfield) which will be conducted within the streets to the north, east and south of the school,
- Work to be performed by a future Metrolinx utility services contractor to install a new directionally drilled micro-tunnel which will pass underneath the exterior playground area of the School, and
- Works to be performed by future Metrolinx design-build contractors to: a) construct a new portal for the transition of Metrolinx service from the GO corridor into new tunnels to be driven under the general alignment of Pape Avenue, certain demolition and other preparatory works to allow for the construction of the portal, and construction of the tunnels, and b) complete the installation and commissioning of track and rail systems within the new tunnels.

There will be other works in the future related to construction of real estate developments around the portal structure and adjacent areas. Further information will be provided regarding future real estate development as it is determined.

Metrolinx, the City of Toronto, TDSB and the responsible contractors will continue to use the Construction Liaison Committee (CLC) meetings as the forum to communicate the schedules for each item of work and to discuss the specific arrangements which will be put in place for each element of work in advance of the work commencing as outlined in this plan.

2.0 SITE SPECIFIC OPERATIONS

For each element of work the responsible contractor will perform its activities in accordance with the requirements specified in the contracting authority's contract documents and be responsible for the management of activities in accordance with those requirements and any limitations imposed in permits granted by the City of Toronto.

Metrolinx will assign site management staff to oversee all elements of project work to confirm that appropriate monitoring and controls are in place to meet the requirements and limits specified in this Plan. Where any contractor, whether being directly managed by Metrolinx or by a third-party utility company, is in breach of a requirement of this Plan, Metrolinx will stop the activity until site conditions and activities are reviewed and, where appropriate, mitigative measures are implemented before work resumes.

Metrolinx will ensure that day-to-day communications are established by its site team with the appropriate school officials to provide a single point of contact in the event of concerns or interest in the work. A 24-7 Communications Hotline is being established to allow the public to report any concern or issue for immediate attention by Metrolinx (the details of which will be communicated via the CLC and public notices).

Metrolinx and/or the responsible contractors will employ security services to provide control and monitoring of all construction sites during hours that contractors are not on site and/or working.

3.0 SITE SPECIFIC PLANS AND SCHEDULES

For each element of the work, a detailed package will be delivered to the school, and presented to the CLC, which provides the specific plans, sequences and schedules for the work in advance of commencing the work. This package will contain information that identifies key contacts for the work, plans and/or diagrams which depict the scope of work and the contractor's arrangements for traffic management, pedestrian management, noise mitigation, air quality control and, where applicable, monitoring for settlement and movement due to works adjacent to the school structure.

4.0 NOISE AND VIBRATION CONTROL

4.1 Noise

4.1.1 Noise Exposure Limits

Metrolinx, from extensive experience gained through a variety of other projects, has developed construction noise limits which will be imposed on the contractors. Construction noise limits to be employed for work in the vicinity of the School are identified in Table 4-1.

Table 4-1 Construction Noise Limits

***Leq*, dBA (daytime, 07:00 – 18:00)**	***Lmax*, dBA**	***Lpeak*, dBZ [1]**
69	85	120[2]

The following notes are included as part of Table 4-1:

1. Noise limits are applied outdoors to the exterior of the building and the open playground areas.
2. L*eq* refers to the energy-average noise level, over the given period (e.g., 1 hour), as a measure of loudness.
3. L*max* refers to the maximum short-term (e.g., 1 second) average noise level, as a measure of loudness.
4. L*peak* refers to the instantaneous sound pressure, as a potential for hearing damage related to impact or instantaneous noise (e.g., jackhammer, piling).
5. dBA refers to the loudness of the noise (decibels, A-Weighted sound level).
6. dBZ refers to the unweighted noise, as an instantaneous sound pressure (decibels, unweighted).
7. L*eq* daytime defined based on the monitored surrounding area average noise level (64 dBA) and a maximum increase of 5 dB, defined as the point where a "clearly perceptible"[3] increase in loudness begins.
8. Baseline noise levels in the area to be confirmed at the school through additional noise monitoring in advance of works (see Section 4.1.2 Noise Monitoring below).

These construction noise limits are consistent with applicable noise exposure regulations defined in Ontario Regulation 381/15 under the *Occupational Health and Safety Act*. This regulation identifies that the "employer shall ensure that no worker is exposed to a sound level greater than an equivalent sound exposure level of 85 dBA [L*eq*, 8-hr]" as applicable to the utility workers and staff. Though this is an average of 85 dBA over an 8-hr period of exposure, providing an L*max* of 85 dBA and L*eq* daytime of 69 dBA ensures that the provincial occupational sound exposure level shall not be exceeded at the school as result of construction activities. An additional hearing protection criterion for children of 120 dBZ L*peak* has been identified through review of WHO and Health Canada guidance and adopted for these works[4,5].

Toronto Public Health provides guidance on noise-induced hearing loss and notes "noise-induced hearing loss is unlikely when average daily exposure (24-hour) to noise is below 70dBA. The

[1] As provided by WHO (1999) and Health Canada (2017) for hearing damage to children. L*peak* levels of 140 dBZ are associated with adults.
[2] Identified as the L*peak* noise level measured at 100mm from a child's ear.
[3] Increase in noise level – reference Table 2.1, Bies & Hansen "Engineering Noise Control Theory and Practice 3rd Edition".
[4] Health Canada, "Guidance for Evaluating Human Health Impacts in Environmental Assessment: NOISE", 2017
[5] World Health Organization "Guidelines for Community Noise", 1999

equivalent 8-hour exposure threshold for hearing loss that includes impulse sounds is 75dBA L*eq*, 8-hr].[6] The average noise limit in Table 4-1 (69dBA) ensures compliance with the Toronto Public Health recommendation of 75dBA L*eq,* 8-hour.

Toronto Municipal Code Chapter 591-2.3 Construction Noise does not have specific noise limits at the receptor for construction. This by-law only identifies exclusion times for construction activity when the noise may clearly audible. Thus, Table 4-1 noise limits supplement the By-law by applying specific noise limits irrespective of the exclusion times.

Ministry of Environment, Conservation and Parks (MECP) does provide guidance on environmental noise and its impact. MECP guidelines NPC-115 and NPC-118 provide maximum noise limits for specific construction equipment, which are provided as mitigation requirements (see 4.1.3 Other Noise Mitigations below).

4.1.2 Noise Monitoring

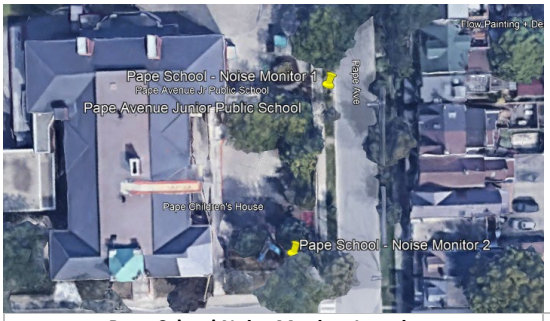
Metrolinx has been conducting noise monitoring to confirm baseline noise levels at the school and establish the L*eq* daytime limit. Construction noise monitoring will continue to be conducted during the entire course of the construction works.

Figure 4-1, below, illustrates the current noise monitoring locations and an example of a monitor installation. Further details on the noise monitoring include:

- Industry-quality Type 1 sound level meters are be used at the site.
- Equipment will be set up in a tamper-resistant case, with the microphone secured at a height of 3-5 meter (m) on a tripod or metal pole.
- The equipment is set up to continuously log noise in the area to capture all noise data from construction and other ambient sounds in the area.
- Sound level meters automatically upload logged data to the cloud, with real-time exceedance notification emails and/or SMS texts.
- Audio will only be recorded for any exceedances of L*eq,* L*max* and L*peak* to confirm if exceedances were construction related.
- Warning/review levels will be set lower than those noted in Table 4-1, to provide opportunity for adaptive management where feasible prior to any potential exceedance.

Indoor noise monitoring will not be considered due to staff and child privacy concerns and expected false readings due to classroom activity.

[6] Toronto Public Health, "How Loud is Too Loud? Health Impacts of Environmental Noise in Toronto", 2017



Pape School Noise Monitor Locations

Noise Monitor 1 Setup

Noise Monitor 2 Setup

Figure 4-1 Noise Monitoring Locations (subject to site conditions)

4.1.3 Noise Mitigation

4.1.3.1 Long-Term Barrier

Metrolinx will design and install a long-term noise barrier on the east, north and south sides of the playground area east of the school building pending agreement of details with the School and TDSB. The long-term noise barrier will address noise impact from the adjacent works.

Details of the specific location and height of this barrier will be confirmed through noise modelling analysis. Conceptual design details of this long-term barrier will consider:

- Construction with acoustic material on the side facing the construction equipment
- The side facing the school will be constructed with acoustically engineered plywood (or other acceptable material) to reduce noise through the barrier from construction activity,
- A wall of up to six meters in height to ensure noise over the barrier is attenuated effectively.

This long-term barrier will be in place for the duration of planned utility and sewer works as a minimum. The requirements for this barrier will be reassessed at subsequent phases of construction to make sure appropriate noise mitigation is in place.

Given the size and permanence of this long-term barrier, an aesthetic upgrade to its construction may include having the side facing the school covered in a mural (similar to Figure 4-2). The design of any mural will be coordinated with TDSB and the School, with input from the students and staff on its design.

Figure 4-2 Custom Art Construction Hoarding Example

4.1.3.2 Temporary Barriers

To complement the long-term noise barrier, temporary barriers will be installed as required to mitigate noise at nearby residences.

Temporary construction-noise barriers can be erected and dismantled as required. Examples of temporary barriers are shown in Figure 4-3. These barriers are expected to provide 6-12 dB of noise reduction[7].

Figure 4-3 Temporary Noise Barrier

4.1.3 Other Noise Mitigations

Monitoring and noise barriers, in combination, are the main construction noise controls identified for implementation for the works adjacent to the School. However, Metrolinx acknowledges that additional mitigation may be required to address construction noise impact. Should monitoring identify an exceedance to the noise limits, the following mitigation options shall be investigated and implemented as agreed with the School.

Further physical mitigation strategies will be used where appropriate to address construction noise may include:

- Locating noisy equipment as far away as possible from the school.
- Using equipment only in tasks for which they are designed.
- Using equipment with the lowest noise emission levels.
- Use equipment powered by electricity rather than diesel engines.
- Minimize the use of diesel electric generators and use mains electricity where available.
- Shut down or throttle down to a minimum all equipment between construction activities.
- Fit all equipment with appropriate mufflers and silencers.
- Providing an acoustic shed around the noisiest equipment.

[7] Based on site measurements conducted in January 2023 at Pape School.

Further operational mitigation strategies will be used where appropriate to address construction noise. Some examples include:

- All construction equipment to comply with MECP NPC-115 and NPC-118 noise guidelines.
- Adopting working hours to restrict noisy activities outside of school hours where applicable.
- Limiting, as practical, noise generating activities during periods of time when children are outside (e.g., during school commutes and playground activities).
- Arranging delivery times outside of school hours.
- Planning deliveries and vehicle movements so that vehicles are not waiting or queuing on public roads. If waiting and queuing is unavoidable then engines should be turned off.
- Planning site layout to ensure that reversing is kept to a minimum and, where practicable, eliminated altogether.
- Where reversing is required, using broadband reverse sirens/alarms or, where it is safe to do so, disengaging all sirens and alarms and use flagmen.
- Reducing the need for noisy assembly practices (e.g., by fabricating off site).
- Sequencing the use of equipment such that multiple noise-generating activities are not occurring during the same time-period.
- Rather than breaking in-situ, removing larger sections and breaking them either in an area away from sensitive receptors or off-site.
- Locating the site access points and the construction vehicle routes as far away as possible from sensitive receptors.
- Minimizing the drop height into trucks and other equipment.
- Choosing working methods with the lowest noise impacts.
    - In demolition work, avoiding the use of percussive demolition techniques, use hydraulic shears instead of hydraulic impact breakers.
    - When breaking pavements, using methods other than pneumatic breakers and drills, including chemical splitters and falling weight breakers.
    - When excavating hard material, using rotary drills and bursters actuated by hydraulic or electrical power.

4.2 Vibration

4.2.1 Vibration Limits

Metrolinx, from extensive experience gained through a variety of previous projects, has developed construction vibration limits for the works. These limits are presented in Table 4-2.

Table 4-2 Construction Vibration Limits

Frequency of Vibration (Hz)	Maximum Vibration Peak Particle Velocity Limit for Standard Construction (mm/s)	Maximum Vibration Peak Particle Velocity Limit for Built Heritage Resources (mm/s)
Below 4H	8	3
4Hz and below 10Hz	15	3
10Hz and below 50Hz	25	8
50Hz and above	25	10

The following notes are included as part of Table 4-2:

1. Limits are applied indoors of the building.
2. Limits are applicable to levels where cosmetic damage (e.g., cracking) may occur.
3. Built Heritage Resource limits are as per DIN 4150-3 Structural Vibration: Part 3 Effects of Vibration on Structures.
4. Standard construction limits are per City of Toronto Bylaw 514 Construction Vibrations.
5. Vibration levels are expected to be perceptible (i.e., felt) in the building at levels below those noted in Table 2.
6. Table 4-2 vibration levels are not applicable to vibration impacts on asbestos.[8]

The Pape Avenue Junior Public School, given its age and construction, would apply the "Built Heritage Resources" limits.

4.2.2 Vibration Monitoring

Metrolinx has been conducting vibration monitoring to confirm baseline vibration levels. Construction vibration monitoring will also be conducted during the entire course of the works.

Vibration monitoring is located inside the school, at the façade closest to the planned construction activities. Further details on the vibration monitoring include:

- Industry-quality geophone vibration monitors are to be used.
- Equipment set up in a tamper-resistant case, inside the school on the floor.
- The equipment is set up to continuously log vibration in the area to capture all vibration data from construction and other ambient vibrations in the area.
- Vibration meters automatically upload logged data to the cloud, with real-time exceedance notification emails and/or SMS texts.
- Vibration triggers will only be recorded with exceedances of the vibration limit to confirm if exceedances are construction related.

[8] Review of supplemental construction vibration requirements for asbestos is ongoing and Table 4-2 is subject to review and update upon completion of the asbestos vibration review.

- Warning/review levels will be set lower than those noted in Table 4-2, to provide opportunity for adaptive management where feasible prior to any potential exceedance.

4.2.3 Vibration Mitigation

Should monitoring identify an exceedance to the vibration limits, the following mitigation options shall be investigated and implemented where appropriate, as agreed with the school.

- Rather than breaking in-situ, removing larger sections and break them either in an area away from sensitive receptors or off-site.
- In demolition work, avoiding the use of percussive demolition techniques, using hydraulic shears instead of hydraulic impact breakers.
- When breaking payments, using methods other than pneumatic breakers and drills, including chemical splitters and falling weight breakers.
- When excavating hard material, using rotary drills and bursters actuated by hydraulic or electrical power.
- Adopting the following hierarchy of groundwork/piling methods:
    - Pressed-in methods, e.g., hydraulic jacking
    - Auger / bored piling
    - Diaphragm walling
    - Vibratory piling
    - Driven piling
- Using vibratory equipment in a manner that minimizes the incident vibration at nearby receptors (e.g., by using smaller equipment, turning off the mechanical vibration on vibratory rollers and conducting more passes, engaging concentric weights only when running at speed).

5.0 AIR QUALITY CONTROL

The objective of this Health and Safety Plan for Air Quality Control is to minimize the effects from the works to ambient and indoor air quality to the greatest extent practicable, and to minimize the children's exposure to air pollutants resulting from construction. Metrolinx has developed ambient action levels and mitigation and control measures targeted to the works to minimize the impacts to air quality. Potential air pollutants considered in this plan include airborne particulate matter including the inhalable fraction (PM_{10}), the respirable fraction ($PM_{2.5}$), metals, volatile organic compounds (VOCs) and respirable crystalline silica.

Dust emissions typically arise during handling of soils or aggregates, vehicle traffic on roadways, and cutting, sanding and grinding associated with construction. Engine exhaust emissions may also contribute to poor air quality due to very fine particulates associated with fuel combustion and may contribute to adverse health effects, particularly for children and people with respiratory difficulties. Dust and other airborne contaminants can be mitigated through good management practices and standard dust control measures such as misting exposed soils and dusty surfaces with water, sweeping and tarping of materials, and control of traffic routes and speeds. The effectiveness of dust control measures can be monitored visually or through air sampling.

Table 5-1 below presents the federal and provincial criteria as well as Metrolinx developed action levels that will trigger investigation and, where required, implementation of additional mitigation

measures. However, as stated above, the objective is not only to aim for adhering to these limits, but to limit the air quality impacts from the works as much as reasonably possible through:

- Limiting dust generating construction activities during morning drop-off time and after school pick-up time.
- Monitoring – Ambient air quality levels in the area ahead of the works will be confirmed at the School through baseline monitoring by Metrolinx (see Air Quality Monitoring below). Ambient air quality monitoring will continue throughout the works.
- Implementing mitigation measures - The contractors will implement mitigation measures to limit, to the extent possible, the impacts (i.e., increase in dust and other air pollutant levels) to baseline air quality levels.

Federal and provincial ambient air quality limits and Metrolinx action levels for particulate matter and metals that are applicable to the works are identified in Table 5-1. Limits for other air pollutants (VOCs, metals) will be based on the Ontario Ambient Air Quality Criteria (AAQC).

Table 5-1 Outdoor Ambient Air Quality Limits for Particulate Matter (PM) and Silica

Parameter	Ambient Air Quality Limits note 1	Averaging Time Period	Air Quality Action Level that triggers investigation	Length of time action level is exceeded that triggers investigation	Monitoring Method
$PM_{2.5}$ note 2	27 µg/m^3 **note 4**	24 hours	81 µg/m^3	15 minutes	Real-time, continuous
PM_{10} note 3	50 µg/m^3	24 hours	150 µg/m^3	15 minutes	Real-time, continuous
Respirable Crystalline Silica	5 µg/m^3	24 hours	NA	NA	Time-interval sample analyzed at a laboratory

The following notes are included as part of Table 5-1:

1. Ambient air quality limits are applied outdoors to the exterior of the building and the open playground areas.
2. $PM_{2.5}$ refers to particulate matter less than 2.5 microns in diameter, and typically includes diesel combustion particulates and emissions from gasoline, oil and wood burning.
3. PM_{10} refers to particulate matter less than 10 microns in diameter and includes $PM_{2.5}$ as well as dust, pollen and bacteria.
4. µg/m^3 means micrograms per cubic metre.

Ambient air quality limits are governed by provincial and federal regulations. There is no legislation that specifically addresses air quality on construction project sites. Ambient air quality limits for PM_{10} and respirable crystalline silica are set by the Ontario Ministry of Environment, Conservation and Parks (MECP) as the Ontario Ambient Air Quality Criteria (AAQC). Ambient air quality limits for $PM_{2.5}$ are set by the federal Canadian Council of Ministers of the Environment (CCME) as the Canadian Ambient Air Quality Standards (CAAQS). The province's AAQCs

consider sensitive or vulnerable populations in their development and meant to be protective against adverse effects on health and/or the environment. These values are most commonly used in special studies using ambient air monitoring data and the assessment of general air quality in a community.

The 15-minute air quality action levels are set by the Metrolinx Environmental Guide for Air Quality and Greenhouse Gas Emissions Assessment (2019) as a mitigation threshold for managing temporary elevated concentrations of particulate matter from construction projects. Exceedances of the 15-minute air quality action levels trigger investigations into the cause of elevated particulate matter levels and assess whether the contractor needs to implement mitigation measures (e.g., application of water for dust suppression or changes in work practices) to lower the particulate matter or silica levels. The 15-minute action levels are set higher than air quality exposure limits because they are triggered after 15 minutes so that mitigation measures can be implemented before the lower, more sensitive 24-hour limit is exceeded.

Indoor air quality limits proposed for the works adjacent to the School are identified in Table 5-2.

Table 5-2 Indoor Air Quality (IAQ) Reference Guidelines for Particulate Matter (PM) and Total Volatile Organic Compounds (TVOCs)

IAQ Parameter	Reference Guidelines note 1	Monitoring Method	Reference Source
PM_{10} note 2	50 µg/m^3 note 4	Real-time, continuous	ASHRAE, USGBC LEED
TVOCs note 3	1000 µg/m^3 (or 440 ppb)	Real-time, continuous	Health Canada

The following notes are included as part of Table 5-2:

1. Indoor air quality limits are compared to data collected from inside the school building.
2. PM_{10} refers to particulate matter less than 10 microns in diameter and includes $PM_{2.5}$ as well as dust, pollen and bacteria.
3. TVOCs refer to total volatile organic compounds.
4. µg/m^3 means micrograms per cubic metre.
5. Concentrations of PM_{10} and TVOCs will be measured inside the school through baseline monitoring ahead of construction (see Indoor Air Quality Monitoring below).

Indoor air quality limits are reference guidelines. Indoor air quality reference guidelines for PM_{10} have been published by the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) and the United States Green Building Council Leadership in Energy and Environmental Design. Indoor air quality reference guidelines for TVOCs for office buildings are published by Health Canada. Health Canada does not have published reference guidelines or standards specifically for schools or daycare settings.

The following monitoring measures will be implemented for each element of the works:

Ambient Air Quality Monitoring

Prior to the start of the works, baseline monitoring will be conducted by Metrolinx at the School to measure ambient levels of PM_{10}, $PM_{2.5}$, respirable crystalline silica, metals, speciated VOCs and TVOCs.

Metrolinx will continuously monitor ambient levels of $PM_{2.5}$and PM_{10} at the School during the works. Metrolinx will also continuously monitor ambient TVOCs for the duration of planned utility and sewer works as a minimum. The monitoring data will be compared with the Applicable Air Quality Criteria and Limits and will be used to assess changes in air quality due to the works, to assess the effectiveness of the mitigation measures, and to determine the need for additional mitigation measures. Additional monitoring and sampling may be conducted at the beginning of each new construction activity and repeated on a regular interval depending on the results of the baseline air monitoring ahead of construction.

For ambient air quality monitoring during the works:

- The monitors used will log data frequently, and at a maximum of 15-minute intervals.
- Monitors will be calibrated following manufacturer's specifications.
- Metrolinx will receive real-time e-mail alerts of exceedances of the 15-minute air action levels and applicable Air Quality Criteria and Limits for $PM_{2.5}$ and PM_{10} .
- Silica samples will be taken during periods when construction activities have the potential to generate silica.
- Weekly report will be generated to summarize monitoring data from the previous week and recorded observations.
- Metrolinx will have access to historical and real-time monitoring data; and
- Metrolinx will retain all monitoring data and related reports for the duration of the construction activities.

Indoor Air Quality Monitoring

Prior to the start of the works, baseline monitoring will be conducted by Metrolinx to measure indoor levels of PM_{10} and TVOCs. Metrolinx will continuously monitor indoor concentrations of PM_{10} and TVOCs for the duration of planned utility and sewer works as a minimum to compare the collected data with the applicable guideline values and previously collected baseline data, to assess the effectiveness of the mitigation measures, and to determine the need for additional mitigation measures. The requirement for indoor air quality monitoring will be reassessed at subsequent phases of construction to make sure appropriate mitigation measures protective of indoor air quality are in place.

For indoor air quality monitoring during the works:

- Metrolinx will log data frequently, and at a maximum of 5-minute intervals.
- Monitors will be calibrated following manufacturer's specifications.
- Metrolinx will receive weekly updates of measured concentrations of PM_{10} and TVOCs.
- Metrolinx will have access to historical and weekly monitoring data.
- Metrolinx will retain all monitoring data and related reports for the duration of the works.

Where there is a potential for impacts to air quality the existing control measures will be reviewed and recommendations for improvements will be provided where needed.

Mitigation Measures

The following control and mitigation measures will be implemented for each element of the works to the extent practicable:

Table 5-3: Construction Activities and Control Measures

Activity	Control Measures
General Dust Suppression	▪ Daily, or more frequently, if required, wetting of all soft and hard surfaces and any excavation face (if applicable) on the site. ▪ Non-hazardous chemical stabilization, such as polymer additives, can also be used in conjunction with wet suppression. This involves the use of chemical additives with minimal water (as little as 0.1 per cent moisture addition with dry fog suppression systems), which help to form a crust on the surface and bind the dust particles together through particle agglomeration. ▪ Surface improvements. For example, paving with concrete, asphalt or cobbles. ▪ Control methods and work practices that reduce dust accumulation in concrete cutting and grinding include: Wet-cutting and HEPA Vacuum & Exhaust Ventilation Systems. ▪ Adjust construction activities or suspend work under unfavourable conditions (sustained wind speed greater than 30 km/hr). ▪ Conduct dusty operations during weather conditions that limit emissions wherever possible, particularly where no other mitigation option is available (e.g., avoid windy dry weather days for ground stripping). ▪ Provide funding for HEPA air filters inside classroom areas.
Truck Traffic	▪ Limiting on-site vehicle speeds to 15 kilometers per hour. ▪ Wet down unpaved haul roads. Keep paved roads clean or wet down. If required, daily cleaning of the road pavement and sidewalks of the entire frontage of the property. ▪ Load trucks on an asphalt base to limit tracking of material onto the sidewalk and street. If the loading point becomes dusty, it shall be cleaned. ▪ Cleaning of all visible loose soil and dust from all trucks and vans leaving the site including washing of tires and sweeping or washing of exteriors and tailgates. ▪ Tarping all trucks leaving the site which may have been loaded with soil. ▪ Gravel access pads at entry/exit locations to be inspected daily to ensure functionality, add additional rock as required. ▪ Minimize or avoid truck idling while on site.

Demolition / Excavation Soil/Debris/Waste/Salvage Loading, Hauling, and Placement	▪ Use of water spray or misting as required. Tarping of all trucks leaving the site which may have been loaded with soil. ▪ Use of dump trucks with retractable covers for the transport of all friable materials. ▪ Temporary stockpiling of soil and other friable materials in locations less exposed to wind. ▪ Tarping of temporary storage piles as required.
Diesel and Gasoline Powered Equipment	▪ Diesel fuel and gasoline powered on-road and off-road equipment must meet applicable exhaust and evaporative exhaust emission standards established pursuant to Ontario Regulation (O. Reg.) 457/19 which defines the emission testing requirements and protocols for heavy diesel equipment, including maintaining the equipment and emissions controls in good operating condition. ▪ Construction equipment suitability for use shall be tracked by the responsible utility contractors and verified by Metrolinx.
Storage Piles	▪ The dust control options for storage piles can include but not limited to: barriers, pile location, tarping, water application, tackifiers and soil stabilizers, vegetation seeding

6.0 TRAFFIC AND PEDESTRIAN MANAGEMENT

The following criteria will be adhered to for each element of the work:

- Safe accommodation will be provided for all road users, including pedestrians, cyclists, transit users and people driving, in proximity to all construction zones, including conformance with the Accessibility for Ontarians with Disability Act (AODA) guidelines.
- A traffic signage plan will be developed for each element of the work in conformance with the applicable Ontario guidelines, including Traffic Manual Book 7 – Temporary Conditions, and Ontario Traffic Manual Book 18 – Cycling facilities, with clear guidance to all road users in the work zone. The signage plan will form part of the works information submissions to CLC as outlined in Section 3.0
- Metrolinx will work proactively with all contractors to minimize the impact of construction on the road network and adjacent land uses, including construction noise impact on the nearby noise-sensitive land uses.
- Access to transit, emergency services, residences, and businesses will be maintained, including foot access to front doors and vehicular access to driveways or parking within private properties.
- Plans for each element of the work will be designed to minimize impact on the on-street permit parking spaces and accommodate them at alternate locations, where feasible.
- Traffic calming measures will be utilized to discourage speeding.
- Potential conflicts between pedestrians and construction vehicles, particularly at the site driveways, will be managed by utilizing crossing guards assigned at intersections during the work and, where possible, through installation of physical barriers.
- No construction vehicles will be permitted during school children drop-off and pick-up times.

- Metrolinx will coordinate with other planned non-Ontario Line works in the area to minimize concurrent work on parallel routes.

The following monitoring and control measures will be implemented for each element of the work:

- Metrolinx contractors are required to obtain a permit before undertaking construction within the City road right-of-way. As part of the permit application, each contractor will prepare and submit traffic control plans that are compliant with the City and Provincial policies and standards and provide specific work details (scope, location, duration, and technical drawings), a traffic control plan (including establishment of alternate routes), evidence of insurance, and any additional information required by the permitting authority.
- In addition to oversight by the City for permit compliance, Metrolinx's site teams will monitor the work zone to ensure compliance with the approved plan as part of the City issued construction permit.
- Metrolinx will provide advanced construction notification to the city work zone traffic coordinator, the School, affected residents and businesses.
- Metrolinx contractors will be required to notify Road Disruption Activity Reporting System (RoDARS).
- Metrolinx, with the City's cooperation, will provide trained traffic control personnel, paid duty police officers and/or school crossing guards for each element of the work.
- Metrolinx will ensure that contractors install appropriate traffic signage aimed at specific road users, including pedestrians, in accordance with their approved traffic plans.
- City and Metrolinx will monitor and enforce time or route restrictions on construction vehicle movements, including the requirement for no construction vehicle movements during school drop-off and pick-up times.
- Metrolinx's site teams will ensure that contractors properly maintain work zones and adjacent street networks to a high level of cleanliness.
- City and Metrolinx will establish and enforce restrictions on construction crew private vehicle parking in work zones and on city roads.
- City and Metrolinx will establish and reinforce restrictions on haul truck staging and vehicle idling on city roads.
- City and Metrolinx will establish and enforce requirements for vehicle cleanliness and removal of street debris from vehicular movements.
- In the event the contractor violates the terms and conditions of the permit, Metrolinx site staff will stop work and the issued permit may be cancelled by the City.

7.0 GROUND MOVEMENT AND SETTLEMENT MONITORING FOR SEWER REPLACEMENT WORKS

The sewer replacement works will include the directional drilling, via a micro-tunnel boring machine (TBM), of a new sewer line diagonally under the School's playground area. The following criteria will be adhered to for each element of the work which will present the risk of ground movement during the work:

With respect to the vibration impacts from the sewer replacement works a Potential Damage Assessment Report and a Noise and Vibration Assessment Report was prepared by a

professional engineer to ensure vibration concerns are addressed. A vibration detector has been installed at the school property to capture baseline data and monitoring will continue throughout the construction activities. Using appropriate analysis based on the expected zone of influence, the types of soils and levels of vibration anticipated, the school is expected to remain under the maximum acceptable vibration limits of 3 mm/s for Heritage Structures at all stages of the construction works and will meet the Transportation Vibration Manual and City of Toronto Bylaw requirements. The monitoring equipment installed at the school property will ensure that those limits are not exceeded during execution of the works.

The following monitoring and control measures will be implemented prior to the sewer replacement works:

- A precondition assessment will be undertaken by the Contractor for all buildings affected by the works, including the school.
- A detailed monitoring and instrumentation plan will be produced by the appointed contractor prior to construction.
- Settlement monitoring along and adjacent to the tunnel alignment will be conducted prior to, and during construction. Readings are to be taken remotely, in real time as well as directly measured outside of school hours.
- The Contract will include ‘threshold’, ‘response’ and ‘shutdown’ values for ground movement, which include requirements the Contractor must adhere to.
- Reaching a ‘threshold’ level requires increased scrutiny on the works.
- Reaching a ‘response’ level requires implementation of ground control measures to actively control ground movement to prevent reaching the ‘shutdown value’.
- Reaching a ‘shutdown’ level halts all work immediately and requires development of an action plan before any work resumes.

8.0 GROUND MOVEMENT AND SETTLEMENT MONITORING FOR PORTAL AND TUNNELING WORKS

The design and construction of the Gerrard Portal and the tunnels under Pape Avenue will be accomplished by a yet to be selected contractor who will perform their work under a Project Agreement with Metrolinx. The Project Agreement will contain detailed technical requirements governing geotechnical instrumentation and protection of existing adjacent structures. The contractor will be responsible to accomplish the following activities under the Project Agreement which will form the basis for identifying potential impacts and mitigation measures which will be discussed and implemented prior to the commencement of work:

- Obtain, through surveys and investigations, pertinent information with respect to the School and complete an existing adjacent structures verification study which provides the required data and inputs to allow a deformation analysis of the structure to be accomplished,
- Conduct pre-, during- and post-construction condition surveys of all existing adjacent structures affected by the work,
- Conduct sufficient geotechnical ground investigations to support the design of the permanent OL infrastructure and associated deformation and other analyses,
- Perform a deformation analysis to determine the anticipated extent of ground movements for work to be accomplished, including the preparation of surface settlement

contour plans and construction impact assessment reports for each existing adjacent structure,
- Prepare, where the construction impact assessment report shows potential impact to an existing adjacent structure, an impact mitigation plan that identifies the proposed mitigation measures to prevent a loss of appearance, structural integrity, functionality, operability and durability and to ensure the continued operation and safety of the structure,
- Through the above process establish and maintain communication with, and gain acceptance of any required impact analysis plans by, the School through the Construction Liaison Committee meetings and other submissions and engagements with the school,
- Develop and implement a geotechnical instrumentation and monitoring program of a capacity, frequency and duration to monitor construction induced noise and vibration, displacements and strains for fill embankments, groundwater elevation and pressure and ground movements due to excavation and tunneling,
- Establish a baseline from which the above and other parameters are measured at required frequencies prior to the commencement of work, and
- Implement a response plan that prompts specified actions upon the actual conditions approaching minimum trigger levels as specified in the instrumentation and monitoring program.

The full specification for geotechnical instrumentation and protection of existing adjacent structures will be submitted for information upon development of such information by the selected design-build contractor for the Pape Avenue tunnels, portal and underground stations.

9.0 SOIL MANAGEMENT

The following criteria will be adhered to for each element of the work:

Soil excavation, material handling and stockpiling shall be performed in a manner that limits mixing of different categories of soil. Excavated soils shall be reused on-site to the extent feasible.

Soils excavated from known contaminated areas or exhibiting staining or olfactory evidence of contamination shall not be reused on-site.

Stockpiling of excavated material at discrete excavation locations will be kept to a minimum. Short term stockpiling or storage of materials may be needed until soil testing for disposal has been completed. The following procedures will be followed for the stockpiling and storage of soils:

1. Soils shall be segregated based on previous soil testing results or field observations and stockpiled in discrete piles in a way that limits the potential for mixing of different soil types or contamination. Soils shall be visually examined for staining or olfactory evidence of contamination. Soils shall be continuously screened in the field with portable field instruments including a photoionization detector (PID).
2. Soil identified as impacted or waste will be segregated from clean materials.
3. Soils shall be visually examined for staining or olfactory evidence of contamination. Soils shall be periodically screened in the field with portable field instruments including a photoionization detector (PID).

4. Soils shall be stockpiled in a clearly designated storage area pending disposal. Signage for stockpiles indicating material quality, soil type, destination site, etc. will be posted as indicated once the stockpiling area is established.
5. Soils shall be managed in accordance with applicable regulations under the supervision of the responsible contractor's Qualified Person and tracked as required by governing regulations.
6. Stockpiles shall be surrounded by erosion and sediment control barriers. When not in use, stockpiled soils shall be covered by an impermeable material and secured for containing dust or to prevent potential erosion by wind and rainfall. Periodic inspections will be done and if needed repair or replacement of damaged or dislodged covers and/or erosion and sediment controls will be completed. Mud mats, silt soxx or silt fencing may be installed to mitigate soil migration or surface run-off off-site during the construction.
7. Stockpile areas will be inspected during regular environmental inspections for compliance with segregation, signage and sediment control measures.
8. Tunnel spoils shall be stored in leakproof containers until they are solidified.
9. Workers will be required to wear Personal Protective Equipment (PPE), including safety boots, safety glasses, work gloves and hard hat to prevent direct contact with potentially impacted materials.
10. Impacted soils will be disposed of by licensed waste disposal contractor to a Ministry of Environment Conservation and Parks (MECP)-permitted waste disposal facility.

The following monitoring and control measures will be implemented for each element of the work:

Environmental inspections shall be completed on an operating day basis by the Contractor and inspected on a weekly basis by Metrolinx. The Contractor shall be responsible for completing a Daily Inspection Checklist on operating days, including a brief description of that day's work activities and approximate location and depth of excavation and tunnelling activities, if any. Inspection checklists will be entered directly into a software data collection program and will be viewable to Metrolinx.

Inspections shall document all observations including:

- A list of stockpiles present on site and soil quality, if known.
- Visual observations of any dust emissions, erosion and sediment controls, mud tracking or other environmental concerns associated with soil management.
- Confirmation of the implementation of soil management best management practices (BMP) listed above.
- Review of correct documentation of soil import and soil disposal tracking.
- Periodic photographic records of BMP practices.

A geotechnical drilling program was completed in the vicinity of the school to collect information on soil and groundwater conditions.

- Nine (9) boreholes were advanced on Pape, Riverdale and Langley Avenues (see Figure 9-1, below).
- Forty-one (41) soil samples were collected for lab testing for one or more of the following chemicals: metals and inorganics, petroleum hydrocarbons (PHCs), volatile organic

compounds (VOCs), semi-volatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), dioxins and furans.

- Benzo(a)pyrene was identified at a concentration of 0.41 ug/g in one soil sample from borehole OL-9102 from 0.3 to 0.9 metres below ground surface, which is within the proposed storm sewer removal excavation. The MECP Table 3 standard for all types of property use for benzo(a)pyrene is 0.3 ug/g. The MECP standard for benzo(a)pyrene is based on the background levels of this chemical in Ontario soils, which is 0.3 ug/g.
- Salt-related parameters (electrical conductivity, sodium adsorption ratio) were identified above MECP Site Condition Standards, but the MECP does not consider this an exceedance of environmental standards because salt is expected as a result of road-salting operations and is not a risk to nearby residents.
- The remaining chemicals tested in soil were below MECP Site Condition Standards.
- Soil in urban settings such as the Pape Avenue Junior School's community may sometimes exhibit elevated chemical concentrations due to historical land uses. There is a low risk of harm to the community from these chemicals because the public does not come in contact with soil material below ground.

Figure 9-1 Geotechnical Borehole Locations

10.0 GROUNDWATER MANAGEMENT

The following criteria will be adhered to for each element of the work:

Groundwater management during utility relocation work is expected to be minimal. The following procedures will be followed for groundwater management:

1. Groundwater from utility relocation work will be hauled off-site or discharged to the municipal sewer system.
2. Groundwater hauled off-site will be disposed by a licensed waste disposal contractor to a Ministry of the Environment, Conservation and Parks (MECP)-permitted waste disposal facility.
3. Groundwater discharged to the municipal sewer system will be treated to meet sewer discharge limits in accordance with municipal discharge agreements.
4. Groundwater holding tanks and treatment systems (if applicable) will have signage posted.

The following monitoring and control measures will be implemented for each element of the work:

Environmental inspections shall be completed on an operating day basis by the Contractor and inspected on a weekly basis by Metrolinx as described in Section 9.0 above.

Inspections shall document all observations including:

- A description of groundwater holding tanks and/or water treatment systems on-site, if appliable.
- Visual observations of the integrity of holding tanks and discharge outlets to the municipal sewer, if applicable.
- Review of correct documentation of groundwater disposal tracking.
- Review of operating records for the water treatment system.
- Periodic photographic records of BMP practices.

A geotechnical drilling program was completed in the vicinity of the school to collect information on soil and groundwater conditions.

- Groundwater samples were collected from six monitoring wells (G85-355-088S, G85-355-089S, OL-9102, BH-01, BH-02, and BH-03 – see well locations in Section 9.0).
- The chemicals tested met MECP Table 3 standards for all types of property use.
- Total suspended solids (TSS) were above the City of Toronto Sanitary Sewer Use By-Law limits for discharge to sanitary sewers in two wells (G85-355-088S and G85-355-089S.) TSS exceedances of the sewer by-law limits do not pose health concerns to the community. Water removed from excavations will be treated to settle the solids and discharged to the municipal sewer system under a sewer discharge permit from the City of Toronto. There is a low risk of harm to the community from TSS in groundwater because drinking water is supplied by the municipal water system.

11.0 REFERENCES

Pape CLC Terms of References, dated February 27, 2023