CITY OF OTTAWA'S COMBINED STORAGE AND SEWAGE TUNNEL PROJECT: Health Risks and Mitigating Requirements for Site #5 (New Edinburgh)

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Disclaimer: This paper does not purport to constitute a scientific review of all issues associated with the CSST project and has not been commissioned to do so. Rather, it is a series of observations based on 37 years of experience in the field and specialties of medicine.

Principal risks

From a reading of documentation prepared by the City of Ottawa and its contractors for the CSST project, there are four domains of principal risk for site #5 area residents. These are:

1) from contaminated soil, relating to the history of use of the area as waste disposal sites for mills and potash factory
2) from noise and vibration
3) safety and security concerns relating to heavy trucking: traffic and vehicular emissions, as well as equipment used on-site
4) mental health: anxiety and depression

Any risk to property is not within the purview of this paper. Environmental impacts without direct effect on health are also excluded from this review.

Risks from contaminated soil and from noise are especially applicable to children and young adults. This is particularly the case for auditory function.

Risks from diesel fumes and other emissions are especially applicable to any persons with pre-existing respiratory challenges: asthma, chronic bronchitis, emphysema and other COPD, especially among the elderly. Respiratory problems may exacerbate existing cardiovascular frailties.

Security concerns from heavy trucking apply equally to all demographic strata.

Mental health risks stemming from acute and chronic stress in relation to the project will apply particularly to parents worried about long-term health impacts on their children.

It may not be possible, post facto, to determine subsequent causality of illness of residents in relation to identified risks, since a prospective, population-based study – including random sampling and adequate stratification – would require many months of preparation and investment of resources. If the city authority had wished to be accountable in this way, it would have established such a study months or years before proceeding with the project. In industry, accountability for health impacts is commonly evaded through bad faith and by similar absence of epidemiological study. While a case study of health effects may be performed post facto and is a worthy endeavour, it may be insufficient to exact accountability from project designers and municipal authorities.

Brief analysis of risks

1. Contaminants

Present in the soil to be disturbed and removed by trucking is a substantial load of contaminants – in the many thousands of cubic metres. Contaminants include polycyclic hydrocarbons, petroleum hydrocarbons and inorganic metalloids, as well as organic substances. Of these, studies in various locations indicate higher risk for chronic or acute illness from inorganic metalloids, which include: arsenic, tellurium, silicon, antinomy, boron, polonium, astatine, and others, depending on strictness of definition. When inorganic metals are included, the list of contaminants encompasses cadmium, mercury, lead, and chromium

The preeminent concern will be dispersion of these contaminants as particulate matter. In particular, excavation will generate dispersion of contaminated dust; and trucking will release amounts of contaminated soil into the air locally, as will backfilling, if it occurs.

It is noteworthy that a previous review conducted for the NCC, and which did not indicate high risk for the surrounding area, is not relevant to this new situation, by which large amounts of contaminated soil will be extracted and removed. Therefore, the NCC study is an entirely invalid starting point for any review of risk to residents of contaminants under the CSST project.

Acute risks from polycyclic and petroleum hydrocarbons related to toxicity. Chronic risks from exposure to PHCs include carcinogenesis: lung, bladder, skin, liver, digestive - similar to smoking.

Acute risks from exposure to inorganic metalloids and metals are from toxicity, which is particularly well documented for arsenic, mercury, chromium, lead, and cadmium.

Risks from chronic exposure are primarily those of carcinogenesis.

There is some evidence of developmental impacts and cardiovascular risk from exposure to some of these contaminants.

The degree of risk associated with construction and removal activities associated with the project will be proportional to adequacy of mitigation (see “mitigation” below); although, despite best efforts, there will remain an element of risk for residents.

2. Noise and vibration

Health effects of noise and vibration will impact residents proportionally to levels permitted by city authorities, frequency and duration of high levels, and the distance of residents from the sources.

In industry, ongoing exposure to noise level above 85 decibels (dB) usually requires mitigation for workers. Shorter- term exposure to higher levels may be permitted when mitigation is in place.

Documents from the contractor indicate that levels of 130 dB will be allowed this project. This level exceeds both provincial and national standards. It must be understood that, because the quantification of noise is measured on a logarithmic scale, this level considerably exceeds those normally permitted through legislation and presents serious health challenges.

Potential short-term impacts include:

- psychological and perhaps physical stress or pain;
- interference with concentration and communication (also rendering accidents more likely); and
- sleep disturbance, both during noise and in anticipation of noise.

Longer term impacts include:

- irreversible hearing loss;
- increased heart and respiratory rates; and
- increased blood pressure.

Particular concern would be for children playing in the vicinity of Stanley Park while heavy noise and trucking are occurring, both because of the noise and on account of potential for mishaps with truck traffic.

A high-quality study of noise issues under this project has been conducted for the City by a specialist in the field, Williamson Associates. However, that review is unclear with respect to the consideration of night-time noise. In addition to the general potential impacts noted above for day-time noise levels, there exists substantial evidence that sustained night-time noise above 40 dB can produce adverse health impacts. This is the reason for which the European section of the World Health Organisation has advocated for 40 dB as a maximum permissible night-time level.

European noise experts note, in reaching the conclusion that potential adverse impacts occur above 40 dB include: hypertension; other cardiovascular effects; hormonal disturbance which may eventuate in behavioural awakening; insomnia and its effects; psychiatric and psychological problems; and reduced cognition.

No night noise above 40 dB (after 20:00) should be permitted during any stage of the CSST project.

3. Emissions

It is understood from a reading of City documentation that there will be variable, but also very considerable vehicular movement over a lengthy period of time, as well as emissions emanating from machinery onsite.

Exhaust from equipment and vehicles in the form of particulate matter does not pose risks similar to those from the contaminants referenced above. Instead, primary risks from the nitrogen, sulphur and carbon oxides to be released from machines may aggravate pre-existing respiratory illnesses (COPD, childhood asthma) on a chronic basis. They may also precipitate acute illnesses and exacerbations (e.g. asthma attacks) and may in addition exercise deleterious effects on those with cardiovascular issues. Potential long-term impacts, depending on toxic load, many include reproductive issues, issues for the foetus during pregnancy and carcinogenic effects.

4. Mental Health: anxiety and depression

Impacts on psychological health, and their corollary effects on physical health status, are the most challenging to identify, quantify, and treat. They are nonetheless very real and present risks from projects and disruptions similar to the CSST initiative.

Although we cannot discount the fears that will be generated among the young and the elderly from this project, the brunt of mental health effects in other examples has been borne predominantly by parents who are anguished by potential adversity for their children – both in terms of acute concern for security and through the potential for long-term chronic disease. In the case of the CSST, the very lengthy nature of the project will induce profound feelings of insecurity among some parents; and there will likely occur cases of chronic anxiety and depression as a result. In addition, whether or not parents decide to continue to reside in the neighbourhood during the work, there will be instances of doubt and guilt: among those who elect to remain, there may be post facto feelings of culpability if and when their children fall ill (whether or not related to the project, which will be impossible to verify). Among those who depart, there may be guilt associated with disrupting the lives of their offspring. That there exists no correct decision will traumatise some.

Financial pressures associated with removing families from risk zones for extended periods will induce additional stresses on residents, with potential adverse effects on mental health.

Required mitigation and remediation

The following are the minimal mitigating steps and activities required of the proponents and executors of the CSST project.

Required general procedures

1) Information and its dissemination

Proponents – in this case the City – must establish a team of employees whose function is to respond to all inquiries from bona fide New Edinburgh community groups within 24 hours from time of inquiry, as well as to monitor the behaviour of the contractor. The responsible parties must be transparent and skilled in communicating clearly and efficiently.

The City must not rely upon or delegate dissemination of information to the contractor since it is the City that is entirely accountable for impact of the project on residents.

Advance notice, within a reasonably long time frame, must be given by the City monitoring and communication team of any unusual or accentuated health threat. A salient example would be notice of increase in noise volume. Such notice may not be general only, i.e. as part of a general description of planned activities of the project: it must be specific to time (day by day) and place (distance from any homes affected, with accurate quantification of expected noise in their vicinity); and therefore must be adjusted whenever there is alteration of schedule (which will occur very frequently in all such initiatives). Not only will this procedure reassure residents as to the accountability of the City; it will also permit families and individuals to remove themselves temporarily if they judge the risk to warrant it.

2) Monitoring and reporting: establishment of a strict regulatory framework and well-staffed City monitoring and supervisory structure

There must be strict adherence to legislated norms, or to those specifically and very publicly stipulated in advance by City authorities. Any deviation from these standards that are reported by residents or noticed by the City monitoring team must be immediately rectified.

Ideally, this function would be filled by an independent third party, thereby ensuring the degree of transparency that affected people have a right to expect. This independent monitor will be particularly important for monitoring of emission, of air quality, and of contaminated material.

3) Sanctions against the contractor for any violation of declared norms and standards

The City must clearly articulate and publish in advance of the project the sanctions that will be applied against the contractor for any breach of the regulatory framework that the City must put in place (see below) with regard to mitigation of health impacts.

Experience with similar projects indicates that only severe sanctions, clearly articulated in advance and rigorously applied, will motivate contractors to adhere to all standards. The presence and application of such sanctions will engender more confidence among residents, with consequent reduction of risks to psychological health.

Required targeted mitigating procedures

1. Contaminated soil

a) Risk of dispersal of contaminants into the air may be partially mitigated by ensuring that no removal of material occurs when the wind is blowing above a pre-determined rate, announced in advance of the start date for the project.

b) All soil removed by trucks from Stanley Park and other areas of identified contamination must be watered down and completely and securely enveloped (covered on all sides) in the trucks before they are allowed to progress through the park and into the neighbourhood.

c) Soil should be removed during periods of less pedestrian presence, e.g. during school hours. There should be no removal at weekends.

d) Ensure that this be no cross contamination along truck routes.

e) Avoid removing soil from the playground.

A note must here be made concerning the ¨soil management plan", prepared for the City by consultants Dragados and Tomlinson. This brief constitutes one of the least competent documents that we have seen in the field of industrial medicine, public health or epidemiology. The acceptance of such a risible piece of work by the City brings into question the extent of its seriousness in accountability to residents of the area.

Among the many problems associated with this shoddy piece of work:

i. Inept expression in English: merely a cursory review of the initial two pages of the document reveals 14 errors of basic grammar or punctuation. In the vast majority of cases

in the field of public health and epidemiology, such utter carelessness of expression (in French or English) indicates not only poor competence but also unreliability in the actual conduct of related work -- generally, those who cannot be bothered to express themselves clearly should not be given public trust.

ii. Many levels of responsibility will impede access to responsible parties and therefore obscure accountability: it appears that the main contractor, Stantec, (or else the city) has sub-contracted "soil management" issues to Dragados. This company appears to be foreign-based. In many instances of large-scale projects globally, foreign firms are less sensitive to local concerns, thereby reducing accountability.

iii. No details are given with regard to the credentials or qualities of the "qualified person"; interested parties therefore are presumably to take her/his qualifications on faith. Can that faith be justified, given the above?

iv. The introduction of many levels of responsibility in relation to such projects usually results in reduced accountability – as "blame" is shifted from one contractor to another. More importantly, it impedes adequacy and timeliness of response to emergent issues.

It appears that the sub-contractor for "soil management" has sub-contracted to a sub-sub-contractor (termed a "qualified person"). The sub-sub-contractor appears to have sub-contracted important responsibilities to a sub-sub-sub-contractor (termed "consultant").

x. Untimely documentation: the sub-contractor responsible for soil management advises that documentation regarding "audits" on compliance "will be handed over to the Owner upon completion of the construction works" – in other words, at a point when it would be too late to amend problems and make any difference to outcomes; this, despite that this process is claimed to be a "live document, reviewed on a regular basis".

xi. Minimisation of risk: the Dragados document refers merely to "dust control during the transportation phase" (p.4), as if this were merely a normal waste disposal issue.

Similarly, in almost unintelligible English, the paper, referring to "material arising from excavation of contaminated soil", states: "all arising will be stock piles, tested to be reuse if found suitable". If one can interpret this drivel correctly, it implies that contaminated material will actually be considered for reuse.

Reference to this wholly inadequate paper makes clear that it will be foolhardy to place any confidence in the principals who drafted it.

2. Noise and vibration

a) The City must analyse the precise maximum level of noise expected for each quadrant of the New Edinburgh (NE) area and must communicate that information to each home well in advance of any noise being made. As indicated above, it must also report to the community in advance a day by day analysis of expected noise levels during each and every period of activity that is expected to produce moderate or high decibel levels.

b) The City monitoring and reporting team must ensure that all equipment being deployed has been demonstrated to be state of the art in terms of both production and muffling of noise, since there can be substantial differences among machinery depending on its quality.

c) 360 degree noise attenuation barriers of adequate height and thickness must be placed around all significant sources of noise, together with sound barriers fronting residences.

d) No night-time (20:00- 7:00) noise levels above 40dB should be permitted.

3. Emissions

a) The City must certify that all equipment and vehicles deployed for the project are state of the art in terms of limiting emissions of nitrous, carbon and sulphur oxides. Those that fail to meet that international standard must be excluded for both emissions and for noise.

Particular attention must be paid to the use of diesel engines and other ancillary equipment, for both noise production and for emissions.

b) No vehicles must be allowed to idle at any time or any place in New Edinburgh – winter or summer.

c) Vehicles must not be permitted to accelerate quickly when exiting the park and proceeding onto streets.

d) Air quality must be monitored, with particular attention to spring, summer and early fall. Mist should be sprayed during warm weather to damp down dust that will have collected due to construction and associated emissions and deposit of particulate matter, thereby minimising inhalation by residents.

4. Safety and security

a) Clearly, unless it is to be closed, here must be **no vehicular traffic circulating past the playground and its associated structures** for the duration of the project; children and their mentors are unsafe due to contaminants, to emissions, and vehicular traffic.

b) Only very slow movement of truck traffic should be allowed through the streets of New Edinburgh. Any trucks turning or accelerating in the vicinity of playground or retirement homes must be closely monitored for compliance.

5. Mental health

As noted above, mitigating for mental health encompasses the three elements outlined, that will enhance confidence and reduced perceived stress and its attendant outcomes in chronic anxiety and depression:

- A regulatory framework, supported by a City team responsible for monitoring and supervising all contractors; and reporting to residents as described. Any breach of conditions as reported by staff or by residents must be rectified within hours.
- Provision of advance information to neighbourhood, information that is very specific to time and place (as indicated above).

- Severe sanctions, details of which are communicated in advance to both contractors and public, to be applied to any breach of the regulatory framework that is sketched out in this brief.

Final note

This brief makes no claim that the application of its recommendations will dispel all doubts, fears and negative health impacts. In that sense, the mitigating arrangements and factors outlined must be seen as minimalist, if this project is to proceed.

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NB: Dr. Cappon is not a resident of New Edinburgh or of surrounding communities.