

FEATURE ARTICLE

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Oil Train Derailment in the City? Estimating Toronto’s Real-Estate Value at Risk

The City of Toronto is crossed by major freight routes owned and operated by the CN and CP railway companies. Following the 2013 Lac Megantic disaster in Quebec, the Toronto Star newspaper started a series of articles based on growing concerns from local communities and City councillors about the risk from hazardous material transports on those tracks. For example, in April 2014, the Star reported that in a 24-hour period “more than 130 cars of crude oil, tankers carrying methyl bromide and ethyl trichlorosilane — highly poisonous chemicals rated among the world’s most dangerous — as well as radioactive material, methanol, diesel, sulfuric acid and other hazardous goods” [1] were observed on the CP line along Dupont Street, cutting

through high-density residential neighbourhoods. Around the same time, the grassroots initiative Safe Rail Communities [2] started lobbying for enhanced safety procedures, and local politicians are pressuring the federal government and railway companies for more information sharing and increased safety measures, including the re-routing of dangerous goods transports to rural areas to the north of Toronto [e.g., 3]. At the federal level, Bill C-52, the Safe and Accountable Rail Act, was introduced to amend the Canada Transportation Act and the Railway Safety Act. The amendment includes more stringent liability insurance requirements of up to \$1 billion to cover the risks of bodily injury or death, third-party property damage, as well as pollution and contamination risks [4].

In this exploratory study, we were interested in the potential real-estate property damage from an oil train fire or explosion within the City of Toronto. We used the 800-metre isolation and evacuation zone for crude oil train fires specified in Transport Canada’s Emergency Response Guidebook 2012 [5] as well as the one-mile (approximately 1,500-metre) potential impact zone considered by the US Department of Transportation according to several sources such as the web site “Oil Train Blast Zone” [6]. We found that approximately two-thirds of Torontonians live within the potential impact zone and that an oil train accident within the City could put property values up to \$14b at risk.

The analysis is based on the main railway lines from DMTI’s CanMap RouteLogistics “Rail and Transit Lines” (2014 update) as well as address points (Sept 2015) and average residential home prices per neighbourhood (2011-2012 data) from the City of Toronto open data catalogue. In Figure 1, the 800m buffer, which includes

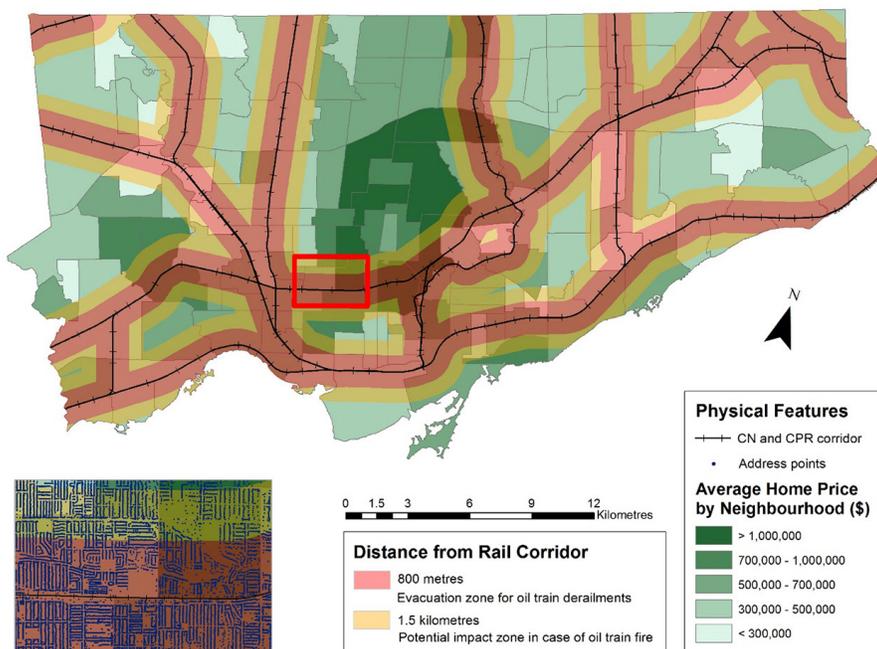


Figure 1: 800m and 1.5km buffers around major railway lines in conjunction with average home prices in Toronto neighbourhoods. Inset also shows individual address points.

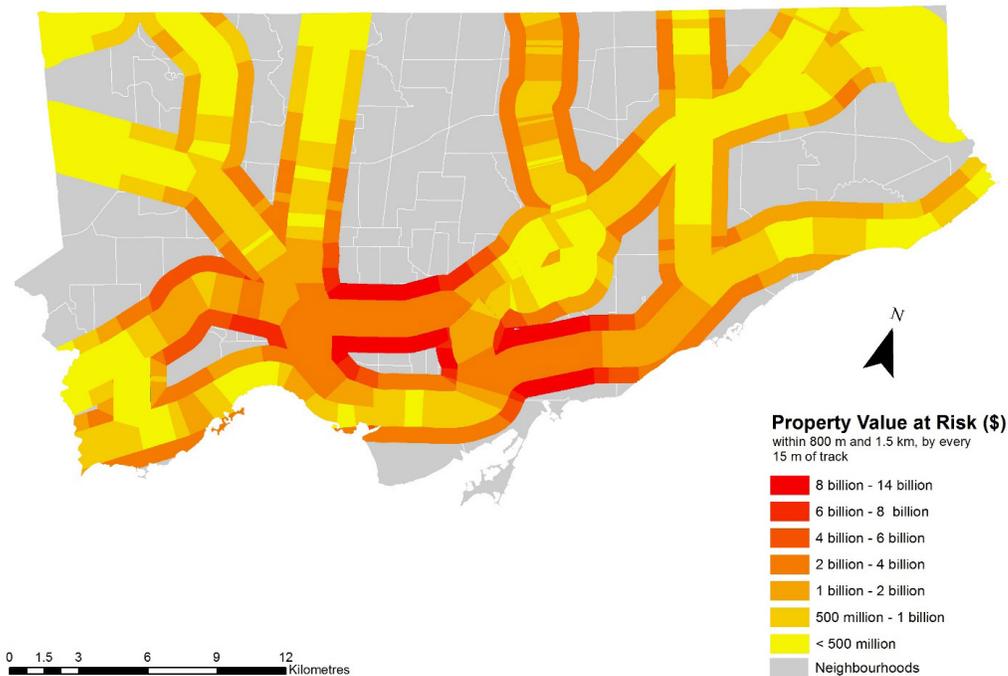


Figure 2: Total property value at risk by 15-metre railway segments.

202,506 address points or 39% of all Toronto addresses, is shown in red; the yellow 1.5km buffer includes 341,974 addresses or 66% of all addresses. To estimate the property damage that could be caused by a rail accident, we assigned each address point the average home price of its corresponding neighbourhood (also shown in Figure 1). The railway lines were then split into 15-metre segments (the approximate length of a rail car) to assess the varying risk along the each corridor. The 800m and 1.5km buffers were created around each of these potential accident locations and the values of the address points within each buffer were summed, resulting in the total potential property damage.

Figure 2 displays the spatial patterns of property value at risk. Property value at risk within the larger “potential impact” radius has a maximum of \$14 billion for a single incident, and is generally much greater than property value at risk within the smaller “evacuation zone”, which ranges up to \$4 billion. As one would expect, greater values cluster in the core of the City in densely populated neighbourhoods with expensive dwellings. The three points of greatest potential damage within the 800m buffer are located in the Annex neighbourhood, while the maximum damage points for the 1.5km distance are located in the Dovercourt-Wallace Emerson-Junction, Birchcliffe-Cliffside, and Little Portugal neighbourhoods.

Although this analysis may provide valuable risk estimates for policy-makers and community advocates, our approach has important limitations. The average home price data used were from 2011 and therefore not up to date. The inclusion of the many recently completed condominium properties, for example, would likely further increase the value-at-risk in the downtown area. In addition, different address points may represent largely different types of property, including single residential, multi-residential, institutional, and commercial. Individual property values per address are not publicly available, and using the average residential home prices as a proxy may under-estimate the value of properties near railway lines, because these may include higher proportions of expensive commercial and multi-residential properties. However, it is also possible that some

neighbourhoods have lower-price homes within undesirable proximity to the rail corridor. Although the distances used for the analysis are based on government safety regulations, it can be hoped that some properties within the circular buffers around an incident location would be not affected, or not at their full value, thus our results may be over-estimated in this regards. In addition, not all railway lines shown may currently be used for dangerous goods transports. Finally, it must be noted that the analysis did not take human casualties and the costs of emergency response, medical treatment of injuries, or lost business into account.

References and Web pages:

- [1] The Toronto Star, Toxic chemicals, crude oil, radioactive material ride the rails through Toronto. By Jessica McDiarmid, news reporter. Published on Sat Apr 26 2014
- [2] Safe Rail Communities, Web site, <http://www.saferail.ca/>
- [3] The Toronto Star, Toronto and Mississauga mayors want dangerous goods off their cities’ rail lines. By Jacques Gallant, staff reporter, and Jessica McDiarmid, news reporter. Published on Thu Dec 04 2014
- [4] Bill C-52, An Act to amend the Canada Transportation Act and the Railway Safety Act. First reading, February 20, 2015, 41st Parliament, 2nd session
- [5] Transport Canada, Emergency Response Guidebook 2012, Guide 128 (petroleum crude oil)
- [6] Oil Train Blast Zone. Web site by ForestEthics, <http://explosive-crude-by-rail.org/ca/>