

## Chapter 7

### Student Exercise

*This exercise was adapted from a post published on [dataprof.ca](http://dataprof.ca)*

When an out-of-control train carrying crude oil hurtled down a hill and exploded in the middle of Lac Mégantic, Que., it was a wakeup call for Canadians living near railways. Forty seven people died that day as much of the downtown of the picturesque town was incinerated.

For Jacques Marcoux, data reporter with the Canadian Broadcasting Corporation in Winnipeg, there was an obvious and simple question. How many properties in his city are too close for comfort when it comes to the railway lines that converge on the city from every direction? To come up with an answer, he used the mapping program QGIS to see how many existing properties fell within recommended safety buffer zones between rails and people.

You can read his resulting story here:

<http://www.cbc.ca/news/canada/manitoba/thousands-of-winnipeg-properties-dont-meet-new-national-rail-line-setback-recommendations-1.3401310>

Marcoux created buffers along the rail lines based on the setbacks contained on a report prepared by Canada's railways and municipalities:

[http://www.proximityissues.ca/asset/image/reference/guidelines/2013\\_05\\_29\\_guidelines\\_newdevelopment\\_e.pdf](http://www.proximityissues.ca/asset/image/reference/guidelines/2013_05_29_guidelines_newdevelopment_e.pdf) He then performed a spatial join between the buffers layer and the layer of properties to determine how many layers lay partially or completely within the safety zones.

Your task is to repeat Marcoux's analysis. For the purposes of this exercise, we are providing the buffers that Marcoux created, as a shapefile. You can download them from the companion website to *The Data Journalist*. If you wish and you want a more advanced challenge, you can create the buffers yourself. If you are unsure how to create buffers, you can learn how to do so in the tutorials on creating buffers in ArcGIS Desktop, ArcGIS Pro, and QGIS. You will need to add a field to the attribute table for the rail lines with the width of buffer required for each stretch of track, as the buffer distances vary, then set the buffer for each segment of railway to the value in the field. The recommended setback distances are on page 27 of the document linked above. You will need to determine which sections of track fall into the various categories, such as main line, secondary line, and freight yard. The rail line data for Manitoba is available at [http://ftp.geogratis.gc.ca/pub/nrcan\\_rncan/vector/geobase\\_nrwn\\_rfn/mb/](http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/geobase_nrwn_rfn/mb/). Download and extract the zip file, and add the Tracks layer to your map. It is available in shapefile and KML formats.

Once you have chosen whether to use Marcoux's buffer file, or make your own, you will also need the layer of property parcels in Winnipeg, available at <https://data.winnipeg.ca/City-Planning/Survey-Parcel/emk4-cdaw>.

Using the buffers and the property layers parcel, you can duplicate Marcoux's analysis. To do so, add the two layers to a new map in ArcGIS Desktop, ArcGIS Pro or QGIS. If you like, add in the rail tracks layer to give you additional context.

Using the methods explained in the tutorials **Spatial Joins in ArcGIS Desktop**, **Spatial Joins in ArcGIS Pro**, or **Spatial Joins in QGIS**, join the buffers to the properties shapefile. This way you can obtain a count of how many properties intersect the buffers.

**Challenge 1:** Duplicate the analysis for your own town or city. If you are in Canada, you can obtain the rail lines for your province from this FTP site: [http://ftp.geogratis.gc.ca/pub/nrcan\\_rncan/vector/geobase\\_nrwn\\_rfn/](http://ftp.geogratis.gc.ca/pub/nrcan_rncan/vector/geobase_nrwn_rfn/). You'll need to obtain a property parcel map either from your municipality's open data site, or directly from the municipality, if it keeps one. You can use the same setback recommendations from the report available at [http://www.proximityissues.ca/asset/image/reference/guidelines/2013\\_05\\_29\\_guidelines\\_newdevelopment\\_e.pdf](http://www.proximityissues.ca/asset/image/reference/guidelines/2013_05_29_guidelines_newdevelopment_e.pdf)

Write a 500-word story to go with your map analysis.

**Challenge 2:** Create your own original analysis using buffers and a spatial join. Obtain shapefiles of line or point features in your city or town, or create your own point file by geocoding addresses. Create buffers around the line or point features using the methods in the tutorial on creating buffers in ArcGIS Desktop, ArcGIS Pro, or QGIS. Using a second shapefile of points or polygons, determine using a spatial join how many points or polygons intersect each buffer. The key to this exercise is using your story sense. How can you combine two different sets of spatial data to create a newsworthy analysis? Do you want to see how many properties are within a set distance of a super highway? How many homes are within a certain distance from polluting factories? How many school students (while at school) are within a kilometre of a fast food restaurant? The choice is yours.

In a separate memo, explain your analysis and why you chose to do it. Why is it newsworthy? What is the public interest in doing this analysis? Optional, write a 500-word story to go with the map analysis.

**Thanks to Jacques Marcoux for providing his buffer shapefile for this exercise.**