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Train Noise Study for 276 Duke St.

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1.0 Introduction:

Channel Technical Services Ltd. has been retained by Fusion Capital to prepare certain reports and other document submissions for the purpose of rezoning a property located at 276 Duke Street, Dryden, Ontario. This Railway Noise Study is being prepared as part of that application for the rezoning. The present zoning for the site is R2 (Residential Two) and the developers are submitting an application to change the zoning to RM (Residential Multiple). It is intended that, once that zoning amendment has been approved, the developers will begin the process to utilize the subject property as the site for the construction of 4 multi unit residential complex buildings. Each building is to house 12 individual apartments and will be 3 stories high.

It is noteworthy that one of the accompanying documents to this report is a full Environmental Impact Statement, which contains much more details on the surrounding area, history of the site, drawings, maps, location of features in the immediate area and photos. This report is intended to be an extension to that report, and it should be reviewed in conjunction with it. (Certain relevant information from sections of that report and other reports have been culled and inserted herein, and in addition please refer to the Appendices in these other reports for plans, drawings, and photos).

In addition, 2 other previous documents have been prepared and submitted: one was a train vibration study and the other a noise study to satisfy the Ministry of Environment's "*Requirements for Noise Emissions*", which was intended to assess the impact of noise generated by the development on the neighborhood. It is noteworthy that the primary "target" of the noise legislation appeared to be heavy and light industrial developments, commercial and institutional enterprises with round the clock production and process equipment and utilities noise and not at all intended for a relatively small residential development on a single lot, plus there are requirements for noise testing from the constructed developments that are not possible until post construction and in this instance, occupancy of the buildings. The report also requires the listing of the facility's NAICS (North American Industry Classification System) Code. In this instance, the only code that closely matched the code list was "72" which is for "Accommodation and Restaurants", which implies a hotel/motel establishment and not an apartment complex.

As part of their review, the City of Dryden has now specifically requested a third study, being on the effect on the future residents of the apartments of any noise generated by the trains travelling along the Canadian Pacific Mainline, which passes within a relatively close proximity but not exceptionally so, to the proposed apartment buildings. The nearest edge of the Canadian Pacific (CP) Rail main line corridor is located 63.4 m (208') from the presently designed, nearest corner of the nearest planned structure, although the middle of the buildings would be in excess of 100 m and the far end over 130 m, (see Appendix for Plan View and Photos of Area) and the buildings have to be capable of withstanding any vibration created by any passing train and as detailed in the railway vibration study document, train vibrations absolutely will not produce any significant vibrations or their effects on the new structures.

2.0 Description of Proposed Project Location:

The proposed development is to take place on a vacant piece of property located on the south side of Duke Street, at the very Eastern end of the subdivided area. This portion of Duke Street is 2 blocks east of the north bound bend for the majority of traffic that directs it to the overpass over the Canadian Pacific Railway (CPR) Main Line and that terminates at the intersection with Highway 17.

The legal description of the lot is: Registered Plan M-318, Parcel 18801 D.K.F., Part 1, Plan KR-1013, Parcel 25313 D.K.F., Part 1, Plan 23p-2337, part of Parcel 28040 D.K.F., Secondly.

The lot measures 125 m (410') x 47.25 m (155').

The lot is at the corner of Duke Street and the northern branch of Arthur Street, (which is a gravel road leading to the south) and the northeast corner of the lot is "kitty corner" from the CPR railyard. There is a lockable steel gate located at the approximate mid point of Duke Street in front of the lot at which point the paved street becomes a gravel road.

3.0 Brief Description of Topography:

The lot itself is a short plateau that is relatively flat running in a south-westerly direction until it reaches a bedrock ridge located past the southern lot boundary that runs diagonally to the property line ranging from approximately 75 m past it at the easter end to 15 m at the western

end. The plateau does slope gently to the northeast with an overall drop of approximately 2.5 – 3.5 m. Duke St, running in front of the lot, starts at a level to the lot at the west end then runs downhill to become approximately 6.5 m below the crest of the plateau at the bottom of the ditch at the corner with Arthur Street then there is a further 1.5 m drop along Arthur St. to become 7.5 m at the bottom of the ditch below the top of the very steep slope on the east end to the road.

4.0 Description of Project:

It is intended that, once that zoning amendment has been approved, the developers will begin the process to utilize the subject property as the site for the construction of 4 multi unit residential complex buildings. Each building is to house 12 individual 2-bedroom apartments and will be 3 stories high, for a total of 48 new housing units.

Plans call for each individual unit to have 3 bedrooms, 2 bathrooms with full laundry services. Construction is to be wood frame and all 4 buildings will be built to the latest standards established by the Ontario Building Code, designed by an architect and project managed and inspected by a registered professional engineer as well as the Dryden Chief Building Official.

5.0 Impacts Due to Noise from Trains:

The previous noise study stated: "Since the location of the proposed construction is at the end of a short residential street that is 2 blocks removed from any major transportation route, and the presence of the gate indicates that there would be periodic times when traffic would be prohibited from continuing to Arthur Street, there would be limited traffic going past the property. Therefore, the only real source of noise from off site that was identified in the noise study would be any passing trains, which averaged 21 per day in 2019 according to the CPR website."

The Canadian Transportation Agency has produced an excellent source of information on the issue in a document entitled: "*Railway Noise Measurement and Reporting Methodology*", which was used as the reference material for this document. However, the focus of that report was for responding to complaints as opposed to this report, which is being written to outline the issue and provide a quantified assessment of the potential noise level at the receptor.

One of the main problems in determining the amount of noise that can be experienced at any point in time by a receptor is that unlike vibration that travel through the ground and can be consistently expected to diminish in direct inverse proportions to distance and thus independent of outside influences, sound waves can particularly be greatly affected by various weather phenomena, vegetation, topography, and the creation of manmade sound barriers.

The topography of the building lot has been detailed in Section 3.0 and noted that the building site will be 6.5 m above the road at the point where it is directly across from the railway, thus immediately providing a significant noise barrier.

There presently is virtually no significant vegetation along the northern boundary of the property, so until (if ever) a row of trees/hedge are planted and grow to a significant height, there will be no noise reduction from vegetation. Although the construction of a solid fence along the front of the property could reduce the sound significantly on the lower floor it will not be high enough to be effective for the upper floors of the 3-story high building. However, the top floors do benefit from the increased elevation which at 12.5 m means that the top of the buildings will be 19 m above the level of the tracks.

Wind direction and temperature inversion can significantly increase or decrease the level of sound as measured in Decibels (or dB) for any distances in excess of 40 m. With temperature inversions, sound waves that would normally diminish into the atmosphere can be refracted downwards and can increase the level of sound by 5 – 8 dB. With temperature lapse conditions, the inverse can happen, and sound can be redirected upward resulting in a reduction of sound levels of 5 – 10 dB. Likewise, wind can direct sound towards a receptor or away with significant effects.

Information on the train traffic has been gleaned from the Canadian Pacific's website found on-line and according to the Company's website, in 2019, the average daily train traffic on the CP mainline between Winnipeg and Thunder Bay was 21 trains per day. Since passenger traffic through North-Western Ontario has become very limited, almost 100% of all train traffic would be freight trains. The overall average speed of a CP freight train in 2019 was 35.7 kph or 22.2 mph and the speed in town would be significantly slower than that. In addition, it is very noteworthy that in this particular location, there are no unguarded road

crossings in the immediate vicinity and the tracks run straight, so there will be neither loud train whistles blaring at all hours of the night and day, nor the loud squeals associated with the steel wheels going around a curve.

Background noise can have a noticeable effect on the perception of the receptor. A train travelling in a tranquil rural area will have a much more pronounced sound than one producing the same sound level adjacent to a major highway or bustling, busy city center. In the aforementioned information source, various settings were described and the one that could be the "best fit" for this situation, would be "**Normal Suburban Residential**", described as: "Sounds from human activity are audible during the day with some sounds of nature during the night" with an average population density of 772 people per sq km and dwellings 120 m-245 m from highway or major thoroughfare. The average of background noise attributed to this type of residential area is 55 dBA during the day and 45 dBA at night.

In order to estimate the Train Pass-by Noise, this report utilized the procedure as detailed in the reference document's Appendix A – Simplified Estimation Procedure. The chart begins with a single "base" train per day and adjustment are made for any difference in: No. of trains per day factored by time period, No. of locomotives, No. of cars, Train speed, Distance from tracks, and Height above tracks. (Note that certain factors in the source were often rounded to even significant figures of 10 which is more than acceptable for an estimate of this nature). For a conservative estimate, the "base" train selected from the list in the guide to begin with was: 1 train per day, with 2 locomotives, 100 cars per train, travelling at an average speed of 60 kph, 30 m from the tracks and 1.5 m above the tracks. Adjustments as per the methodology employed used were: 20 trains per day averaging 1 train per hour over the 8-hour nighttime period, 2 locomotives per train, 100 cars per train, average speed of 30 kph, (which is much higher than the actual speed through town), 60 m from the tracks, and a height of 6.5 m above the tracks. The listed sound produced by the standard train was 55 dB over a 16-hr period and 58 dB over an 8-hr period. The adjustments in sound levels due to any differences are as follows: #Trains per Period: +8 dB, # Locomotives (same): 0 dB, # cars (same): 0, Speed: -5 dB, Distance: -3 dB, Height: -10 dB: Total of Adjustments = -10 dB. Therefore, the estimated noise level at night for the proposed apartment complex, using the 100 car trains with 2 engines and the shortest distance to and the ground floor of the buildings, without any

dampening due to vegetation or sound barriers is only: 58 dB – 10 dB = **48 dB**. This level is the equivalent of normal conversation at 12'.

6.0 Summary and Conclusions:

Using the Canadian Transportation Agencies' method to estimate the level of noise to be received at the nearest apartment building using long 100 car trains powered by 2 diesel engines (electric engines are significantly quieter) and not taking into account an additional 10 dB reduction for the height of the 3 storey buildings, the estimated noise is determined to be **48 dB**. This is the equivalent sound to normal conversation at 12' and is comparable to the background noise of **50 dB** during the day and **45 dB** at night.

Across the street and immediately to the west of 276 Duke Street are single family houses on both sides of the street, including 1 of the houses directly across the street from the proposed development, and that one house is 45 m from the front of that unit and therefore, along with its neighbors, appreciably closer to the trains and thus would be significantly more impacted by any noise. In the City's consideration of the application for the rezoning of the subject lot, I would suggest that it would be only logical that a review of files into whether or not those residents along the north side of Duke Street had filed any complaints in the past about the noise from CP Rail should be conducted by City staff. Obviously, if there are no complaints on record then it follows that the decades of noise from the trains in that area have not been an issue.

Respectively submitted:

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