Kassner Goodspeed Architects Ltd.

Twin Lakes Residential Project
Prince Albert Road, Dartmouth, NS

Wind Impact Qualitative Assessmentment

The project is a mixed-use building on a south facing sloped site fronting Prince Albert Road in the Graham's Grove commercial node in central Dartmouth. The building design features a streetwall height of 3 stories, with the upper 9 floors organized in two towers stepped back from the edge of the streetwall mass. The following assessment looks to interpret the likely wind impacts on surrounding properties and sidewalks as a result of the proposed development.

The site is located on the east side of Lake Banook, set back approximately 300 m from the shoreline, near the Circumferential Highway crossing between Lake Banook and Lake MicMac to the north. The site slopes upwards from Prince Albert Road to Alderney school to the east, with an elevation increase of approximately 70 feet. The top portion of the slope is forested. To the north across Prince Albert Road is a large format grocery store with an expansive parking lot. To the east is a tract of semi-detached housing along Prince Albert Road and Curley Drive which rises to the Alderney School site. Immediately to the south are three medium density apartment buildings and a hotel on Lawrence Street, along with two large vacant lots zoned for apartment building development. To the west, along Prince Albert Road are two commercially zoned houses and a development site where a 16 storey hotel is under construction. The site also surrounds a small scale mixed commercial building at 335 Prince Albert Road

Available historic wind data shows that the highest and most frequent wind speeds come from the west and south. During fall and winter months, wind primarily blows from the northwest and west. Through the spring and summer, south and southwesterly winds prevail. The relative distribution of higher wind speeds is somewhat constant from the north, north-west and south-west. High wind speeds from north east, south and south-east are infrequent when compared to other directions.

Winds vary in direction, strength and turbulence, while buildings vary in plan form, height and arrangement. Determination of wind effects is complex and difficult to predict in any detail. Generally, only those buildings that are at least twice the height of upstream obstructions are likely to create significant problems. This can create effects on the pedestrian zone that can make walking difficult, affect snow and rain deposition patterns and make a place chillier than it would otherwise be. Downwind wake zones will include a quiet zone roughly equal to the height of the structure where the wind can actually be reduced. Beyond the wake zone there is typically an area of turbulence and eddies which can extend for considerable distances depending on the roughness of the terrain.

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Wind speeds at ground level (boundary layer) are much lower than those in the unobstructed air flow several hundred feet higher. In general, the rougher or more built up the area, the lower the wind speed near the ground. However, there will be a number of impacts from the new building including:

1. *Downwash;* Wind speed increases with height , so when a tall building is exposed to wind, the pressure differential forces the high pressure at the top down the windward face dramatically increasing wind speeds in the pedestrian zone. This can direct direct wind down into previously sheltered areas. The stepback at the 4th floor level will receive the bulk of this downwash flow, sheltering the pedestrian zone.

2. *The Corner effect*: At the windward corners of a building there can be unexpected increases in wind speed as the wind flows from the windward side to lower pressure areas on the lee side. This impact can be reduced by increasing the surface roughness by providing more surface area. This has been designed into the towers placing balconies at the corners and introducing steps in the exterior wall layout.

3. *The Wake Effect*: Wake is the result near ground level of the combination of downwashing and the corner effect. The greatest area of impact occurs within an area of direct proportion to the tower height and the width of the lee side of the building. Impacts on the pedestrian zone are minimized by maintaining a slim profile for the taller portions of the building and creating a stepback base of the building

4. *Building Groups*: The effects that occur individually around buildings cannot be applied directly to groups of buildings, The cumulative affect of many clustered tall buildings can create a a wide range of different wind scenarios that must be modelled as a group to understand the cumulative impacts

It is anticipated that the new structure on the subject lands will have minimal impact on the wind patterns in the immediate vicinity. The general topography of Dartmouth, with many steep glacial moraine hills tends to increase the height of the boundary layer, where wind impacts are minimal. In particular, the strong rise of the existing terrain to the south and east of the property, and the forested buffer retained on the upper part of the lands, significantly reduces the wind exposure of the site to south and east winds.

The building form incorporates stepbacks at fourth floor to protect the pedestrian zone from downwashing flows. The upper volume is organized in two slim towers reducing the area of uninterrupted wall presented to the wind, reducing downstream impacts. The exterior wall configuration creates significant surface roughness, which mitigates the corner effect. Wind impacts from the proposed towers can be expected to largely dissipate over the adjacent street right of ways, so the project is not expected to have any significant wind impact on the Superstore parking area or the nearby Grahman's Grove park. Based upon the urban context and the wind mitigation features described above, the impact of the building is expected to be minimal on the pedestrian zones abutting the site and negligible on adjacent private and public lands.

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21 May 2019

Ref: Canadian Building Digest # 174 – Ground Level Winds Around Tall Buildings 1976
Building Science for A Cold Climate, Construction Technology Centre Atlantic Inc. NRC 1989