EKISTICS PLANNING & DESIGN
Landscape Architecture | Engineering
1 Starr Lane, Dartmouth, NS
Canada, B2Y 4V7 | 902.461.2525
www.ekistics.net

August 24, 2017

HRM Planning & Development
Eastern Region, Alderney Gate
40 Alderney Drive, 2nd Floor
Dartmouth, NS

To Whom It May Concern,

RE: Proposed 6030 Pepperell Road Wind Impact Qualitative Assessment

The proposed 14-storey mixed use development project at the corner of Pepperell and Robie Street sits south of the Quinpool Corridor and is bordered by high and mid-rise building type (some up to 14 storeys, with proposed buildings heights up to 22 storeys) to the north and west of the site. To the west and south, the surrounding residential neighbourhood includes mostly low rise 2-3 storey residential structures. To the east of the site lies the Halifax Commons and the Infirmary.

The following assessment looks to interpret the probable wind impacts on surrounding properties and sidewalks as a result of the proposed development. To that end, wind data from the Shearwater Airport was assembled and analyzed (1953 to 2000) using Windrose PRO 2.3 to understand the intensity, frequency and direction of winds at the Pepperell and Quinpool site. The resulting diagram (Fig.1) shows that the highest and most frequent wind speeds come **from** the west and south. The relative distributions of higher wind speeds are somewhat constant from the north, north-west, and south-west. High winds from the north-east, east and south-east are substantially infrequent when compared to other directions. This has viable implications for development on this site as is shown in Fig.2.

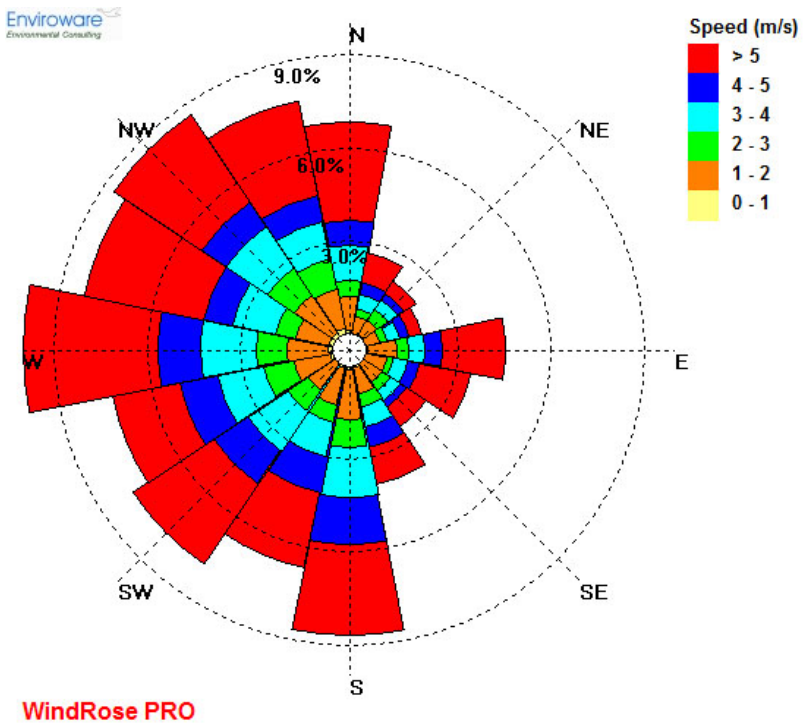
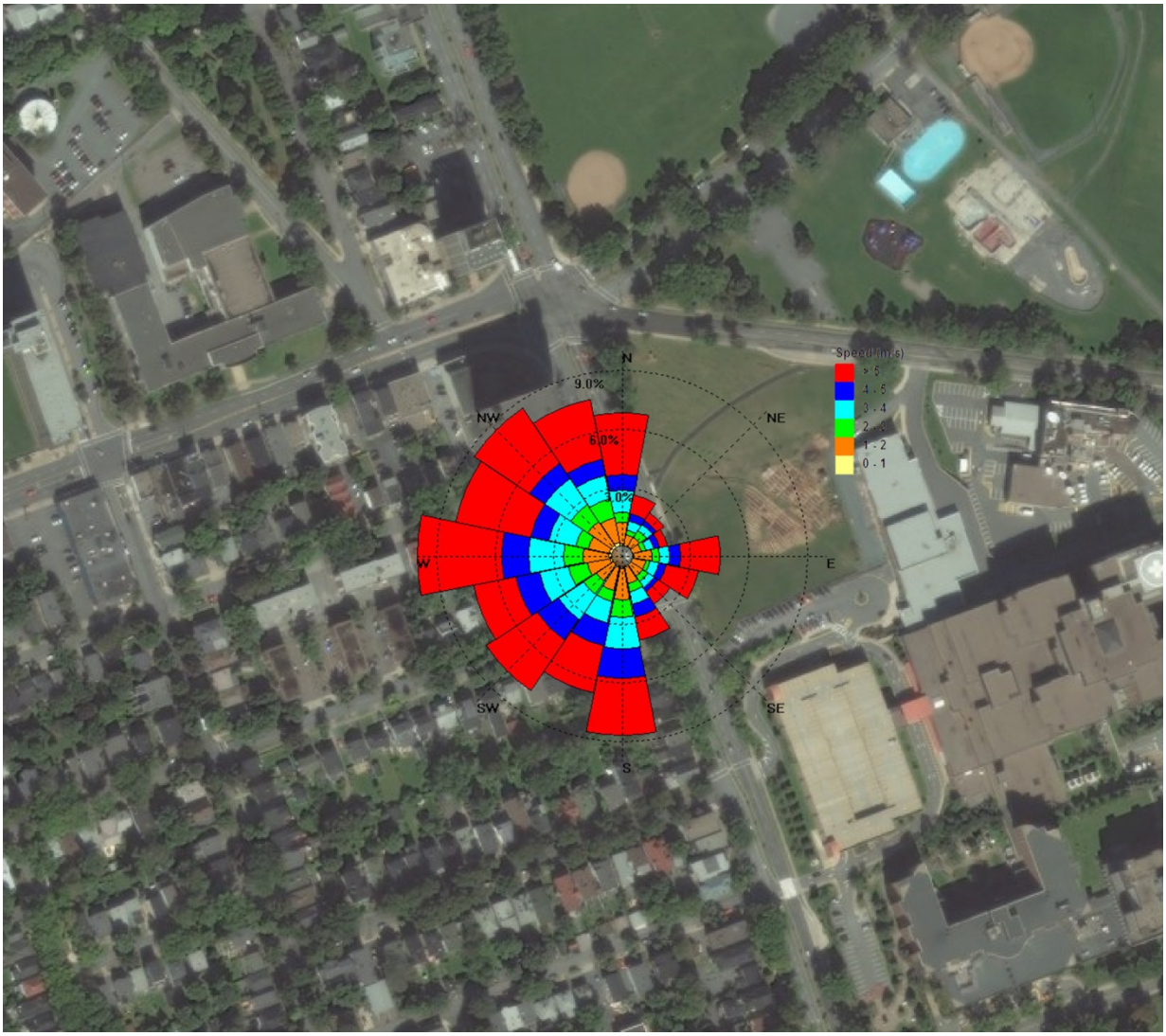


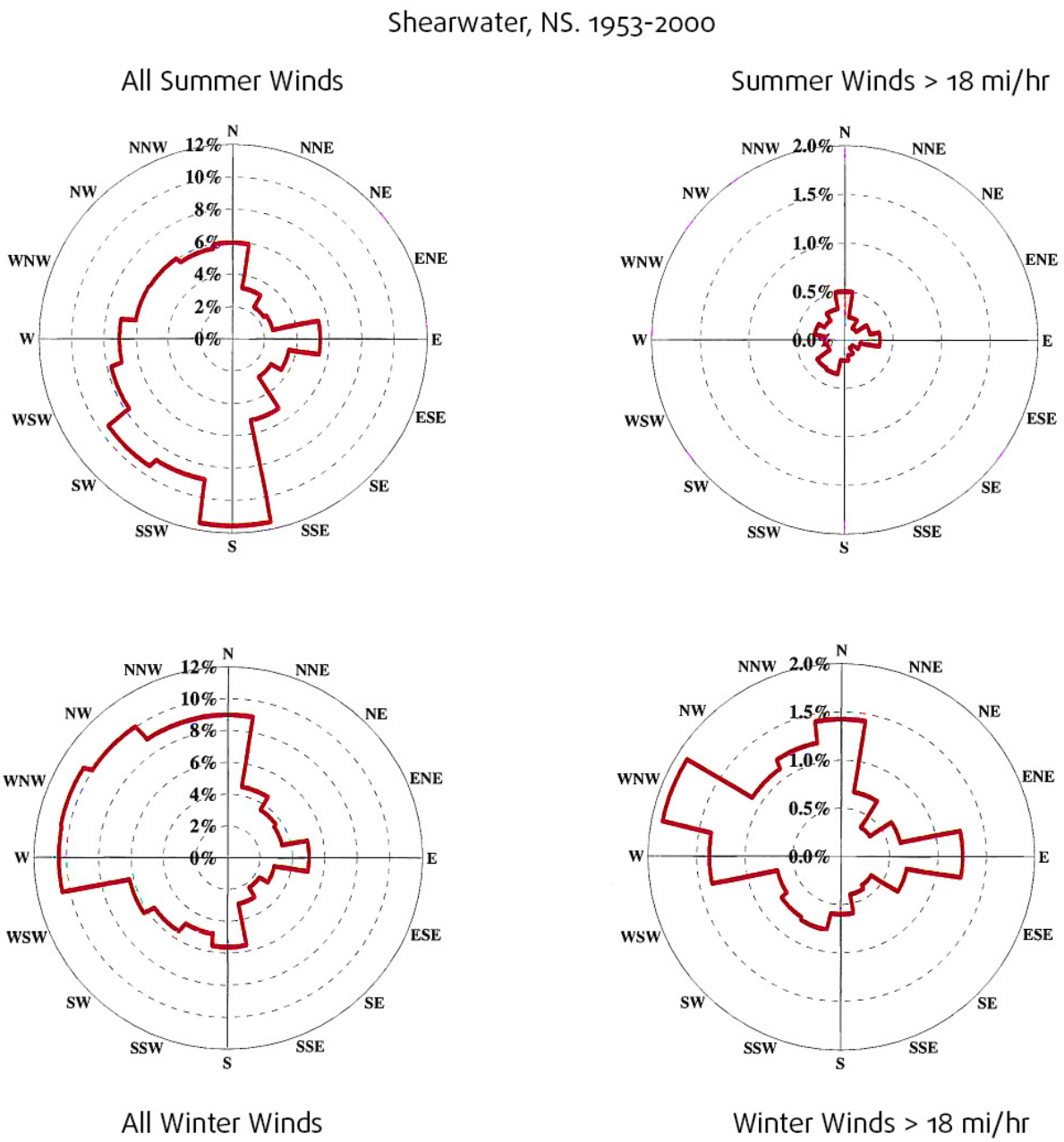
Fig 1. Wind Rose Shearwater 1953-2000

Fig 2. Wind Rose overlain on the site



The taller surrounding buildings to the north already have wind implications on this site and on the adjacent neighbourhood. Since most of the taller buildings ring the site from the north (and prevailing winds come from the north-west in the summer and winter, see Figure 3), the site is already currently in the wake zone of the surrounding buildings mostly during the winter. This wake zone usually extends 8-30 times the height of the building. So, a 10-storey building will have reduced wind speeds for 800-3000 feet on the lee side of the building depending on the prevailing wind. Beyond the 8-30 wake zone, there is typically more gusts and eddies as a result of more turbulent air. On the trailing edges of the building, wind strikes the building and concentrates the flow, accelerating the wind speed near the trailing fringes and on the windward side. The Atlantica Hotel (14 storeys) to the north is currently creating accelerated wind flows on this site and to the

Fig 3. Wind Rose frequencies during 4 seasons



properties that surround it mostly during the winter. In the summer months, when the prevailing wind switches to a more southerly orientation, the wind downdraft from the hotel will create turbulence and additional wind speeds on east Pepperell Street.

COMFA Model (Brown and Gillespie, 1995)

Dr. Robert Brown of the University of Guelph developed the COMFA model to model human thermal comfort as a result of a number of variables including wind speed. Human thermal comfort is more pronounced during low activity situations like site than during highly active situations like running.

The model is explained in the attached paper by Brown and LeBlanc (2003). Mr. LeBlanc was also the co-author with Dr. Brown in the 2008 ed. "Landscape Architectural Graphic Standards", Microclimate Chapter. This model is the basis for the theoretical assessment of human thermal comfort changes as a result of the building explained below.

Seasonal Wind Impacts

Looking at the seasonal wind impact (Fig.3) during the summer, most of the wind comes from the south (12% of the time) and southwest (10% of the time). During the summer there will be very little impact on the private properties surrounding the proposed development. The corner of Shirley and Robie is most likely to see elevated wind turbulence where downdrafts from the building could increase wind speeds and wind turbulence. The building has been designed though with a 5–storey stepback that will significantly reduce wind sheer at the street. Summer, spring and fall winds will not be increased in the general neighbouhood surrounding the building. To the north of the site on the Common, wind speeds will likely decrease for 900-2000' during the summer but turbulence will increase at the fringes of the air flow.

In the winter, the prevailing winds shift to the west, north-west and north. These winds could elevate the wind speeds on Pepperell street between the new development and the Atlantica hotel particularly when winter winds come from the west when wind gets funneled between the two buildings. The stepped design of the new building will reduce this impact though on the street. Winds from the north west will have little to no impact on the adjacent neighbourood to the west and south of the site. Winds from the north are already being accelerated on the edge fringe by the Atlantica hotel so it is not anticipated that the new building will any significant additional impacts on wind speeds on adjacent properties to the south. In fact, the new building will likely significantly shelter houses that front on Shirley Street for northern winter winds.

It should be noted that the building's stepped massing nature should significantly reduce wind impacts in the direct vicinity of the sidewalks all around the development. Wind down gusts from the upper storeys will hit the upper raised terraces, reducing the wind speed significantly at the sidewalk, but causing more turbulence in the area of the canopy. In addition, overhangs and street tree canopies have been included at the ground level, again adding a second level of wind and weather protection.

Wind Comfort Assessment

Changes in wind speed as a result of buildings vary depending on wind direction and building morphology. On the upwind side of the building (west and north side in the winter; or on the Pepperell Street in this case) there can be more turbulent wind but little change in wind speed if the building is vertically stepped. On the downwind side of the building (south and east; or the Robie and

Shirley Street side), wind speed is often reduced up to 8-30x the height of the building in what often referred to as the "quiet zone". On both sides of the proposed building, "streamlines" can occur where the wind is accelerated through the openings between buildings - the taller the buildings, the greater the potential for increased wind speed. The area where this will be most impacted as a result of the new building will be the Pepperell Street area when winds prevail from the west (10% in the winter) and from the east (about 5% of the time during the summer and winter). The fact that the Atlantica Hotel tower is pushed back from the street with a podium means the canyon effect of west and east winds will be reduced along the street. Even during these infrequent times, wind speeds will likely not increase more than 10-15% at the street or sidewalk level due to vertical stepping. The main building entrance is recessed and located on the north side of the building which will be protected from the wind by the quiet zone created by the height of the Atlantica Hotel. The balconies further reduce wind speeds at the sidewalk.

Even with these slight increases in wind speed along Pepperell we do not anticipate "uncomfortable" human comfort increase as a result of the building. Around other areas of the building, there will be no measurable change in wind speed as a result of the development. There will be no measurable change in discomfort for people walking on any of the sidewalks surrounding the development, and no measurable change in comfort for people sitting around the development.

Since the residential neighbourhood lies directly south and southwest of the new development, the infrequent winds from the east and north east mean that there will be reduced potential for the building impacting these residential properties.

Summary

The 14-storey building is not anticipated to have any measurable change in human thermal comfort of a person sitting, standing, walking or running with the 8x impact zone of the building. Portions of Pepperell Street may occasionally be windier than currently exists but this change in wind speed should not measurably change the comfort of people on this corner. Street trees should be planted around the development with a small caliper tree that is wind tolerant. The smaller caliper allows the tree to acclimate to the site conditions better than a larger caliper tree.

Please contact me with any questions.

Sincerely,

original signed

Rob LeBlanc
Ekistics Planning & Design