November 12, 2020

Millcroft Greens Corporation

Re: Qualitative Pedestrian Level Wind Assessment
4252 Dundas Street, Burlington
GWE File No.: 20-146-DTPLW

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Millcroft Greens Corporation to undertake a qualitative pedestrian level wind assessment for the proposed residential development at 4252 Dundas Street in Burlington, Ontario. This report provides a qualitative assessment of pedestrian level wind comfort for the noted site based on drawings received from Kirkor Architects and Planners in July 2020, consideration of existing and approved future surrounding buildings, statistical knowledge of the Burlington wind climate, and experience with similar projects in Burlington.

In the early stages of design development, a qualitative wind assessment is useful to identify any significant massing features or design elements which may adversely impact pedestrian activities within the study area, and to provide initial recommendations for mitigation strategies, as may be required.

1. TERMS OF REFERENCE

The focus of this qualitative pedestrian wind assessment is the proposed residential development at 4252 Dundas Street. The study site is situated on a triangular parcel of land on the southeast side of Dundas Street between Tim Dobbie Drive / Weslock Common and Millcroft Park Drive.

The proposed development is a 6-storey building with an “L-shaped” planform oriented longitudinally along Dundas Street. The ground floor features a residential lobby accessed from the west side of the north elevation, an indoor amenity area at the northeast side that provides access to outdoor amenity areas located along the east and south elevations, as well as residential units and building support functions elsewhere. A driveway along the west elevation services a ramp to one level of below-grade parking, surface parking, and a loading area, located at the rear of the building. Above grade, the building

rises with uniform residential floorplates to Level 6 where setbacks on all elevations accommodate private terrace spaces, above which mechanical penthouses complete the development.

Regarding wind exposures, the near-field surroundings of the development (defined as an area falling within a 200-metre radius of the site) are characterized by the open/suburban exposure of Millcroft Golf Course and undeveloped land from the north rotating clockwise to the south, low-rise suburban massing in the southwest quadrant, and additional open space at Norton Park in the northwest quadrant across Dundas Street. The far-field surroundings (defined as the area beyond the near field and within a two-kilometer radius), are classified as a mixture of low-rise suburban and commercial buildings in all directions, with forest and farmland beginning approximately 1.5 kilometres from the site from the southwest rotating clockwise to the northeast.

The ground floor plan is illustrated in Figure 1 (following the main text), with letter tags identifying wind sensitive pedestrian locations considered in this assessment.

2. METHODOLOGY

The main aspects of a qualitative pedestrian level wind assessment include (i) consideration of the statistical properties of the local wind climate; (ii) knowledge of wind flow behaviour in typical urban and suburban environments; and (iii) an understanding of how common wind conditions relate to typical pedestrian activity types[1].

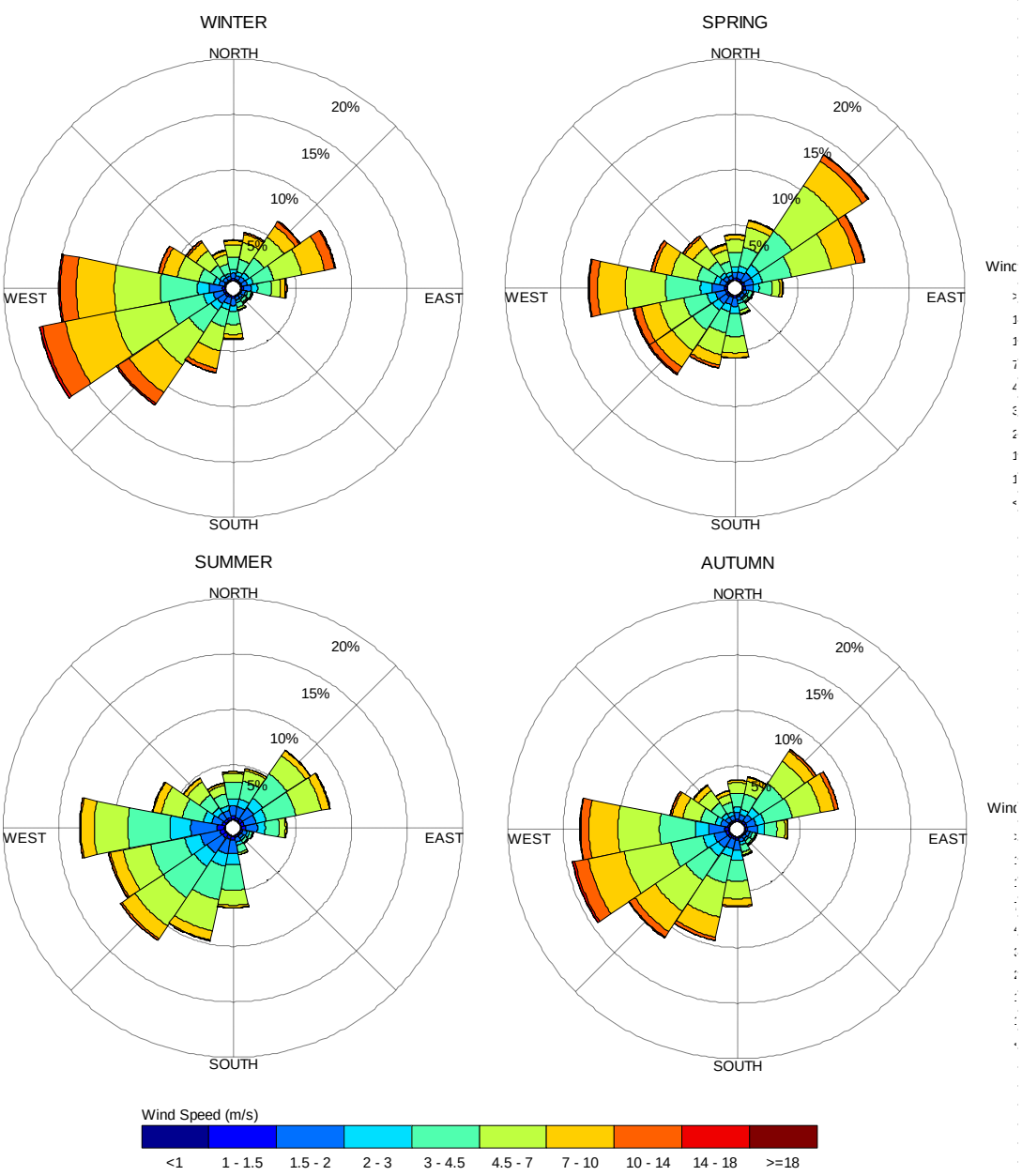
2.1 Burlington Wind Climate

The statistical model of the Burlington wind climate, which indicates the directional character of local winds on a seasonal basis, is illustrated on the following page. The plots illustrate seasonal distribution of measured wind speeds and directions in kilometers per hour (km/h). Probabilities of occurrence of different wind speeds are represented as stacked polar bars in sixteen azimuth divisions. The radial direction represents the percentage of time for various wind speed ranges per wind direction during a 40-year measurement period. The preferred wind speeds and directions can be identified by the longer length of the bars. For Burlington, the most common winds concerning pedestrian comfort approach from the southwest quadrant, followed by those from the northeast. The directional preference and relative

[1] Pedestrian Level Wind Study Guidelines and Terms of Reference, March 2020

magnitude of the wind speed varies somewhat from season to season, with the summer months displaying the calmest winds relative to the remaining seasonal periods.

SEASONAL DISTRIBUTION OF WINDS FOR VARIOUS PROBABILITIES
HAMILTON INTERNATIONAL AIRPORT, HAMILTON, ONTARIO



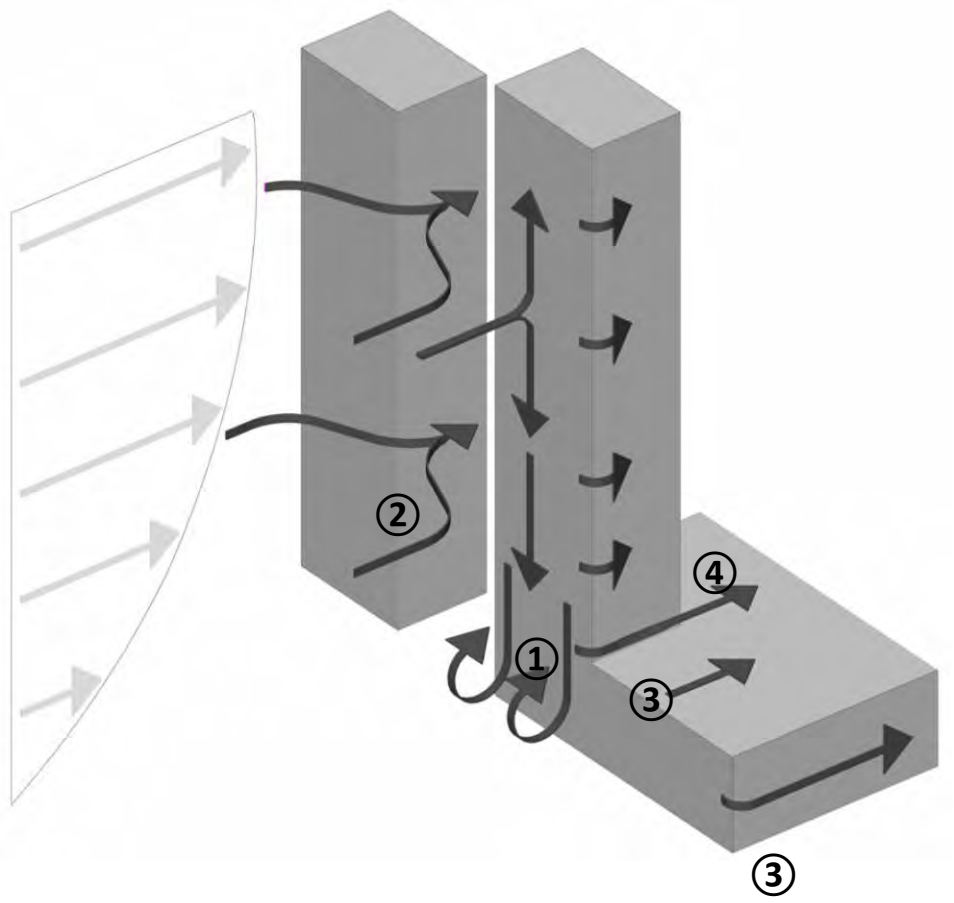
Notes:

1. Radial distances indicate percentage of time of wind events.
2. Wind speeds are mean hourly in km/h, measured at 10 m above the ground.

2.2 Massing vs. Climate – Geometric Effects

The physical features of a development site that are most influential to the local wind conditions include the massing and relative spacing of surrounding buildings, the geometry and orientation of the study building, and the alignment of the study building with respect to statistically prominent wind directions.

Wind flow characteristics which combine to determine how conditions will develop include phenomena known as downwash, channelling coupled with acceleration, and shielding, as illustrated in the image below. Downwash ① relates to the effect of winds against a tall building, whereby much of the impinging flow on the windward side of the building, nominally below two-thirds of the total height, is directed to lower levels. Taller buildings with smooth façades and no podiums produce the strongest downwash effects at grade, while the presence of protruding balconies and a tower setback from the podium edge mitigates downwash effects at the ground level. Channelling ② refers to acceleration of wind through gaps between buildings, while acceleration of wind ③ occurs around building corners. Shielding ④ relates to calm zones on the leeward side of buildings, protected from prevailing winds.



2.3 Pedestrian Comfort and Safety Guidelines

The pedestrian wind comfort guidelines used by Gradient Wind, which correspond to industry-accepted standards, are based on the correlation between a variety of pedestrian activity types and acceptable wind speed ranges for those activities. More specifically:

- Wind conditions are comfortable for *sitting* when gust wind speeds no greater than 16 km/h occur at least 80% of the time;
- Wind conditions are comfortable for *standing* when gust wind speeds no greater than 22 km/h occur at least 80% of the time; and
- Wind conditions are comfortable for *walking* when gust wind speeds no greater than 30 km/h occur at least 80% of the time.

These guidelines are based on gust wind speeds, since people are most sensitive to wind gusts rather than to constant wind speeds. The guidelines are applied to the intended use of an outdoor area. For example, an entrance to a building should be suitable for standing, but need not be suitable for sitting, while a public sidewalk need only be suitable for walking in most circumstances.

3. ANTICIPATED PEDESTRIAN COMFORT

Based on consideration of the proposed residential development at 4252 Dundas Street in Burlington, surrounding building massing, and the relationship to the local wind climate, the following statements summarize our assessment of wind comfort at key pedestrian areas.

Sidewalk along Dundas Street, inclusive of Primary Building Entrance (Figure 1, Tags A and B): Due to the minimal surrounding massing, there will be limited upwind buffering of salient southwest quadrant winds. The sidewalk along Dundas Street (Tag A) is expected to experience wind conditions suitable for standing in the summer, and walking or better for the remainder of the year, which is acceptable. The main entrance to the building (Tag B) is expected to experience similar conditions. Although the canopy above and nearby landscaping will provide some wind protection, it is recommended to either recess the entrance into the building façade or flank the entrance with vertical wind barriers, to ensure conditions at the doorway will be suitable for standing or better on a seasonal basis.

Laneway and Surface Parking Areas, inclusive of Secondary Building Access (Figure 1, Tags C and D): The laneway, surface parking areas, and entrance to below-grade parking along the west elevation (Tag C) are well-sheltered from prominent winds by the study building itself and by the surrounding buildings to the southwest. Wind conditions are therefore expected to be comfortable for standing during the summer and walking or better throughout the remaining seasonal periods. Access to the loading area at the rear of the building (Tag D) will be sheltered from most prominent winds by the study building itself, and is expected to experience conditions suitable for standing or better during the summer and autumn, and walking or better throughout the spring and winter. The noted conditions are acceptable.

Proposed Future Walkway Connection (Figure 1, Tag E): The proposed future walkway connection along the southeast of the study site is expected to experience conditions comfortable for standing or better during the summer and walking or better throughout the rest of the year, which is acceptable.

Outdoor Amenities (Figure 1, Tags F and G): The outdoor amenity on the southeast side of the study building (Tag F) will be well-sheltered from salient southwesterly winds by the study building itself, but remains exposed to less-prominent northeasterly winds. The space is expected to be comfortable for sitting during the summer, standing or better during the autumn, and walking or better for the remainder of the year. The calmest conditions will occur close to the building façade, however if seating areas are planned near the outer perimeter of the amenity space, then it is recommended to install vertical wind barriers to the east of such spaces. Such barriers may comprise high-solidity windscreens, dense coniferous plantings, or a combination thereof.

The outdoor amenity on the north side of the building (Tag G) is exposed to winds from all prominent directions with minimal upwind buffering and is therefore expected to be comfortable for standing during the summer and walking or better throughout the remaining seasonal periods. For seating areas within the space, it is recommended to installed localized vertical wind barriers upwind of designated spaces. If seating areas will be provided along the curved north façade of the building, it may be beneficial to install a canopy or pergola structure to reduce downwash winds. The exact placement and configuration of barriers can be determined at a later date as the landscape design progresses.

Influence of the Proposed Development on Existing Wind Conditions near the Study Site: The introduction of the proposed 4252 Dundas Street development is not expected to significantly influence

pedestrian wind comfort over neighbouring areas. Nearby building entrances, sidewalks, parking areas, Millcroft Golf Course, Norton Park, and other pedestrian-sensitive areas beyond the development site are expected to continue to experience acceptable wind conditions.

Applicability of Predictions: The forgoing statements and conclusions apply to common weather systems, during which no dangerous or consistently strong wind conditions are expected anywhere over the study site. During such extreme weather events, (e.g. thunderstorms, tornadoes, and downbursts), pedestrian safety is the main concern. However, these events are generally short-lived and infrequent and there is often sufficient warning for pedestrians to take appropriate cover.

4. SUMMARY AND RECOMMENDATIONS

Based on a qualitative analysis of architectural drawings, surrounding building massing, and the Burlington wind climate, the following general statements summarize our prediction of future wind conditions for the proposed residential development at 4252 Dundas Street in Burlington, Ontario.

1. Wind comfort at most grade-level pedestrian-sensitive locations across the study site is expected to be suitable for the anticipated uses without mitigation. These grade-level areas include nearby sidewalks, laneways, and parking areas. For the primary lobby entrance and outdoor amenity areas, mitigation is recommended as detailed in Section 3.

2. The introduction of the proposed building is not expected to significantly influence pedestrian wind comfort at neighbouring areas beyond the development site. In particular, nearby building entrances, sidewalks, parking areas, Millcroft Golf Course, Norton Park, and other pedestrian-sensitive areas beyond the development site are expected to continue to experience wind conditions similar to those that presently exist without the proposed building in place.

The forgoing statements and conclusions apply to common weather systems, during which no dangerous or consistently strong wind conditions are expected anywhere over the study site. During such extreme weather events, (e.g. thunderstorms, tornadoes, and downbursts), pedestrian safety is the main concern. However, these events are generally short-lived and infrequent and there is often sufficient warning for pedestrians to take appropriate cover.

This concludes our qualitative assessment of pedestrian wind comfort. Please advise the undersigned of any questions or comments.

Sincerely,

Gradient Wind Engineering Inc.

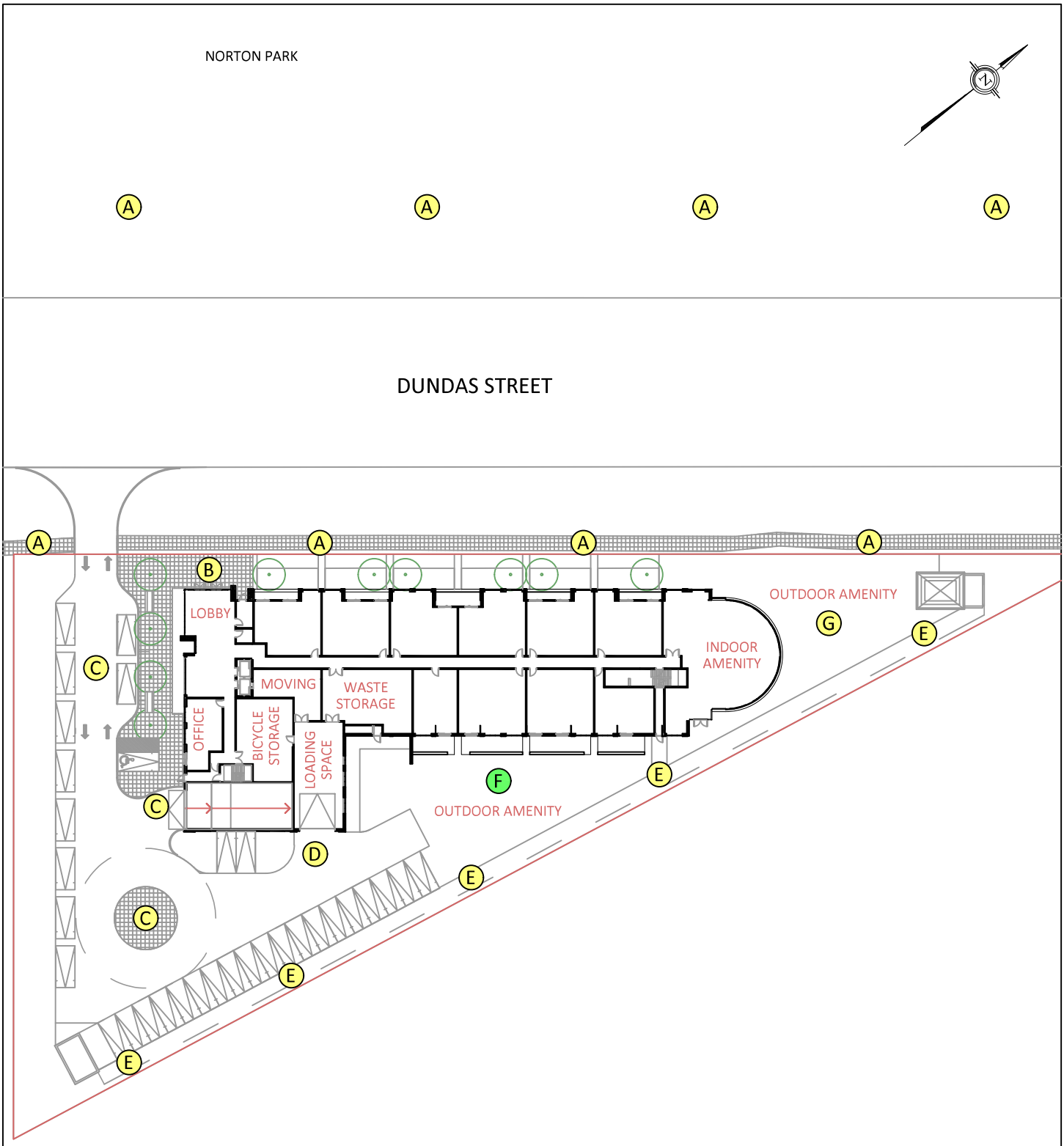


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GW20-146-DTPLW



PREDICTED COMFORT CLASSES

(#) SITTING

(#) STANDING

(#) WALKING

NOTES:

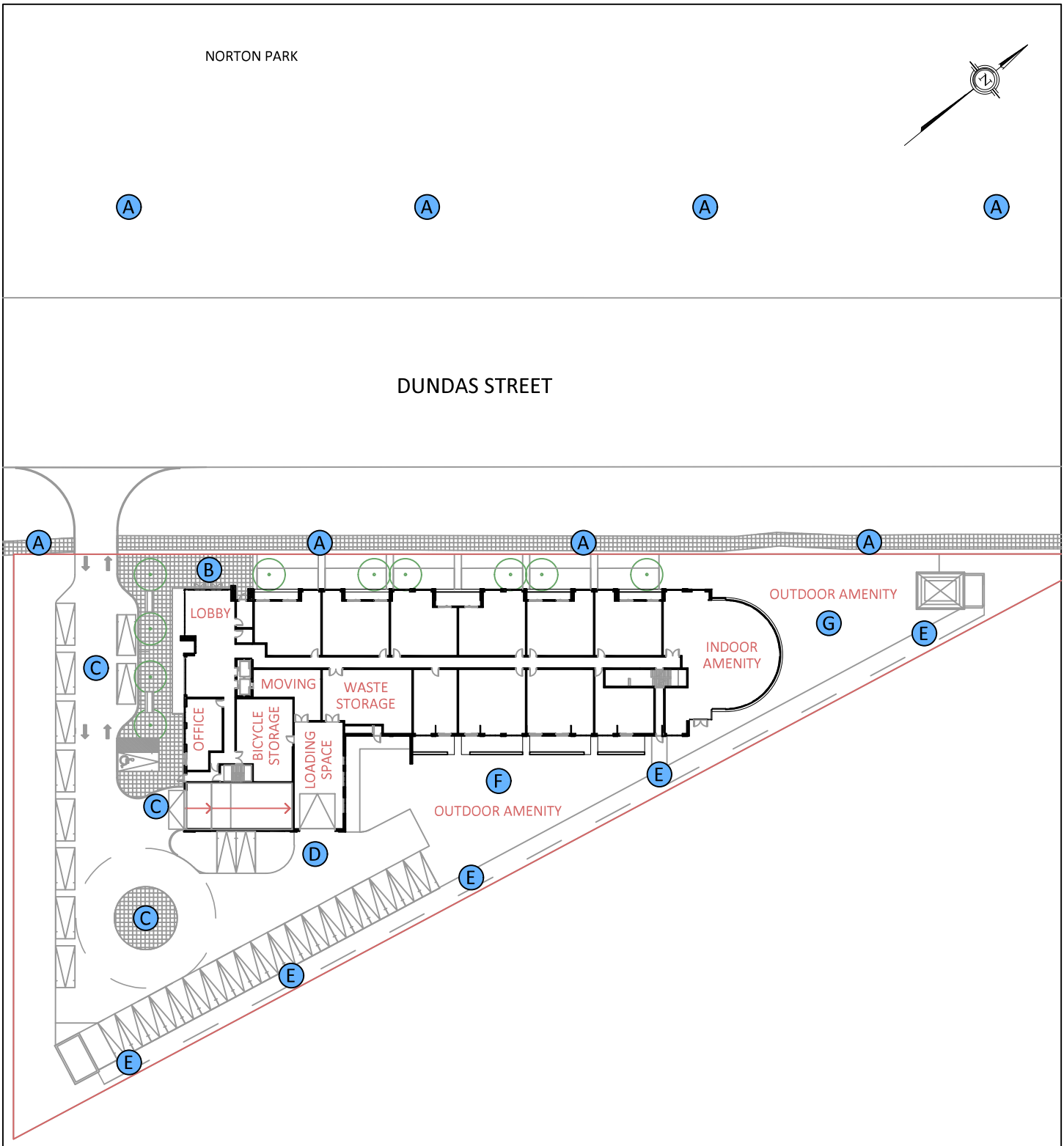
1. SCALE IS APPROXIMATE.
2. (#) PEDESTRIAN LEVEL WIND SENSOR LOCATION.

GRADIENTWIND
ENGINEERS & SCIENTISTS
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613 836 0934 • GRADIENTWIND.COM

PROJECT	4252 DUNDAS STREET, BURLINGTON QUALITATIVE PEDESTRIAN LEVEL WIND ASSESSMENT
SCALE	1:800 (APPROX.)
DRAWING NO.	GWE20-146-DTPLW-1A
DATE	JULY 28, 2020
DRAWN BY	A.G.

DESCRIPTION

FIGURE 1A: SUMMER
GROUND FLOOR PLAN
WITH REFERENCE MARKERS



PREDICTED COMFORT CLASSES

(#) SITTING

(#) STANDING

(#) WALKING

NOTES:

1. SCALE IS APPROXIMATE.
2. (#) PEDESTRIAN LEVEL WIND SENSOR LOCATION.

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DESCRIPTION

FIGURE 1B: WINTER
GROUND FLOOR PLAN
WITH REFERENCE MARKERS