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Wind Assessment of the Proposed Summerset Boulcott Village, Lower Hutt



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1. Introduction

This wind assessment describes the expected effects of a revised design for the proposed Summerset Boulcott Village in Lower Hutt on wind conditions likely to be experienced by residents, neighbours and pedestrians in its vicinity. I carried out a wind assessment of a previous design, and provided a wind assessment report on this design in August 2014 (Opus Research Report 14-529D84.00). I also presented evidence to the Hutt City District Plan Change 35 Hearing for the proposed development in June 2016. For a variety of reasons the development design has subsequently been revised. The following wind assessment has been prepared at the request of Mr Alistair Aburn from Urban Perspectives, and Mr Aaron Smail from Summerset Group Holdings Ltd. It is intended to consider the expected wind effects of the proposed development, with particular reference to the requirements of the Lower Hutt District Plan (Rule 4A 2.3.1 (n) (iv) (c)) for consideration of onsite amenity, but also to consider the potential for wind effects offsite.

My assessment of the expected wind effects of the proposed development is based on (1) my extensive experience of assessing wind conditions for new buildings and additions in urban areas, and (2) plans of the proposed development drawn by DesignGroup Stapleton Elliot dated November 2017. No wind tunnel testing has been performed on the proposal for this assessment.

2. The Site, the Area and the Proposed Development

The Summerset Boulcott Village development site is located south of the new Hutt River stopbank, between the Boulcott's Farm Heritage Golf Course to the north, and the adjacent residential area to the south. Largely vacant, the site extends around from the northern end of Boulcott Street and the northern end of Military Road. Figure 1 shows the existing outlay of the site, and includes the directions of the prevailing strong winds. It can be seen from this figure that the site is roughly split into a western section and an eastern section, with a narrow pinch point in the middle. In addition, it can be seen that the golf course to the north is quite open, while to the immediate south are residential buildings and the Boulcott Primary School playing fields.

Figure 2 shows site plans for the revised design for the proposed development, and includes the storey heights of the different blocks. The western section of the site has a mix of buildings ranging up to five storeys in height, with the lower height buildings, of one or two-storeys, being located on the south side of this area, but still set back around 5 m from the site boundary. The eastern section of the site also has a mix of buildings ranging from one to three storeys in height. Again, the lower height blocks are located along the southern site boundary, albeit with a 5 m setback. All of the blocks in the development have pitched roof designs. There is an internal driveway that connects through the site, between Boulcott Street and Military Road.



Figure 1: Existing Site Layout (including prevailing wind directions for strong winds)



Figure 2. Proposed Site Layout
 (also shows (1) the prevailing wind directions for strong winds, (2) the location of the development site and its main building elements, and (3) the storey heights of these elements)

3. Existing Wind Conditions

Prevailing strong winds over Lower Hutt are dominated by flows from either approximately northerly or southerly directions. Wind flows are generally similar to those over the Wellington region, with the addition of significant sheltering and channelling effects. The hills that line the west side of the Hutt Valley provide considerable shelter from northerly winds. The hills on both sides of the valley channel northerly winds to some degree, but have more impact on southerly winds. Lower Hutt itself is relatively exposed to southerly wind flows. While northerlies usually occur more frequently than southerlies for light to moderate winds, the highest wind speeds generally occur with about the same frequency for both direction sectors. Strong southerly winds are usually noticed more by pedestrians because they are often also cold and wet.

Local pedestrian level wind conditions in this part of Lower Hutt are primarily determined by a combination of four factors. These factors are: (1) the sizes and locations of open spaces, e.g. the golf course, and (2) the sizes, locations, orientations, and heights, of the buildings in the immediate area, (3) the alignment of streets relative to the prevailing wind directions, and (4) the local topography, primarily the new stopbank.

Figure 1 shows that the development site is relatively exposed to winds from the north, receiving very limited shelter from the existing trees on the golf course and from the new raised stopbank. It receives more shelter from southerly winds from the residential buildings and associated trees, other lower planting, and fences. These shelter effects are lower around the Boulcott St end of the site, and adjacent to the Boulcott Primary School playing fields.

Gust wind speeds in the pedestrian areas around and close to the site are assessed to currently range from very low in sheltered areas to high in more exposed locations, as described in Table 1. Typically they are highest in the larger open spaces, around the windward corners of the more exposed buildings, and through some of the narrower gaps between buildings. Generally, the ranges of wind speeds and the overall average wind speeds are expected to be higher for northerly winds than southerly winds because of the variation in the wind shelter effects described above.

Table 1: Gust Wind Speed Range Descriptions

Wind Speed Range	Description
11m/s and below	very low
12 - 14m/s	low
15 - 17m/s	moderate
18 - 20m/s	moderately high
21 - 23m/s	high
24 - 26m/s	very high
27m/s and above	extremely high

4. Effects of the Proposed Development on Wind Conditions

4.1 General

New buildings, as well as changes and additions to existing buildings, can have a significant impact on wind conditions in the surrounding areas. New buildings or additions to buildings occupy space and force wind that would normally flow through this space to take other paths. Wind flows can be deflected down from higher levels into adjacent areas. They can also be channelled through gaps between buildings, or accelerated around corners. Some of the worst wind conditions occur where these vertical and horizontal wind flows combine, most often around the windward corners and sides of a building. However, new buildings or additions will not always cause local wind conditions to deteriorate. New buildings can often provide increased shelter to some areas, generally those immediately downwind. They can also potentially keep wind flows away from pedestrian areas, either by deflecting them into lesser used areas, or well above ground level. Accordingly, new building developments can cause wind speeds to increase in some areas, and to decrease in other areas. These effects can be particularly significant when a new building occupies a vacant or largely vacant site, as is the case here.

Apart from the effects of buildings, and particularly in areas of lower-rise buildings, the effects of landscaping can be very significant in providing wind shelter. Fences, trees and other planting, can provide either direct shelter for specific localised areas, or cumulatively they can provide general shelter for wider areas.

The following assessment of the effects of the proposed development on wind conditions has been divided into sections relating to northerly winds and southerly winds, and into those areas outside the site, i.e. the neighbouring residential areas and the golf course, and the area of the site itself.

4.2 Northerly Winds

4.2.1 Areas outside the site

Eastern Section of the Site

In northerly winds, pedestrian wind conditions in areas outside the site are expected to be largely unaffected. This is partly because of the modest sizes and heights of the buildings (one to three storeys), but also due to the incorporation of a 5 m setback of buildings from the southern boundary of the site. If anything, the blocks that make up the eastern section of the development will provide some additional shelter for the neighbouring properties. This shelter should be further enhanced by any proposed fencing or planting in this area, especially if there is also a more or less continuous line of fencing between the development and the neighbouring properties to the south.

Western Section of the Site

The buildings making up the western section of the site range from one to five storeys in height. However, Figure 2 shows that the taller and larger plan buildings are located more towards the northern and central part of this section of the site, with the one and two storey buildings being located closer to the nearby residential buildings and Boulcott Primary School playground areas. Accordingly, the effects on the adjacent properties will be relatively small, as (1) lower height

buildings typically have less impact on pedestrian wind speeds than taller ones, (2) any effects from the taller buildings will decrease relatively quickly with distance, and (3) there is a 5 m setback of buildings from the southern boundary that creates an additional buffer zone. For most wind directions and wind conditions, the buildings on the western section of the site should actually provide more overall shelter for downstream areas, including neighbouring properties, than currently exists.

In addition, any planting or fencing that is included in this 5 m zone between the buildings on the site and the neighbours to the south will also be beneficial, with the potential benefits generally increasing with higher density of planting, and being generally greater if any trees and shrubs are evergreen. Similarly, creating a largely consistent line of fencing around 1.8m to 2m high between the site and the neighbouring properties would also provide additional shelter.

The Golf Course

There will be no impact on wind conditions on the neighbouring golf course, despite the proximity of the three to five storey buildings, as this area is located upstream of the development, and is also somewhat separated from it by the raised stopbank.

4.2.2 On-site areas

Eastern Section of the Site

Wind conditions around the buildings on the eastern section of the site will be mostly similar to those currently experienced by many of the existing residential blocks adjacent to the golf course. They could potentially be significantly improved by planting and fencing in the areas (1) between the new buildings and the stopbank, (2) in the 5m setback from the southern site boundary, (3) around the corners of the taller buildings, and (4) in the gaps between the buildings.

Western Section of the Site

The revised design has kept the heights of the buildings closest to the southern boundary to one or two storeys. For the most part, wind conditions around these buildings will be mostly similar to those currently experienced by many of the existing residential blocks adjacent to the golf course.

The taller three to five storey buildings on the northern central part of this area of the site are more exposed to direct wind flows. While these buildings will provide substantial shelter for those areas immediately down wind, including the mostly enclosed bowling green area, the areas around the windward corners of the buildings, and in the gaps between them, will be quite windy at times. These areas, and the areas immediately downstream, could benefit significantly from targeted landscaping, screening or fencing.

One area to consider is the space between the stopbank and the buildings. The greater the height and density of any landscaping (trees, shrubbery and fencing) in this area the more shelter will be afforded to both pedestrians and buildings. Around the windward corners of the buildings, which is where wind speeds around buildings are generally highest, the simplest and most effective option is often to use planting, screening, or a combination of these, to keep people away from these areas. Northerly wind flows will also be channelled between these buildings. Accordingly, screening or planting could be used to provide shelter in these spaces. This could be spread out, in an attempt to

shelter the entire area, or it could be more targeted to provide shelter for selected areas or pedestrian routes.

4.3 Southerly Winds

4.3.1 Areas outside the site

In southerly winds the development will not have any major significant detrimental effect on wind conditions in any of the residential areas to the south of the site, as (1) these areas are upwind of the proposed buildings, and (2) there is a 5 m setback from the southern site boundary.

The users of the golf course and/or people potentially walking along the stopbank to the north of the development are unlikely to notice any change in the amenity of this area. This is because:

- the new buildings on the eastern section of the site are mostly one and two storey blocks, which are similar in height and plan to the existing residential buildings to the south,
- the taller buildings on the both the eastern and western parts part of the site will provide additional shelter for those areas immediately downstream, and the potentially windy regions around the corners of the buildings can be improved through the use of landscaping and screening, and
- the new raised stopbank also helps to offset some of the effects around the corners of the new buildings.

4.3.2 On-site areas

Many of the comments and suggestions made for improving the amenity and providing additional wind shelter that were made for northerly winds also apply for southerly winds. This includes (1) landscaping the area between the buildings and the adjacent stopbank, and the 5 m setback area on the southern boundary, (2) keeping people away from the windward corners of the buildings, if possible, and (3) landscaping the areas between the taller buildings according to use and pedestrian routes.

4.4 Building Entrances

The incorporation of a wind lobby at the main entrance to the facility (Building E), the locations and orientations of many of the other building entrances, and the breaking up of the interior spaces with internal doors, are sensible choices, and should help to provide good transitions from internal to external spaces. However, it is possible that the consideration of additional landscaping or screening may be beneficial as use patterns and preferred pedestrian routes develop.

5. Concluding Comments

- (1) Existing wind speeds in the area around the site range from low to high, with many of the higher winds speeds being a consequence of the exposed nature of the site to northerly winds.
- (2) The layout of the revised development design has refined some of the intelligent design choices with respect to wind effects that were included in the previously assessed design. These include (a) the positioning of lower rise elements close to the adjacent residential areas to the south, (b) the massing of the taller buildings away from the adjacent residential areas, (c) the partial enclosure of some outside recreational space, and (d) the use of a main entrance wind lobby and the location/orientation of other entrances and doors.
- (3) In northerly winds the revised development should have a generally beneficial effect on wind conditions in adjacent residential properties, by providing them with additional shelter.
- (4) In southerly winds, the revised development will have minimal impact on wind conditions in the adjacent residential properties, given the new buildings are located downstream of these areas, and there is also a 5 m setback from these neighbouring properties.
- (5) Users of the neighbouring golf course and stopbank areas should not notice any deterioration on the overall amenity of this area.
- (6) The above conclusions would also generally apply if there were further refinements to the revised design that still retained the basic storey heights and site layouts shown.
- (7) There is considerable potential for wind conditions, primarily within the site, to be ameliorated or improved through use of planting (trees and shrubbery), screens and fencing.

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