Fale Malae Trust

WIND ASSESSMENT:

FALE DEVELOPMENT, WELLINGTON

REPORT NO 24-529Q80.00

12 JUNE 2024

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REV	DATE	DETAILS
1	27/2/24	Final
2	12/6/24	Amendments (relating to the District Plan)

	NAME	DATE	SIGNATURE
Prepared by:	Neil Jamieson	27/2/24	
Reviewed by:	Nick Locke	27/2/24	
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1 INTRODUCTION

This desktop wind assessment considers the expected effects of the proposed Fale, a development planned for a site on Frank Kitts Park, on the Wellington waterfront, on pedestrian level wind conditions in the surrounding area. The proposal involves the construction of a two-level pitched-roof building on the site, which incorporates a variety of cultural, sporting, artistic, community and service spaces. Note that this assessment of wind effects does not consider the likely effects of the wider redevelopment of Frank Kitts Park, of which the proposed Fale is one element.

The objectives of the wind assessment are to:

- address the general reporting requirements for the assessment of wind effects contained in the relevant sections of the Wellington City District Plan (2024);
- provide input to the resource consent process.

Assessment of the anticipated wind effects of the proposed development is based on (1) our experience in assessing wind conditions for new buildings and additions in urban areas and (2) the results of wind tunnel model studies carried out in situations with similar sizes and heights of buildings. No wind tunnel testing has been performed on the proposal for this assessment.

Evaluation of the existing wind conditions is based on the anticipated effects of existing buildings on wind flows and on the consideration of the effects of buildings under construction as though they are completed. Where appropriate, comments are made on the anticipated effects of proposed buildings in the immediate vicinity that have resource or building consent, that are expected to proceed, but where construction has not yet commenced.

All comments refer to plans and drawings prepared by Jasmax, dated on 13/2/24.

2 DESCRIPTION

2.1 DEVELOPMENT SITE

The Fale development site is located on the Wellington waterfront, at the southern end of Frank Kitts Park, adjacent to Jervois Quay as shown in Figure 1. Also shown on Figure 1 are the direction sectors for the prevailing winds over Wellington.

Figure 1: *Location of proposed Fale (location F)*
(shown as part of Frank Kitts Park redevelopment plan)

The site of the proposed Fale is currently occupied by part of the underground carpark on the southern end of Frank Kits Park, which has been designated as earthquake prone and is planned for demolition. The topography in the immediate area is approximately flat.

2.2 SURROUNDING AREA

Frank Kitts Park, which was originally developed in the 1980s, is a popular city park located on the Wellington waterfront between Jervois Quay and Wellington Harbour. Immediately to the north is the group of buildings located on Queens Wharf, including the TSB Arena, while to the south is the Whairepo Lagoon, the Wharewaka and the rowing club buildings. Across Jervois Quay to the west is the Wellington central business district. Much of the park comprises open spaces, including grassed and paved areas, some of which are located on top of the partially underground carparking area at the southern end of the site. The sides of this carparking area form a raised element adjacent to the Lagoon.

This area of Wellington has seen some development in recent years, mainly in the waterfront area. Buildings and landscaping changes have occurred from the area adjacent to the Wellington Railway Station right through to Oriental Parade. While several new buildings have been constructed, several other buildings have also been renovated, relocated, or redeveloped. In contrast, the built-up area of the central city across Jervois Quay to the west of the park has seen a much lower level of recent significant change.

2.3 PROPOSED DEVELOPMENT

The proposed Fale development is a two-level building, with a largely sub-ground basement and the main floor above. It is essentially a rectangular glass walled pavilion, with a distinctively pointed and curved pitched roof. This roof overhangs the ground floor significantly on all four sides. Overall, the top of the building is around 13m above Jervois Quay, but only around between 10m and 11m above the immediately surrounding ground level. Of this, the curved roof structure amounts to around 7.5m in height. Figure 2 shows a render of the proposed development that illustrates the scale and design of the Fale relative to the surrounding elements of the planned Franks Kitt Parks redevelopment.

Figure 2: Proposed Fale development – as viewed from the south.

The Fale's ground floor will incorporate function space, service areas and a café at its northern end, which is linked to outdoor dining/seating space. Multiple entrances to the ground floor are provided along the eastern, northern, and western sides of the building.

3 DISTRICT PLAN WIND RULES

3.1 WELLINGTON DISTRICT PLAN (2024)

Wellington City Council are currently engaged in the process of updating the Wellington District Plan. In a recent decision, matters relating to the consideration of the effects of new building developments on pedestrian wind conditions have now become operative. These changes have established a separate Wind chapter, with objectives, policies, standards, and rules that apply to different zones within the city. Under the District Plan (2024), buildings or structures under 20m in height above ground level within the Special Purpose Waterfront Zone are permitted activities.

The relevant sections of the District Plan (2024) are reproduced in Appendix A. The District Plan also provides a separate Appendix 14 – Wind Chapter Best Practice Guidance, which (1) explains how the wind rules and standards apply to building developments, and (2) describes wind engineering principles that relate to meeting the District Plan wind policies.

3.2 CURRENT ASSESSMENT

As noted above, the construction of buildings under 20m in height in the Waterfront Zone is a permitted activity under the District Plan (2024). However, the Wellington Waterfront Technical Advisory Group (TAG) have noted that the Fale is close to a highly pedestrianised and windy location and suggested a wind assessment should be undertaken. Accordingly, this wind assessment has been prepared with reference to the objectives, policies and rules relating to the wind effects of new buildings or additions to buildings contained in District Plan (2024). These objectives, policies and rules are intended to ensure that new buildings or additions to buildings avoid, remedy or mitigate any wind problems that they create.

4 EXISTING WIND CONDITIONS

4.1 WELLINGTON – PREVAILING WINDS

Over Wellington, the prevailing strong winds are dominated by north to north-westerly and south to south-westerly wind flows, as shown in Figure 1 in relation to the area around the development site. Wind flows are also significantly influenced by the local topography, which can affect the exposure of a site to direct wind flows, cause channelling and acceleration of wind flows, or provide shelter from direct wind flows.

Northerly and northwesterly winds typically occur more frequently than southerly and southwesterly winds for light to moderate winds. However, the highest wind speeds occur with around the same frequency for both direction sectors. Strong southerlies tend to be noticed more by pedestrians because they are often also cold and frequently accompanied by rain.

4.2 EXISTING WIND CONDITIONS - SITE

Pedestrian level wind conditions in this part of the city are largely determined by a combination of factors, these being (1) the alignment of the streets relative to the prevailing wind directions, (2) the sizes, positions, designs and heights of buildings, other structures, and landscaping elements, and (3) the sizes and locations of open spaces.

In assessing the wind effects of buildings in urban areas, where specific data from wind tunnel studies is either unavailable or limited, we recommend the use of the wind speed descriptions as listed in Table 1.

Table 1: Gust Wind Speed Range Descriptions.

Gust 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

Based on the results of wind tunnel studies carried out on different areas of the Wellington waterfront ranging from Sky Stadium through to Waitangi Park, we would assess that gust wind speeds in and around Frank Kitts Park are currently in the range we would describe as low to very high. Much of the park is relatively exposed to both strong northerly and southerly winds, with the highest wind speeds occurring in the larger open spaces. Wind speeds are typically lower in the lee of the more solid structural elements such as the underground carpark and promenade walls, or around the more dense plantings of trees and shrubs. The degree of shelter afforded by these elements also varies considerably with wind direction, i.e. whether the wind direction is northerly or southerly.

5 EFFECTS ON WIND CONDITIONS

5.1 BUILDINGS IN GENERAL

Building developments, which can include new buildings, or additions or changes to existing buildings, can have a substantial impact on pedestrian wind conditions in the surrounding public areas. As new buildings are typically either (1) taller in height or larger in bulk (or both) than the existing buildings, or (2) occupy a vacant or largely vacant site, they occupy more space and force wind that would normally flow through this space to take other paths. The resulting changes in wind flows can affect (1) the amenity of certain locations through changes in the frequently occurring wind speeds and (2) the safety of certain locations through changes to the strongest gust speeds.

Vertical wind flows, referred to as “downwash”, can be deflected down from higher levels into adjacent areas. Wind can also be channelled through gaps between buildings or accelerated around corners. Some of the worst wind conditions can occur where these vertical and horizontal wind flows combine, most often around the windward corners and sides of buildings.

New buildings, or additions, do not always cause local wind conditions to deteriorate. They can provide increased shelter to some areas, particularly those immediately downwind. They can also potentially keep wind flows away from pedestrian areas, either by deflecting them into lesser used areas, or keeping them well above ground level. Accordingly, new building developments can cause wind speeds to increase in some areas and to decrease in other areas. This will often depend significantly on the wind direction. These effects can be particularly significant when a large new building replaces a smaller existing building or occupies a largely or completely vacant site.

When building developments are found to cause wind conditions to deteriorate significantly, the effects can often be mitigated. Options for mitigation of wind effects can include design changes, such as canopies, or changes to bulk and form, or screening or planting, among others.

The following assessment has been divided into sections on the anticipated effects of the proposed development on (1) mean wind conditions covering specific wind directions and (2) the expected gust speed levels.

5.2 EFFECTS IN NORTH TO NORTHWESTERLY WINDS

As noted in Section 2.3, the overall height of the Fale is between 10m and 11m, with the roof making up around 7.5m of this. The curved roof design will encourage northerly and northwesterly wind flows to blow over the top of the building, rather than deflecting them down towards ground level and into the adjacent pedestrian spaces. In addition, the large roof overhangs will provide some protection for the pedestrian spaces around the modest 3m height ground floor walls.

Existing ground level wind flows will be deflected around the windward corners and along both sides of the building. However, the development is not expected to increase gust speeds above the 20m/s Safety Criteria specified in the District Plan, primarily because of its modest height and the roof design, and because the long axis of the building is aligned approximately parallel to the prevailing wind directions, rather than normal to them. Exactly how high the maximum gust speeds are will also be determined by the final landscaping design for the surrounding spaces, which is shown indicatively in Figure 2. Planting that is relatively tall, dense, evergreen and contains

a mixture of heights can provide effective shelter from horizontal wind flows. The chosen landscaping is likely to affect the useability of the outdoor spaces of the café situated at the northern end of the building.

5.3 EFFECTS IN SOUTH TO SOUTHWESTERLY WINDS

In south to southwesterly winds the proposed Fale development is relatively exposed to horizontal wind flows blowing across Whairepo Lagoon, but as for northerly winds its long axis is aligned more parallel to the prevailing winds, minimising its exposure to direct wind flows. Some of these horizontal wind flows will be deflected around the windward corners and along the side of the proposed building. However, the pointed and curved pitched roof design of the proposed building will help to encourage wind flows to pass over the building rather than down into adjacent pedestrian spaces. Given the existing wind speed levels, and the modest height of the Fale, it is generally not expected that the proposed development will increase the gust speeds above the 20m/s Safety Criteria specified in the District Plan. Some gust speeds in some localised areas, mainly around the south end of the building, adjacent to Whairepo Lagoon, are likely to approach this level. Wind speeds in the outside areas around the café at the northern end of the building are likely to be lower because of the shelter afforded by the building. As for northerly winds, the maximum gust speeds in the pedestrian areas around the building will also depend on the final design of the external landscaping.

5.4 OVERALL ASSESSMENT OF BUILDING DESIGN

The proposed Fale design does include some positive wind design elements. These include (1) its alignment more parallel to, than normal to the prevailing wind directions, (2) the curved pitched roof design and (3) the large roof overhangs.

There are some areas downwind of the development where wind conditions are expected to be improved compared to existing levels. Wind conditions could also be improved through appropriate design and placement of hard landscaping and planting elements. In addition, the multiplicity of building entrances along three sides of the building may require management during windy conditions to help prevent wind blowing into the building interior.

6 CONCLUSIONS

The following conclusions have been drawn from this assessment of pedestrian wind conditions:

(1) Existing wind conditions in the area near the development site range from low to very high. They are largely dictated by the exposure of the site and surrounding area to the prevailing winds.

(2) At around 10m to 11m in height, of which 7.5m constitutes the curved and pointed pitched roof, the proposed Fale is modest in height and is much lower than many other recently developed waterfront buildings. The combination of the building alignment parallel to the prevailing wind directions, the roof design, and the large roof overhangs, mean that the overall effects on pedestrian wind conditions will be relatively small.

(3) The development design is not expected to increase gust speeds above the 20m/s District Plan Safety Criteria. Wind conditions in some areas will be improved because of the shelter afforded by the proposed building.

(4) The local pedestrian wind environment around the Fale will be influenced by the design and placement of the landscaping around it. Further improvements in wind conditions could be achieved through appropriate design and placement of additional hard landscaping and planting elements.

(5) It is expected that the proposed Fale will generally comply with District Plan wind standards WIND-S1, WIND-S2, and WIND-S3.

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7 LIMITATIONS

This report ('Report') has been prepared by WSP exclusively for the Fale Malae Trust ('Client') in relation to the wind assessment of the proposed Fale development for Frank Kitts Park in Wellington ('Purpose') and in accordance with our offer of service dated 31st January 2024. The findings in this Report are based on and are subject to the assumptions specified in the Report. WSP accepts no liability whatsoever for any reliance on or use of this Report, in whole or in part, for any use or purpose other than the Purpose or any use or reliance on the Report by any third party.

APPENDIX A DISTRICT PLAN - WIND

CITY CENTRE AND WATERFRONT ZONES

The Wellington City District Plan (2024) contains general provisions, policies rules and standards relating to wind effects created by buildings in different zones of the city. The Fale development site is located in the Waterfront Zone under the District Plan (2024) and is located immediately adjacent to the City Centre Zone. Reproduced below are the relevant sections from the District Plan that relate to pedestrian wind effects.

APP8 — Quantitative Wind Study and Qualitative Wind Assessment — Modelling and Reporting Requirements

This appendix details the requirements for both quantitative wind studies and qualitative wind assessments in accordance with the Wind Chapter requirements.

Rule WIND-R1 details the height thresholds and development triggers when either a qualitative or quantitative wind assessment is required to show compliance with standards WIND-S1, WIND-S2 and WIND-S3 as relevant.

Appendix 8 Wind-A2: Reporting requirements for a Qualitative Wind Assessment

This Appendix describes the form and content of qualitative wind assessments, required by rules in the Wind Chapter.

1 Form of Qualitative Wind Assessment Report

A qualitative wind assessment report is not based on the results of a wind tunnel test. It is based on and so ultimately relies on a wind specialist's expert knowledge of the interaction of buildings with the wind, and of any prior evidence of local wind speeds. It must contain the following:

1.1 A description of the existing wind conditions, including sources and limitations of information used in the assessment. Results from previous quantitative wind studies, in the vicinity of the development site, should be used when available.

1.2 A description of the interaction of the existing buildings with the wind that leads to the existing wind conditions.

1.3 A review of the design of the proposed development, and its appropriateness for a windy environment, including a description of how the scale and form of the proposed building relates to the prototypical building forms documented in the Wind Chapter Best Practice Guidance Document.

1.4 A description of the influence of the proposed development on pedestrian level wind speeds in public areas, and its compliance with standards WIND-S1, WIND-S2, and where required WIND-S3. This part of the assessment should, where possible, be quantified by comparison with the wind effects of the prototypical buildings documented in the Wind Chapter Best Practice Guidance Document.

1.5 A discussion of the building design and the effectiveness of wind mitigation measures is recommended when the proposed development will lead to a deterioration in the existing wind conditions., The wind assessment must be based as far as possible on the data in the wind design guide, and must provide a clear rationale that the proposed design is the best practical aerodynamic design to achieve compliance with standards WIND-S1, WIND-S2, and where required WIND-S3.

1.6 A statement at the conclusion of the report that assesses the proposed developments level of compliance in the professional opinion of the wind specialist, with standards WIND-S1, WIND-S2, and where required WIND-S3.

Effects Standards		
WIND-S1	**Safety**	
City Centre Zone Metropolitan Centre Zone Local Centre Zone Neighbourhood Centre Zone Port Zone: Inner Harbour Port Precinct Port Zone: Multi-User Ferry Precinct Waterfront Zone Stadium Zone Hospital Zone Tertiary Education Zone High Density Residential Zone Medium Density Residential Zone	1. The proposed building, additions or alterations must not result in an annual maximum gust speed in excess of 20 m/s in any public space.	Assessment criteria where the standard is infringed: 1. The extent to which pedestrians can easily avoid dangerous gust speeds created by the proposed development, including effects on building entrances, pedestrian crossings, or major walking routes; 2. The extent to which pedestrian use in areas where dangerous wind speeds occur is low and wind conditions elsewhere are improved by the proposed development; 3. The extent to which dangerous wind speeds at one location results from wind being redirected or shifted from another location, with no significant change in the overall wind conditions; 4. The extent to which an existing dangerous gust speed is reduced, improving the overall wind conditions; 5. The extent to which it is shown that the proposed design is the optimum aerodynamic solution, including whether changes in bulk or location of the proposed development are documented and do not significantly improve the situation; and 6. The extent to which the proposed development design is consistent with the Wind Chapter Best Practice Guidance Document (Appendix 14).
WIND-S2	**Deterioration of the wind environment**	
City Centre Zone Metropolitan Centre Zone Local Centre Zone Neighbourhood Centre Zone Port Zone: Inner Harbour Port Precinct Port Zone:	1. Wind conditions overall must not deteriorate in public spaces that are affected by the development when undesirable wind conditions are assessed by the number of hours a mean wind speed of 2.5 m/s is equaled or exceeded each year; and 2. Wind conditions at any specific locations may deteriorate by up to 500 hours per year, provided the wind conditions averaged over all the public spaces do not deteriorate.	Assessment criteria where the standard is infringed: 1. The extent to which pedestrians can easily avoid dangerous gust speeds created by the proposed development, including effects on building entrances, pedestrian crossings, or major walking routes; 2. The extent to which pedestrian use in areas where dangerous wind speeds occur is low and wind conditions elsewhere are improved by the proposed development; 3. The extent to which dangerous wind speeds at one location results from wind being redirected or shifted from

Multi-User Ferry Precinct Waterfront Zone Stadium Zone Hospital Zone Tertiary Education Zone High Density Residential Zone Medium Density Residential Zone		another location, with no significant change in the overall wind conditions; 4. The extent to which existing wind conditions are maintained or improved; 5. The extent to which it is shown that the proposed design is the optimum aerodynamic solution, including whether changes in bulk or location of the proposed development are documented and do not significantly improve the situation; and 6. The extent to which the proposed development design is consistent with the Wind Chapter Best Practice Guidance Document (Appendix 14).
WIND-S3	**Comfort**	
Public spaces in the following Zones: City Centre Zone Metropolitan Centre Zone Local Centre Zone Neighbourhood Centre Zone Port Zone: Inner Harbour Port Precinct Port Zone: Multi-User Ferry Precinct Waterfront Zone Stadium Zone Hospital Zone Tertiary Education Zone Medium Density Residential Zone High Density Residential Zone	1. A proposed development must not cause uncomfortable wind conditions in listed public spaces; and 2. A development must not cause existing uncomfortable wind conditions to deteriorate.	Assessment criteria where the standard is infringed: 1. The extent to which pedestrians can easily avoid areas where winds deteriorate and use other areas where the winds do not deteriorate; 2. The extent to which pedestrian use and expectations for the area where winds deteriorate are low and wind conditions elsewhere improve. 3. The extent to which a deterioration in winds at one location results from wind being redirected or shifted from one area to another, with no significant change in the overall wind conditions; 4. The extent to which existing wind conditions have been maintained or improved; 5. The extent to which very low existing winds speeds have been increased towards the comfort threshold; 6. The extent to which it is shown that the proposed design is the optimum aerodynamic solution, e.g. changes in bulk or location of the proposed development are documented and do not significantly improve the situation. A “significant” improvement would be a difference of more than 175 hours per year; and 7. The extent to which the proposed development design is consistent with advice and recommendations in the Wind Chapter Best Practice Guidance Document.