

**PLANNING PANELS VICTORIA
541 GRAHAM STREET, PORT MELBOURNE
PROPOSED AMENDMENT GC81**

ENVIRONMENTAL WIND CONDITIONS

**by
M. Eaddy
and
W. H. Melbourne**

Instructed by:

Russell Kennedy Lawyers

On Behalf of:

Frank Walker and Sel Reklaw Pty Ltd



Report: 40-18-DE-VCAT-00

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1. INTRODUCTION

1.1. Details of Authors

The names, addresses, and qualifications of the authors are as follows:

Dr Michael J. Eaddy B.E.(Hons), M.E.(Dist), PhD

Prof William H Melbourne BE, DIC, PhD, FIEAust, FTSE

We are both directors of the Wind Engineering Consultancy firm MEL Consultants Pty Ltd that operates a wind tunnel testing facility at 22 Cleeland Road, Oakleigh South.

Michael Eaddy joined MEL Consultants in 2002 as an engineer and became a director of the company in 2006. He is a member of the Australasian Wind Engineering Society and Engineers Australia. He has completed numerous wind tunnel and full scale investigations of environmental wind conditions around buildings and structures within Australia and overseas. Details of Michael Eaddy's experience are given in Appendix A.

William Melbourne was the founder of MEL Consultants in the early 1980's and operated the company whilst he was a Professor of Fluid Mechanics at Monash University. He has undertaken and published research in the area of wind engineering and been a member of national and international wind engineering committees that develop wind engineering standards and guidelines. He is a Fellow of Engineers Australia and a life member of the Australasian Wind Engineering Society. Details of William Melbourne's experience are given in Appendix A.

MEL Consultants undertakes desktop analyses/assessments and wind tunnel testing of buildings and structures for wind engineering areas such as environmental wind conditions, structural wind loads, and pollutant dispersion. We are consulted by developers and state and local government, such as the City of Melbourne and the Victorian Department of Planning to provide expert wind engineering advice.

2. PROPOSED AMENDMENT GC81

The objective of the changes proposed in the proposed Amendment GC81 for the Fishermans Bend Urban Renewal Project is underpinned by 18 background reports and translates the draft Framework by identifying:

- The preferred land use, form and intensity of urban development in each of the four mixed use precincts, including new floor area ratios and maximum height and setback controls; and
- Potential key transport alignments and services and the preferred locations for public open space and community infrastructure.

The changes by the proposed Amendment GC81 to the Melbourne Planning scheme with respect to the environmental wind conditions apply to Schedule 67 to Clause 43.02 Design and Development Overlay with the introduction of wind comfort criteria bringing it in line with the criteria used for other Design and Development Overlay areas. The same change is proposed to the Port Phillip Planning Scheme Schedule 30 to Clause 43.02-Design and Development Overlay.

3. FISHERMANS BEND FRAMEWORK

The changes proposed by Amendment GC81 are based on the Fishermans Bend Vision, September 2016, and the Fishermans Bend Framework and, as noted earlier, is underpinned by 18 background reports. Reviewing these reports, there is no mention of the environmental wind effects in any of the discussion of activation of spaces, built form design, and vision. Considering the Docklands urban renewal area to the north and the reputation of it as an unpleasant wind-swept precinct, it would have been expected that the wind climate would be included as one of the environmental constraints for the Fishermans Bend Strategic Framework.

Fishermans Bend is located on the west side of the city and, like Docklands, would be exposed to the strong and prevailing south through west to north wind directions for Melbourne. Additionally, the Wirraway precinct is close to the edge of Port Phillip Bay, which would result in higher wind speeds at lower elevations due to the approach over the water of Port Phillip Bay. Unfortunately, the roads in Fishermans Bend are aligned with the strong wind directions. This means that strong winds will be funnelled by the buildings along streets intended to be activated for stationary pedestrian activities.

The expectation is that the wind environment is likely to control the built form design for the four precincts of Fishermans Bend. The proposed built form controls would be expected to result in lower adversely shaped buildings from a wind perspective to maximise floor area, which could have more impact compared to a taller aerodynamically wind engineered built form.

Therefore, it is our opinion that the Fishermans Bend Strategic Framework Plan has ignored an important factor of wind effects in coming up with the urban design principles and there is a likelihood of the mistakes of Docklands being repeated.

4. AMENDMENT GC81

The proposed Amendment GC81 changes with respect to wind in the Melbourne Planning Scheme and the Port Philip Planning Scheme have been to include the wind comfort criteria that was implemented in the Melbourne Planning Scheme as part of the C270 and C311 Amendments. Applying consistent wind comfort criteria across the Melbourne and Port Phillip Planning Schemes is supported.

However, the definition of the comfortable wind criteria has an error - the mean wind speed from any wind direction in Melbourne does not occur for more than 20% of the time. MEL Consultants have a wind climate probability distribution as a function of wind direction that would support this position. There is significant intellectual property in the creation and maintaining of these wind climate probability distributions so it will not be provided with this publicly available evidence but can be shown to the members of the Planning Panel at the hearing. Given that the wind does not occur from any wind direction in Melbourne for more than 20% of the time, the criteria as stated in proposed Amendment GC81 means all locations would pass the criteria for every activation down to the sittings area criterion. This was surely not the intention.

We are currently independently working on a revised version of the wind criteria to address the above issue.

5. 541 GRAHAM STREET DEVELOPMENT

The 541 Graham Street development is located in the Capital City Zone – Schedule 1 and is affected by Design Development Overlay – Schedule 30 with respect to the environmental wind conditions. A permit application for the site was submitted for a development with four towers ranging in height between 15 and 18 levels. During the course of the design of the development I worked with the design team to develop the podium and tower configuration to mitigate the wind impacts on the public realm and the private resident amenities areas at Level 15. The development was wind tunnel tested by MEL Consultants and shown to achieve the proposed wind criteria for Fishermans Bend, and the previous criteria of the Amendment C270.

The proposed Amendment GC81 will impact the proposed 541 Graham Street Development by (features influencing wind effects):

- A reduction of the building height from 18 storeys to 6;
- Other built form controls in relation to, inter alia, setbacks, street wall heights, building separation.

MEL Consultants Report 40-18-WT-ENV-00 demonstrated that the permit application scheme would achieve the proposed wind comfort criteria with the current building and street wall heights and setbacks. This also demonstrates that a built form developed in collaboration with a wind engineer during the concept design stage can mitigate the wind effects. A proposal for the 541 Graham Street site that conforms to the proposed Amendment GC81 controls has not been wind tunnel tested. MEL Consultants Report 40-18-WT-ENV-00 is provided in Appendix B.

6. SUMMARY

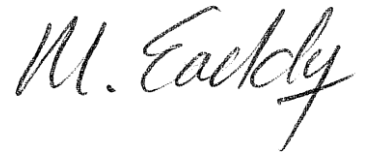
In summary, the main points of this evidence are as follows:

- The background reports that form the basis of the Fishermans Bend Framework have neglected to consider the environmental constraints of the Melbourne wind climate and this could lead to the mistakes of Docklands being repeated in Fishermans Bend.
- The expectation is that the wind environment is likely to control the built form design for the four precincts of Fishermans Bend. The proposed built form controls would be expected to result in lower adversely shaped buildings from a wind perspective to maximise floor area, which could have more impact compared to a taller aerodynamically wind engineered built form.
- The proposed Amendment GC81 has used the wind criteria from the Melbourne Planning Scheme implemented by Amendments C270 and C311.
- The proposed scheme for 541 Graham Street submitted for a planning permit would achieve the wind criteria proposed by proposed Amendment GC81 and demonstrates that a properly wind engineered built form can mitigate the wind effects on the surrounding streetscapes without the need for the significant built form restrictions of proposed Amendment GC81.

7. DECLARATION

We have made all the inquiries that we believe are desirable and appropriate and no matters of significance which we regard as relevant have to our knowledge been withheld from the Panel.

For MEL Consultants Pty Ltd:



M. Eaddy



W. H. Melbourne
29 March 2018

Appendix A – Author Curricula Vitae

Michael J Eaddy

B.E., M.E., PhD, MIEAust

Director

MEL Consultants Pty Ltd

17 Kingston Street

East Malvern

VIC 3145

Senior Research Fellow (2003 - 2009)

Department of Mechanical Engineering

Monash University

Vic 3800

Research and Consulting Fields

Wind Engineering and Industrial Aerodynamics

Environmental Studies

Pressure Measurements and Structural Aeroelastic Modelling

Wind Tunnel Testing

Instrumentation and Acquisition Systems Development

Professional Committees

Australasian Wind Engineering Society (1999 - 2009)

Previous Experience and Qualifications

The University of Auckland, New Zealand (1993 – 1998)

Bachelor of Engineering, Mechanical Engineering, Honours Class 1

Masters of Engineering, Mechanical Engineering, Distinction

UniServices – Wind Tunnel Consulting

Monash University, Australia (1999 – 2004)

Doctor of Philosophy : Lift Forces on Smooth and Rough Circular Cylinders in Low and High Turbulence Flows.

MEL Consultants Pty Ltd

Commercial Wind Engineering (2002 -)

Scholarships and Awards

Monash Graduate Scholarship (1999 – 2004)

Publications (including with co-authors)

Published papers:

Over 10 in the Wind Engineering Field

Propriety Reports

Over 150 for Wind Engineering Consulting

PROFESSOR W H MELBOURNE

BE, DIC, PhD, FIEAust, AFRAeS, FRGS, FTSE

Professor of Fluid Mechanics (1975 - 99)

Chairman, Department of Mechanical Engineering (1976-1994, 1996-98)

Dean, Faculty of Engineering (1994)

Associate Dean, Faculty of Engineering (1995-1996)

Monash University Council (1987-1994)

Founder/Director MEL Consultants Pty Ltd (1981-)

Lawrence Hargrave Medallist (1981)

AGM Michell Award (1993)

Research and Consulting Fields:

Environmental Fluid Mechanics; turbulent flows and their interaction with bluff bodies; the loading and response of structures to wind action; modelling wind flow over complex terrain; dispersion of atmospheric pollutants.

International Committees:

International Journal of Wind Engineering and Industrial Aerodynamics, Elsevier Holland -
Regional Editor Australasia (1974 -)

American Council on Tall Buildings and Urban Habitat - Vice Chairman and Editor Wind
Loading Committee (1972 -)

Commonwealth Aeronautical Advisory Council - Coordinator, Low Speed Aerodynamics
(1967-1983)

International Association for Wind Engineering - Chairman (1979-1983)

International Standards Organisation - Chairman 'Wind Action on Structures (2001 -)

Australian Committees:

Standards Association of Australia Committees - BD/5 : General Requirements for
Structural Design, and BD/6 : Loading on Structures (1970 -)

National Committee Thermodynamics & Fluid Mechanics, IEAust (1970-1978, 1991-1995)

Australian Electrical Services Industry Research Board (1986-1994)

Secretary, Royal Aeronautical Society, Victoria (1964 - 1966)

Publications:

Texts:

Journal of Wind Engineering & Industrial Aerodynamics, (Proc 4th Asia Pacific Symposium on Wind Engineering 1997), Guest Editor of Vol 83, 1999.

Tall building design from linear mode force balance model data, Collected Papers of Habitat and the High Rise, Council of Tall Buildings & Urban Habitat, 557 pp, 1996

Bluff Body Aerodynamics for Wind Engineering, A State of the Art in Wind Engineering, Wiley Eastern Ltd, pp 47-64, 1994

Designing to Reduce Perceptible Wind-Induced Motions, Structural Systems for Tall Buildings Monograph, McGraw-Hill, pp 341-352, 1994

A Commentary on the Australian Standard for Wind Loads, (with J D Holmes & G R Walker), Publisher Australian Wind Engineering Society, 1990

Wind Engineering 1983, (with J D Holmes & P S Jackson) Editors, (Elsevier Proc 6th Int Conference on Wind Engineering, Gold Coast, Australia, 21-25 March, and Auckland, New Zealand, 6-7 April, 1983)

Wind loading and wind effects, Editor of chapter in Monograph on Design of Tall Buildings, Publisher ASCE, pp 145-248, 1980

Architectural Aerodynamics (with R Aynsley & B J Vickery), Applied Science Publishers, 1977

Published Papers:

Over 200 in the aerodynamics field generally and wind engineering in particular.

Unpublished Papers, Lectures, Course Notes:

Over 100.

Major Consulting Reports (Restricted Circulation)

Over 500.

Appendix B – MEL Consultants Report 40-18-WT-ENV-00