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34 CLEELAND ROAD
SOUTH OAKLEIGH VIC 3167
AUSTRALIA

11 November 2010

Billbergia Group
Locked Bag 1400
MEADOWBANK NSW 2114

Attention: Mr W McGarry

Dear Sir,

Re; Precinct B - Sites 2A & 3A,
Walker Street, Rhodes
Environmental Wind Assessment

This report presents the results of a review of the Architectural Documentation as it has progressed towards a DA submission.

As you are aware MEL Consultants has considerable experience in working on projects of this nature and we are recognised as an authority in this field. In fact, many standards and research in this field have been developed in association with our firm and this puts us in an ideal position to provide an overview assessment of the project.

This report confirms that we have reviewed the documentation on several occasions and, in consultation with the Architects, we have developed the DA documentation to a level which incorporates a number of suggestions to deal with the effects of wind.

We note that detailed wind tunnel testing has yet to be undertaken and we recommend that this occur in the near future so as to confirm the suitability of our design measures, and so as to allow for any adjustments which may be required.

Background

This report is in relation to the wind environment impact of the proposed development of Stages 2A + 3A of Precinct B located on Walker Street. The site is bounded by Timbrol Ave to the north, Walker Street to the east, Gauthorpe Street to the South and Shoreline Avenue to the west.

The design includes for five main buildings consisting of

Building A – 25 level residential tower with some retail at ground floor. This building faces predominantly east and west with frontage to Walker Street

Building B – 6 level residential building. This building faces predominantly north with frontage to Timbrol Ave

Building C – 20 level residential tower. This building faces predominantly east and west with frontage to Shoreline Ave.

Building D – 25 level residential tower with retail at ground floor. This building faces predominantly east and west with frontage to Walker Street

Building E – 6 level building with retail at ground floor and residential above. This building faces predominantly north and south with frontage to Gauthorpe Street.

There is also a further single level Common Area building which sits at Podium Level. It consists of a Gymnasium and Pool facility and faces predominantly north and south.

The strongest winds in the Sydney region come from the westerly and southerly directions with secondary strong winds (with respect to environmental wind conditions) coming from the north-east sea breeze.
The Rhodes Peninsular is exposed to winds over water frontages to the west and east and to much of the south, down to the south-south-west and south-south-east. Sites 2A and 3A will get some protection from developments proposed to the west and existing suburban terrain to the south and east.
In summary there will be good low level protection up to about Level 5 for the westerly and southerly winds and for all other wind directions up to about Level 2, but the tower apartment buildings will all be exposed to direct wind flows for much of the strong wind directions.

Criteria Used

The criteria used to assess the environmental wind conditions in the public access ways surrounding the development is based on the research by Melbourne (1978) where comparison was made with Melbourne's criteria and other independent researchers around the world. These criteria are used in all major cities around Australia to assess the environmental wind conditions.

In main public access-ways wind conditions are considered

a. unacceptable (dangerous) if the peak gust wind speed during the hourly mean with a probability of exceedence of 0.1% in any 22.5^{o} wind direction sector exceeds 23 ms-1 (the gust wind speed at which people begin to get blown over);

b. generally acceptable for walking in urban and suburban areas if the peak wind gust speed during the hourly mean with a probability of exceedence of 0.1% in any 22.5^{o} wind direction sector does not exceed 16 ms^{-1} (which results in half the wind pressure of a 23ms^{-1} gust)

For more recreational activities wind conditions are considered

c. generally acceptable for stationary short exposure activities (window shopping, standing or sitting in plazas) if the peak gust wind speed during the hourly mean with a probability of exceedence of 0.1% in any 22.5^{o} wind direction sector does not exceed 13 ms^{-1}

d. generally acceptable for stationary, long exposure activities (outdoor cafes and restaurants) if the peak gust wind speed during the hourly mean with a probability of exceedence of 0.1% in any 22.5^{o} wind direction sector does not exceed 10ms^{-1}

The probability of exceedence of 0.1% relates approximately to the annual maximum mean wind speed occurrence for each wind direction sector. These criteria are developed graphically in terms of hourly mean wind speed versus frequency of occurrence in Melbourne (1978).

Problem Areas and Measures Taken

We have reviewed the Architectural drawings on several occasions throughout October and November and liaised with the Architects in developing solutions to the identified problem areas.

The areas of concern can be summarised as follows;

Building A is exposed to all wind directions and will induce a significant amount of wind flow down to ground level for all wind directions. On the north side the connection to Building B will block any wind flow out into Timbrol Avenue.

On the south side a wind-break feature has been incorporated between buildings A and D along with substantial landscaping so as to prevent wind conditions at this level exceeding the criterion for walking comfort for both westerly and easterly winds. Extension of the podium level canopies will also assist in controlling downdraft wind conditions at this point. The attached drawing indicates this.

The north-east corner of building A would only be affected by the moderate easterly and northerly winds that would not be expected to cause wind conditions there to exceed the criterion for walking comfort.

Building B is six levels high and is either well protected by upstream buildings or is facing only moderate wind directions and would not be expected to induce ground level, or podium level, wind conditions that would exceed the criterion for walking comfort.

Building C will be exposed to the strong westerly and southerly winds. There is sufficient low level shielding and proposed treed landscaping to help reduce incident wind flows approaching along the ground level, however, the main problem with respect to environmental wind conditions will be the wind flows that will be induced down the faces of the building and around the corners.

To ensure that wind conditions meet the criterion for comfort for walking around this building we have introduced landscaping and screen wind-break features at the corners to keep pedestrian walkways away from the corners and to lift these corner flows so that they do not impact on the pedestrian entry points.
The step up in level from Shoreline Avenue creates the ability to make provision for wind-break screening or landscaping at the north-west and south-west corners which also creates a no-go zone for pedestrian traffic. The attached drawing indicates this.

For easterly and northerly winds the wind speeds are much lower and the features required for the westerly and southerly winds would be expected to be sufficient to ensure that wind conditions about the base will be within the criterion for walking comfort.

Building D will also be exposed to the strong westerly and southerly winds. There is sufficient low level shielding and proposed treed landscaping to help reduce incident wind flows approaching along the ground level, however, the main problem with respect to environmental wind conditions will again be that wind flows will be induced down the faces of the building and around the corners. This will be particularly so for some of the westerly

winds for which the wind flow will be induced to ground level around both the north and south ends.

To ensure that wind conditions meet the criterion for comfort for walking around these buildings we have introduced significant landscaping at the corners to keep pedestrian walkways away from the corners and to lift these corner flows so that they do not impact on the building entry points.

For easterly and northerly winds the wind speeds are much lower and the features required for the westerly and southerly winds would be expected to be sufficient to ensure that wind conditions about the base will be within the criterion for walking comfort.

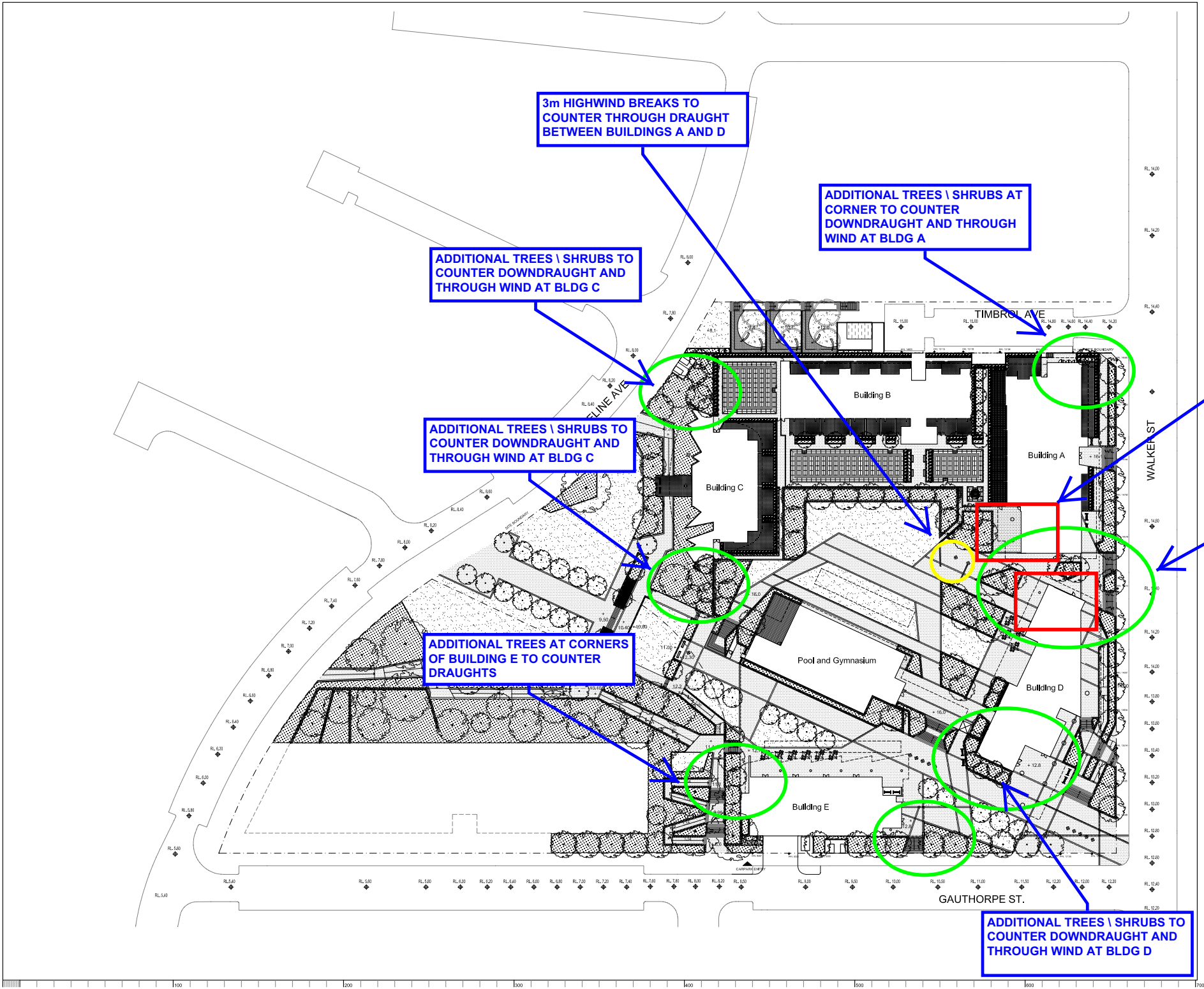
Building E is six levels high and would be expected to have sufficient upstream protection to ensure that wind conditions caused by this building would not exceed the criterion for walking comfort for all wind directions.

The Podium Building is largely sheltered by the surrounding buildings. The main pathways will have landscaping features that would shelter them and the approaches to the gymnasium and pool. This will also provide for areas that would be suitable for recreational activities.

In summary, it is concluded that whilst the proposed development at the Rhodes Precinct B, Sites 2A and 3A, is quite wind sensitive, the problem areas have been recognised and provision has been made for the inclusion of wind ameliorating features.
During our review of the documentation we have made some adjustments to the built form and introduced wind screens and strategically placed landscaping to counter the problem areas.
We are satisfied that appropriate wind tunnel testing will support the measures taken to date and may also identify some areas where adjustments may be required.

Yours faithfully,

W. H. Melbourne
MEL Consultants Pty Ltd



The contractor shall check and verify all work on site (including work by others) before commencing the landscape installation. Any discrepancies are to be reported to the Project Manager or Landscape Architect prior to commencing work. Do not scale this drawing. Any required dimensions not shown shall be referred to the Landscape Architect for confirmation.

Issue	Revision Description	Drawn	Check	Date
E	WORKS IN PROGRESS	ZW	AE	10.11.2010
D	FOR REVIEW AND COMMENT	KA	AE	09.11.2010
C	FOR REVIEW AND COMMENT	KA	AE	08.11.2010
B	FOR REVIEW AND COMMENT	KA	AE	20.10.2010
A	FOR REVIEW AND COMMENT	KA	AE	15.10.2010

LEGEND

Client:
Billbergia

Project:
Stage 2A + 3A
Walker St,
Rhodes

SITE IMAGE
28 Bowden Street
Alexandria NSW 2015
Australia
Tel: (61 2) 9698 2899
Fax: (61 2) 9698 2877
Web: www.siteimage.com.au
Site Image (NSW) Pty Ltd
ABN 44 801 262 380
Landscape Architects

PRELIMINARY

Drawing Name:
LANDSCAPE PLAN

Sheet 1 of 1

Scale: 1:500 @ A1

Job Number:	Drawing Number:	Issue:
SS10-2255	101	E