

Espy / Pavel

ANALYSIS OF OVERSHADOWING IMPACTS IN RELATION TO THE ESPLANADE HOTEL SITE ST KILDA

**Prepared for
City of Port Phillip
&
Becton**

**By
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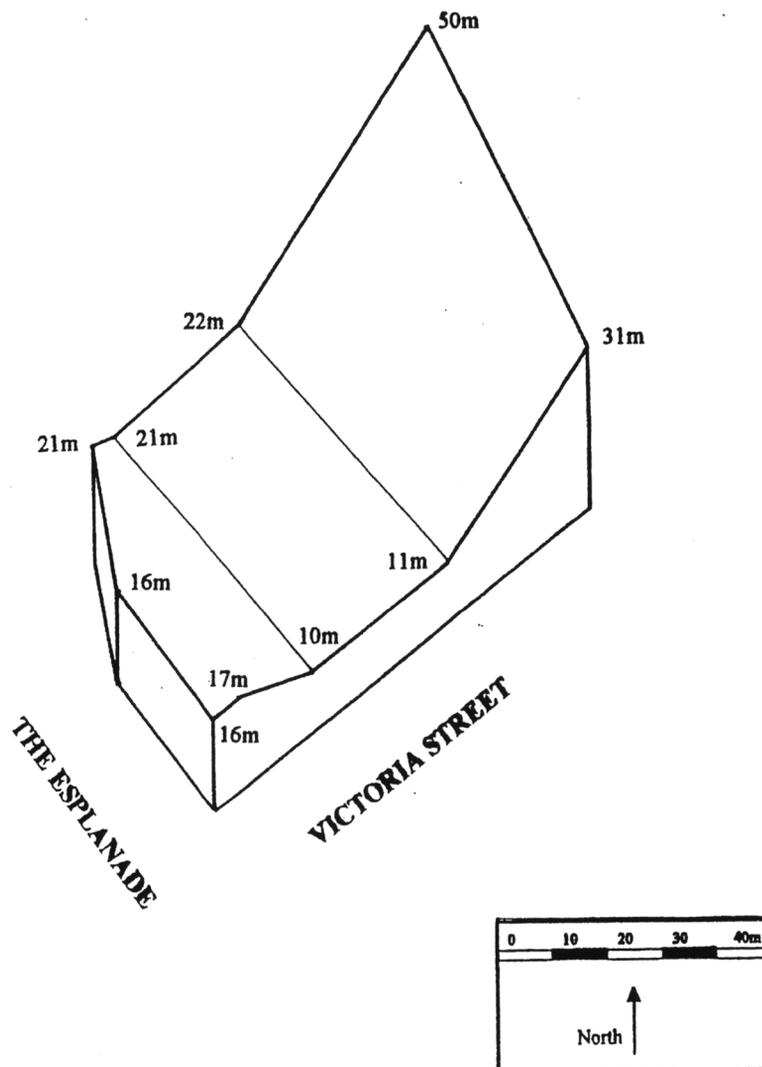
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1 BACKGROUND

In December 2000 Robert Foster Architects prepared a report for the City of Port Phillip entitled *Analysis of Overshadowing Measures in Relation to the Esplanade Hotel Site St Kilda*. In this report an assessment was made of the impacts of Port Phillip's overshadowing planning controls as they related to the Esplanade Hotel site. The final report (following a modification to one of the controls) included a three dimensional representation of a maximum potential building envelope permitted under the then current overshadowing provisions. The maximum envelope is detailed in Figure 1 below.

- Figure 1 Max. Permitted Building Envelope – All three planning provisions (RFA – 2000)



In April 2002, the City of Port Phillip in association with Becton provided three potential building envelopes for overshadowing assessment. The three envelopes were as follows :

1. A Preferred Maximum Building Height (PMH) envelope developed by the City of Port Phillip (and derived from Amendment C25).

2. An Absolute Maximum Building Height (AMH) envelope developed by the City of Port Phillip (and derived from Amendment C25).
3. A Becton proposed Maximum Building Envelope (Becton) developed by Becton as part of Becton's further submission (dated 15 March 2002) to amendment C25.

The set-out for these three envelopes is detailed in Appendix 1.

Comparing the proposed envelopes with the maximum envelope detailed in Figure 1 it is evident that the proposed envelopes (especially the central taller sections) will cause some overshadowing beyond that permitted or recommended by the provisions of the planning scheme. The purpose of this study was to describe using factual text and diagrams when and where such overshadowing impacts will occur.

2 SCOPE OF THE STUDY

This report has been produced to assist Becton in designing and the City of Port Phillip in assessing the potential overshadowing impacts of a proposed development on the Esplanade Hotel site and relate those impacts to the proposed planning controls in Amendment C25.

Amendment C25 to the Port Phillip Planning Scheme contains a number of proposed planning measures that relate to the overshadowing of the foreshore, the Esplanade and nearby Alfred Square. All of these measures have the potential to impact on any proposed development on the Esplanade Hotel site.

The assessment contained in this report relates solely to overshadowing. Other planning considerations such as scale, height, massing and heritage values are not within the scope of this study.

Finally, this study does not attempt to determine the appropriateness of the current overshadowing provisions but merely quantify their impacts.

3 INTERPRETING THE RELEVANT PLANNING PROVISIONS

3.1 Provision 1

Ensure that there is no overshadowing beyond the kerbline on the southern side of Jacka Boulevard road reserve adjoining the Port Phillip Bay foreshore between the hours of 10:00 AM and 4:00 PM on 22 June (the winter solstice)

COMMENT

1. The wording of this provision is mandatory
2. The provision refers to the Southern side of the road reserve. The orientation in the subject area would be more accurately described as South Western This was the interpretation adopted for this study.

3.2 Provision 2

Generally avoid casting shadows beyond the western kerbline of The Esplanade between the hours of 11:00 AM and 2:00 PM on 22 June (winter solstice)

COMMENT

1. The wording of this provision is advisory.
2. The Esplanade runs almost due North – South from Fitzroy St. to Pollington St. In this section of the Esplanade the Kerb line closest to the foreshore is accurately described as “the western kerb line”. Further South between Pollington St. and Cavell St. the Esplanade runs approximately South-East, in this section, the kerb line closest to the foreshore would be most accurately described as a South-Western kerb line. It is understood that the intention of this provision is for the footpath on the foreshore side of the Esplanade between Fitzroy Street and Cavell St. (ie the Sunday market precinct) to be protected from overshadowing. For the purposes of this study the entire kerb line has been considered.

3.3 Provision 3

Generally not further overshadow Alfred Square between the hours of 10.00AM and 4.00 PM on the 22 June (Winter Solstice)

COMMENT

1. The wording of this provision is advisory.
2. Shadow lines across the reserve from exiting buildings as well as any proposed new development will change position continuously throughout the specified period. For developments that cast shadows on the reserve, compliance can only be proven beyond doubt by comparing the existing shadows with those of a new development at regular time intervals (say every 15 minutes) throughout the specified hours. In the absence of a computer modelling tool specifically designed to make this form of assessment, proof of compliance with this provision is quite onerous , although not impossible.

4 METHODOLOGY, ASSUMPTIONS AND PRECISION

4.1 General

As noted in Section 3.3 the provision in respect of Alfred square requires multiple assessments throughout the potential overshadowing period to assess whether additional overshadowing does not occur at any time during the prescribed hours. Assessments were therefore made at hourly intervals throughout the prescribed hours of 10.00 AM to 4.00 PM on 22 June. This range of hours covered the specified periods in all three provisions noted in section 3.

The potential overshadowing from the development site as well as existing buildings was plotted by projecting the Azimuth angles (for each time considered) from each of the corners of each existing building as well as each corner of each of the three development site envelopes. The length of each shadow was then determined by applying simple trigonometric principles to the solar altitude angles, relative levels and distances. Because the affected land is sloping an iterative process was required to ensure that shadow length assessments provided an adequate level of accuracy.

Apart from the existing surrounding buildings that currently cast shadows on Alfred Square a number of features located on Alfred Square itself would also cast shadows on the ground. These features are principally a line of trees along the North East Boundary of the reserve and a small war monument. These features were assessed and found to offer no real scope for a potential developer of the Esplanade Hotel site to increase the height of their building beyond the limits imposed by the shadow lines of the existing buildings alone. These features located on Alfred Square were therefore ignored.

Based on the methodology described above the overshadowing impacts were plotted onto 7 diagrams contained in Appendix 3.

4.2 Data

The position and height of the development site, existing buildings, Alfred Square and the kerb lines to be protected from overshadowing were determined using a combination of the Councils drainage plans plus a field survey conducted by Hellier McFarland surveyors specifically for this study. The survey also provided levels to augment and verify those already available on the drainage plans.

The position and R.Ls of each section of each of the proposed building envelopes for the development site were determined from details provided by Becton to the City of Port Phillip – see Appendix 1

Solar azimuth and altitude angles that would occur during the specified hours were determined using solar tables for latitude $37\frac{1}{2}^{\circ}$ South. These tables are reproduced in Appendix 2.

4.3 Clock time and Solar Time

The planning provisions as written prescribe a range of times during which the overshadowing protection measures apply. Shadow angles may be assessed using either “solar” time or “clock” time. Solar time is based upon the notion that the sun will cross through the observers meridian (ie at its mid, highest point, due North) exactly at noon. In reality this rarely coincides with clock time. The most important difference between these two times is that clock time in Melbourne is based on the Eastern Standard Time (EST) line which crosses roughly through Mallacoota some 400 kilometres to the East of Melbourne. This means that at 12.00 noon clock time when the sun appears directly overhead in Mallacoota, in Melbourne (also 12:00 noon clock time) the sun is still in the eastern sector. At certain times of the year the sun will not reach its zenith in Melbourne until after 12.30 PM clock time.

On June 22 the clock time leads the solar time by approximately 18 minutes. The planning scheme is silent on the issue of whether to use solar time or clock time for the purposes of making an assessment of overshadowing. It is understood that the intention of the overshadowing provision is to protect certain features that are known to be well used by the public during the times noted (ie clock times). Therefore the time that has been used for the assessment purposes was local clock time.

4.4 Precision

Whilst every effort has been made to make the assessments in this report as accurate as possible, limitations do exist to the precision of the estimates contained herein.

Solar angles can and have been predicted with a high degree of accuracy and present a negligible margin of error. The levels of the overshadowing and overshadowed features have been determined using survey data which can be conservatively

considered accurate to within 100mm. In many cases interpolation between points or contours was required further reducing accuracy to within approximately 300mm. The position of the overshadowing and overshadowed features have been determined using a combination of the Councils drainage plans plus a field survey conducted by Hellier McFarland specifically for this study. The graphical projection of Azimuth angles from these features and subsequent scaling of horizontal distances could result in a measurement error of an estimated ± 1.5 metres from the true position of the feature.

In a worst case scenario these inaccuracies could compound to create an over or under estimate of the shadow position by two metres.

5 ASSESSMENT OF THE EXTENT OF OVERSHADOWING

5.1 Provision 1

For this provision the critical hour at which maximum overshadowing was found to occur was at 10:00 AM (22 June). At this time the shadow from the PMH envelope (coloured blue) did not cross the kerb line of the road (Jacka Blvd) adjoining the Port Phillip Bay foreshore. The shadow from the central section (core) of the AMH envelope (combined blue and green shadows) would marginally overshadow the foreshore reserve with an approximate average encroachment of 2 metres and a shaded area on the foreshore side of the kerb line of approximately 30m². The Becton Envelope (combined red, green and blue shadows) with its wider central core set slightly closer to the foreshore would produce a wider (approx. 5metres) and longer (approx. 1.5 metres) shadow than the AMH envelope shadow. This envelope would produce a shaded area of approximately 60m² on the foreshore reserve side of the kerbline at 10.00 AM.

Reference to the diagram for 11.00AM (or any hour after that) indicates that the shadows of all three envelopes will be well within the kerb line of the road (Jacka Blvd) adjoining the Port Phillip Bay foreshore. This indicates that the encroachment for the AMH and Becton envelopes noted at 10.00AM would be a transitory encroachment only, unlikely to persist for more than half an hour (or less).

5.2 Provision 2

For this provision the critical hour at which maximum overshadowing was found to occur was at 11:00 AM. At this time the shadow from the PMH envelope did not cross the "Western" Esplanade kerb line (ie the Sunday market precinct). The shadow from the core of the AMH envelope would marginally overshadow the Sunday market precinct with an approximate average encroachment of 2 metres and a shaded area on the foreshore side of the kerb line of approximately 30m². The Becton Envelope with its wider central core set slightly closer to the foreshore would produce a wider (approx. 5metres) and longer (approx. 2 metres) shadow than the AMH envelope shadow. This envelope would produce a shaded area of approximately 80m² on the Sunday market precinct at 11.00 AM.

Reference to the diagram for 12.00AM (or any hour after that) indicates that the shadows of all three envelopes will be well within the line of the Sunday market precinct. This indicates that the encroachment for the AMH and Becton envelopes noted at 11.00AM would be a transitory encroachment only, unlikely to persist for more than half an hour (or less).

5.3 Provision 3

To gain an appreciation of both the existing overshadowing to Alfred Square and the potential added overshadowing from the development site a series of shadow diagrams were produced. These diagrams (see appendix 3) are like aerial snapshots and represent the overshadowing to Alfred Square that would occur on 22 June at 10:00AM, 11:00AM, 12:00NOON, 1:00PM, 2:00PM, 3:00PM and 4:00PM. Overshadowing from existing buildings is shaded black, overshadowing from the PMH is shaded blue, additional overshadowing from the AMH is shaded green and that from the Becton envelope shaded red.

Reference to the shadow diagrams indicates that overshadowing of Alfred Square from the development site would not commence until some time after 1:00 PM. By 2:00 PM both the AMH and the Becton Envelopes would further overshadow Alfred Square beyond that produced by existing buildings. The PMH envelope does not cause further overshadowing until after 2:00 PM. As the afternoon progresses overshadowing from all envelopes continues to increase in terms of area of parkland subject to further overshadowing. This additional overshadowing is quantified (approximately) in Table 1 in terms of area and in Table 2 terms of a % of the total parkland area.

• Table 1 Additional Area of Alfred Square Overshadowed by Each Envelope (m²)

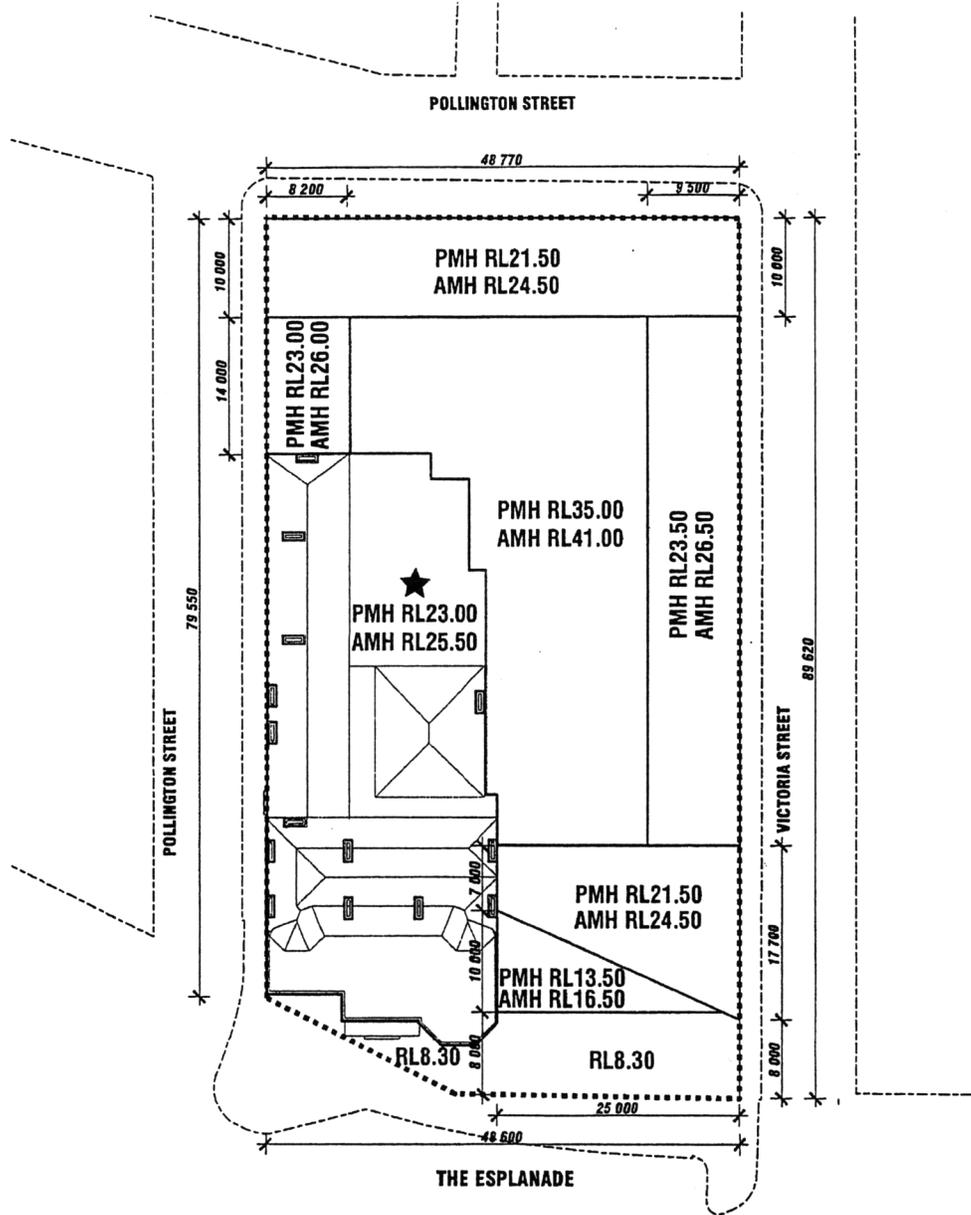
Time	PMH Envelope Area Overshadowed (m ²)	AMH Envelope Area Overshadowed (m ²)	Becton Envelope Area Overshadowed (m ²)
2:00 PM	0	60	204
3:00 PM	135	678	802
4:00 PM	1009	1288	1300

• Table 2 Additional Area of Alfred Square Overshadowed by Each Envelope (% of total park area)

Time	PMH Envelope Area Overshadowed (%)	AMH Envelope Area Overshadowed (%)	Becton Envelope Area Overshadowed (%)
2:00 PM	0.0%	1.1%	3.8%
3:00 PM	2.5%	12.6%	14.9%
4:00 PM	18.7%	23.9%	24.1%

APPENDIX 1
BUILDING ENVELOPES

PMH and AMH Envelopes – Port Phillip Council



★ This building envelope relates to that area of the site occupied by the Esplanade Hotel building to be retained. Should planning approval be granted for demolition of a part of the Esplanade Hotel building, then that area of the site could be included in the proposed core area (PMH RL 35.00, AMH RL 41.00)



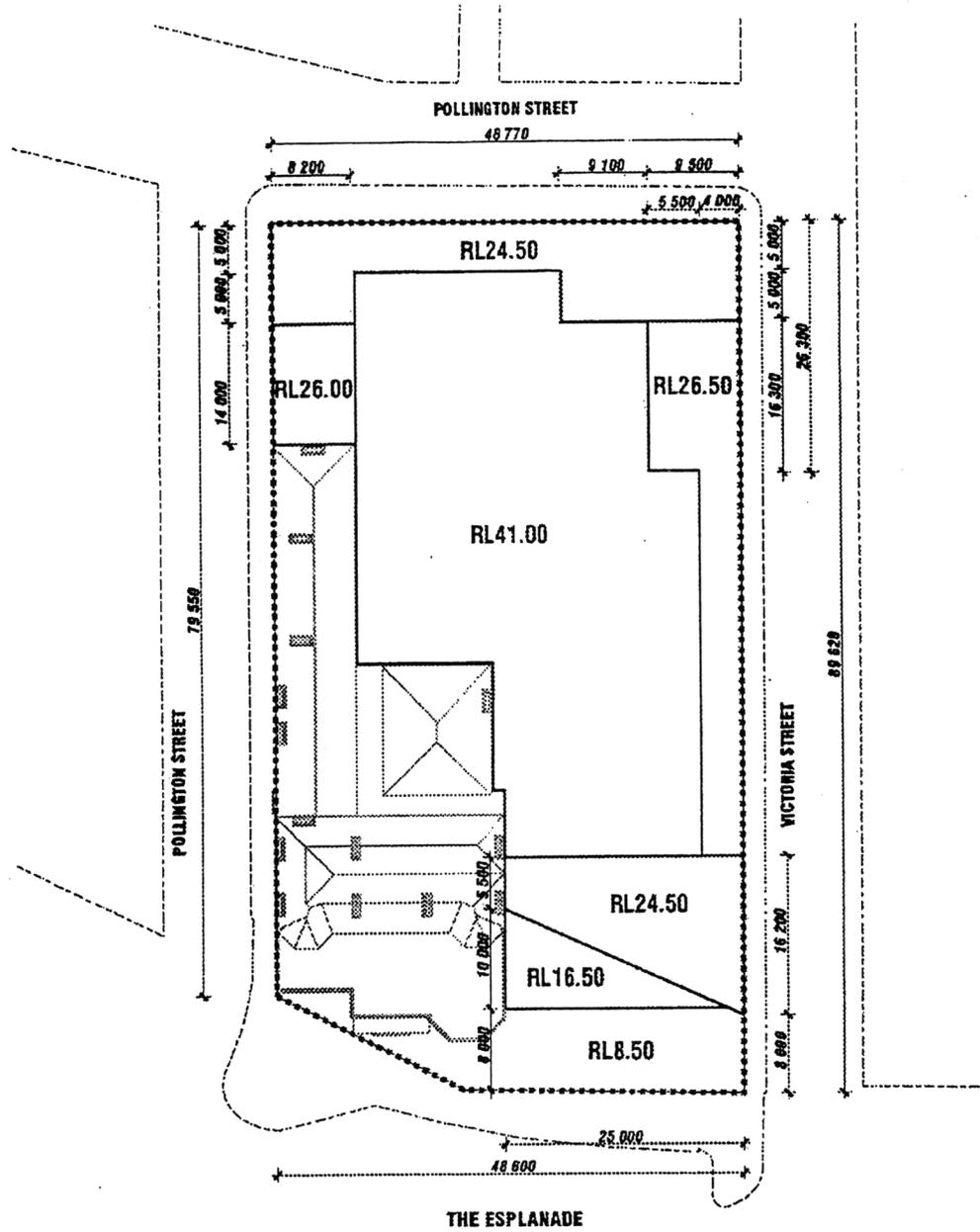
SCALE
1:500 @ A4



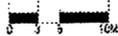
PLAN SHOWING ESPLANADE HOTEL SITE
NOTE: THIS PLAN IS FOR ILLUSTRATIVE PURPOSES ONLY
AND DOES NOT FORM PART OF THE AMENDMENT C25

PMH PREFERRED MAXIMUM BUILDING HEIGHT
AMH ABSOLUTE MAXIMUM BUILDING HEIGHT
levels shown thus RLO.00 are in metres
to australlan height datum

Becton Envelopes – Becton



SCALE
1:500 @ A4



Levels shown thus RL3.00 are in metres
to Australian height datum

PORT PHILLIP PLANNING SCHEME
DESIGN & DEVELOPMENT OVERLAY - SCHEDULE 12

PLAN FORMING PART OF CLAUSE 2.0 OF SCHEDULE 12

APPENDIX 2

Sun Angles

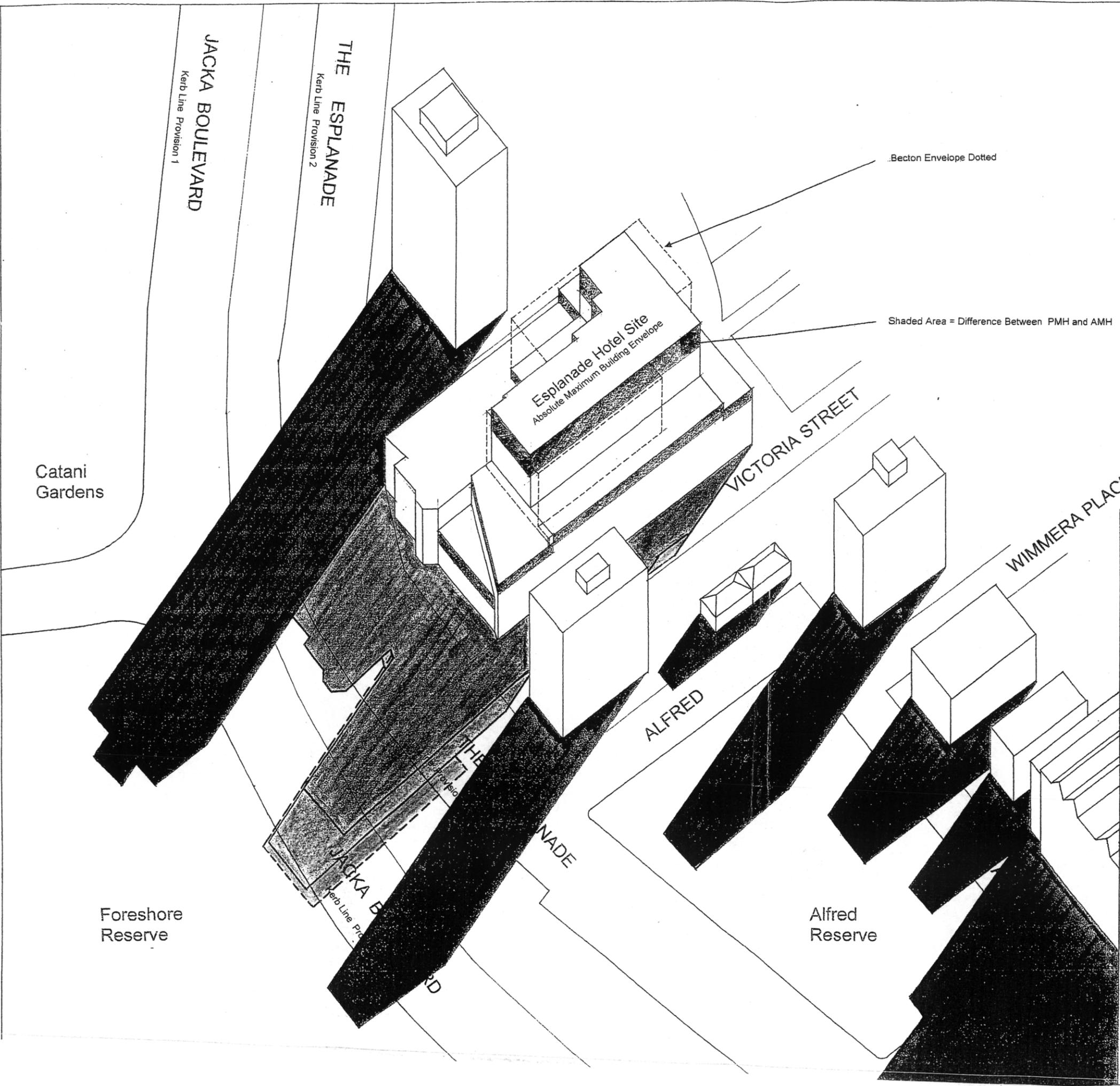
22 June Winter Solstice Latitude $37\frac{1}{2}^{\circ}$ S , Longitude 145° E

Time*	Azimuth	Altitude
10:00	34° 39' 51"	20° 33' 47"
11:00	20° 57' 18"	26° 07' 06"
12:00	5° 45' 22"	28° 52' 26"
13:00	350° 04' 56"	28° 26' 27"
14:00	335° 12' 26"	24° 53' 04"
15:00	321° 58' 56"	18° 41' 03"
16:00	310° 35' 08"	10° 29' 24"

* Time is clock time - EST

Source :Australian National Mapping Agency

APPENDIX 3
OVERSHADOWING DIAGRAMS



Becton Envelope Dotted

Shaded Area = Difference Between PMH and AMH

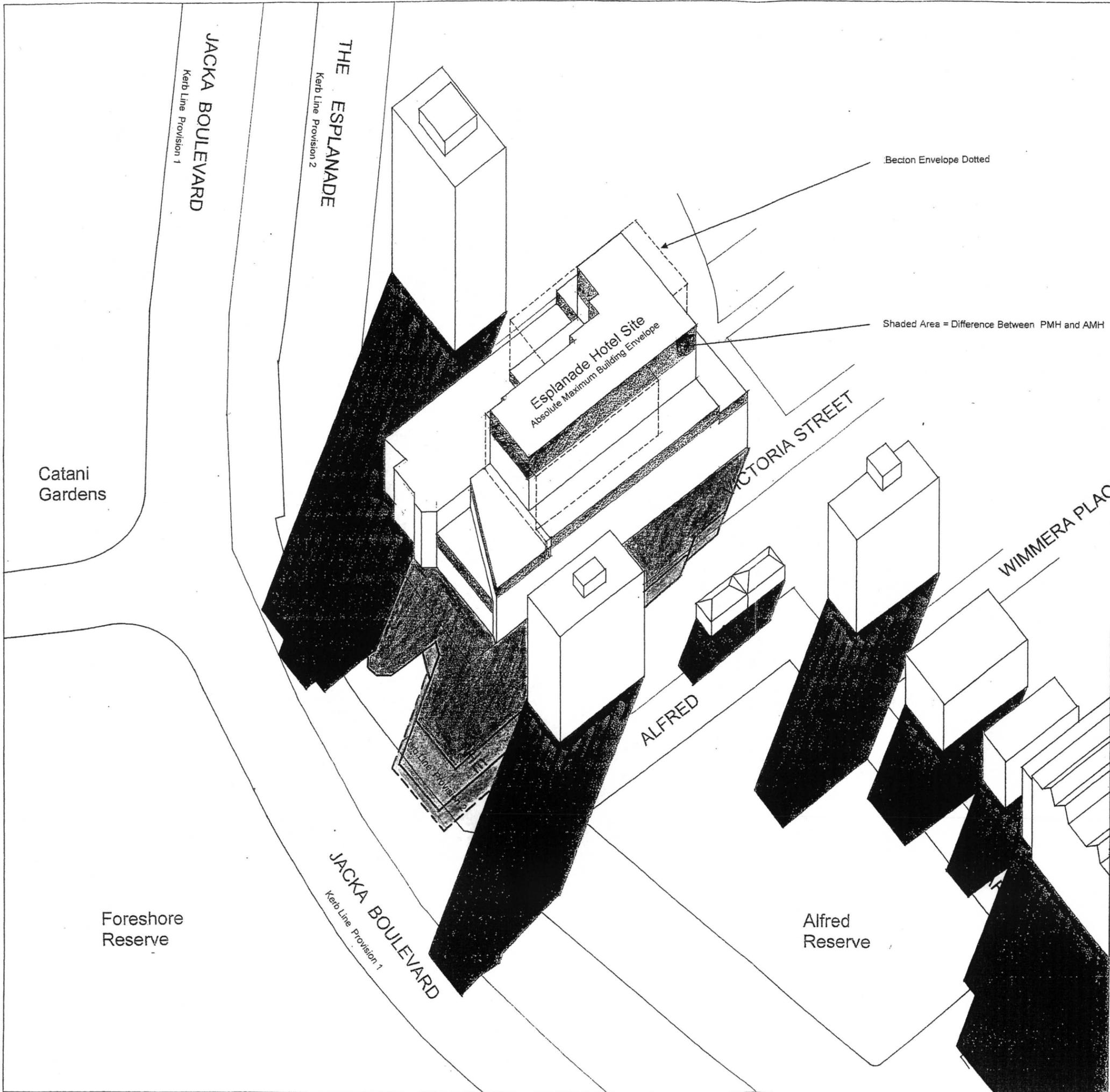
ESPLANADE HOTEL SITE ST KILDA OVERSHADOWING ANALYSIS

10.00 AM
22 June

Solar Azimuth	34° 39' 51"
Solar Altitude	20° 33' 47"

LEGEND

	Shadows from Existing Buildings	 NORTH
	Shadows From Preferred Maximum Building Height	
	Additional Shading From Absolute Maximum Building Height Envelope	 0 5 10 15 20 25m
	Additional Shading From Becton Envelope	
ROBERT FOSTER ARCHITECT		



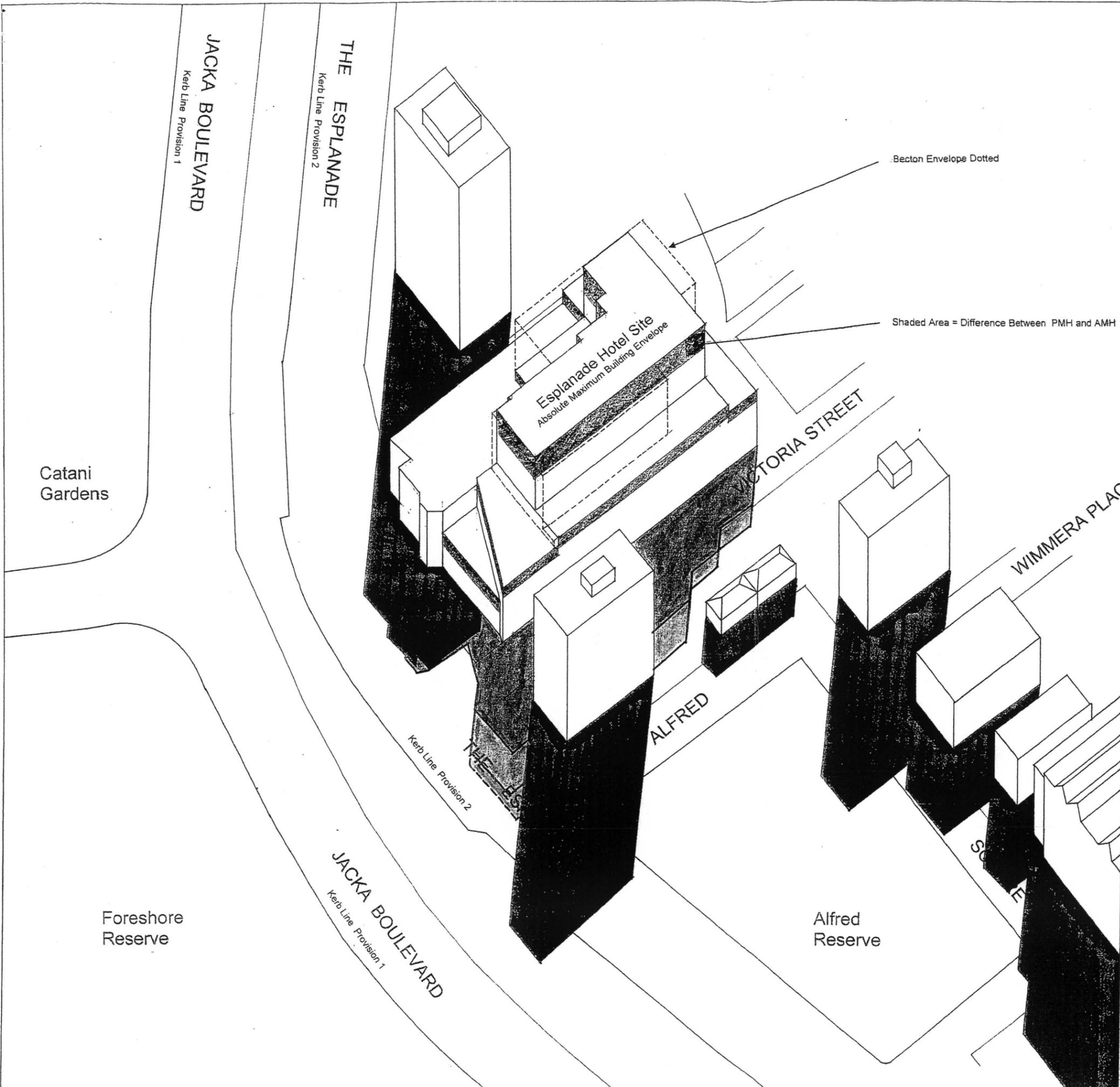
**ESPLANADE HOTEL SITE
ST KILDA
OVERSHADOWING ANALYSIS**

11.00 AM
22 June

Solar Azimuth	20° 57' 18"
Solar Altitude	26° 07' 06"

LEGEND

	Shadows from Existing Buildings	 NORTH
	Shadows From Preferred Maximum Building Height	
	Additional Shadowing From Absolute Maximum Building Height Envelope	 0 5 10 15 20 25m
	Additional Shadowing From Becton Envelope	
		ROBERT FOSTER ARCHITECT



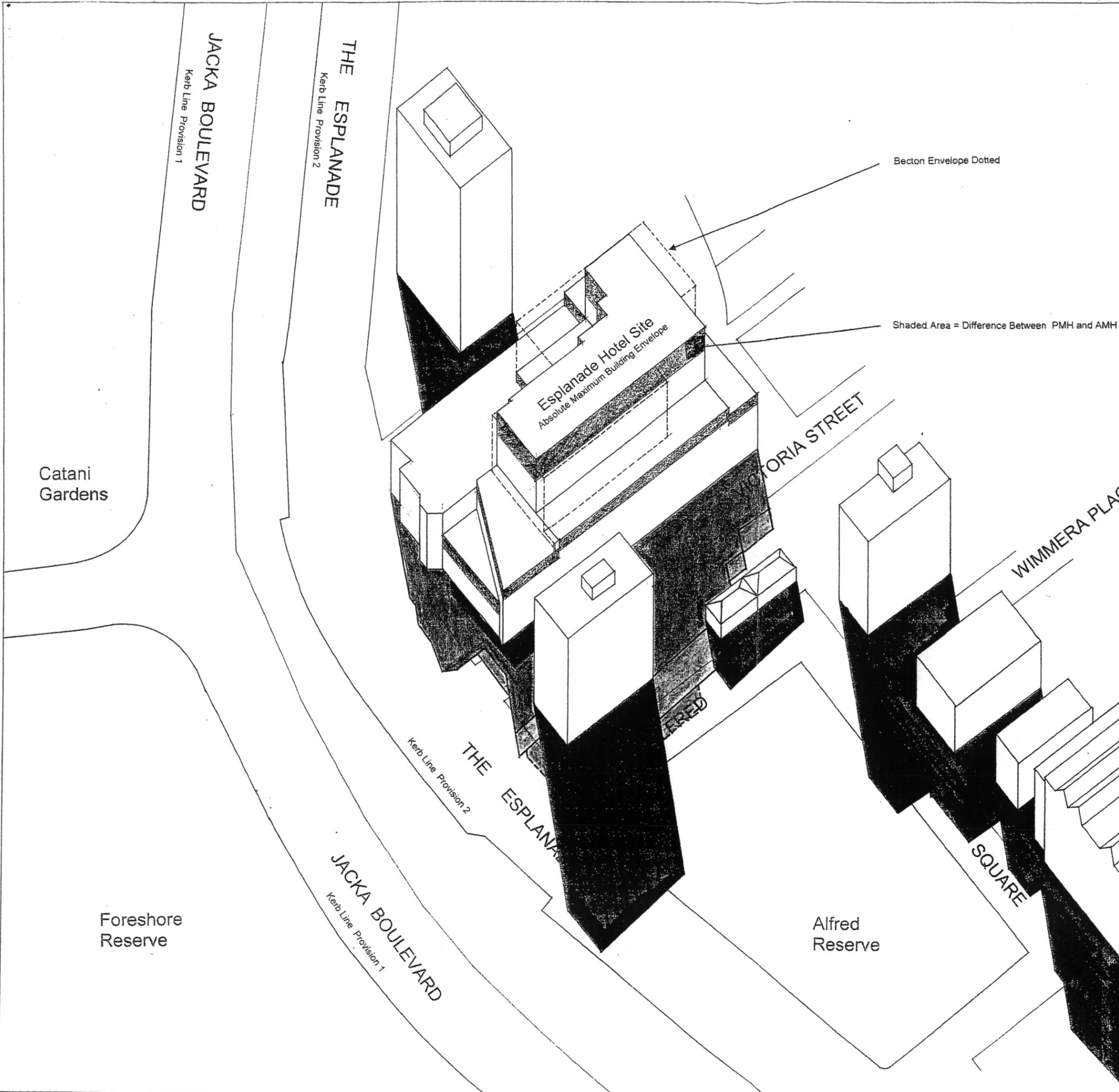
**ESPLANADE HOTEL SITE
ST KILDA
OVERSHADOWING ANALYSIS**

**12.00 Noon
22 June**

Solar Azimuth	5° 45' 22"
Solar Altitude	28° 52' 26"

LEGEND

	Shadows from Existing Buildings	 NORTH
	Shadows From Preferred Maximum Building Height	
	Additional Shadowing From Absolute Maximum Building Height Envelope	
	Additional Shadowing From Becton Envelope	ROBERT FOSTER ARCHITECT



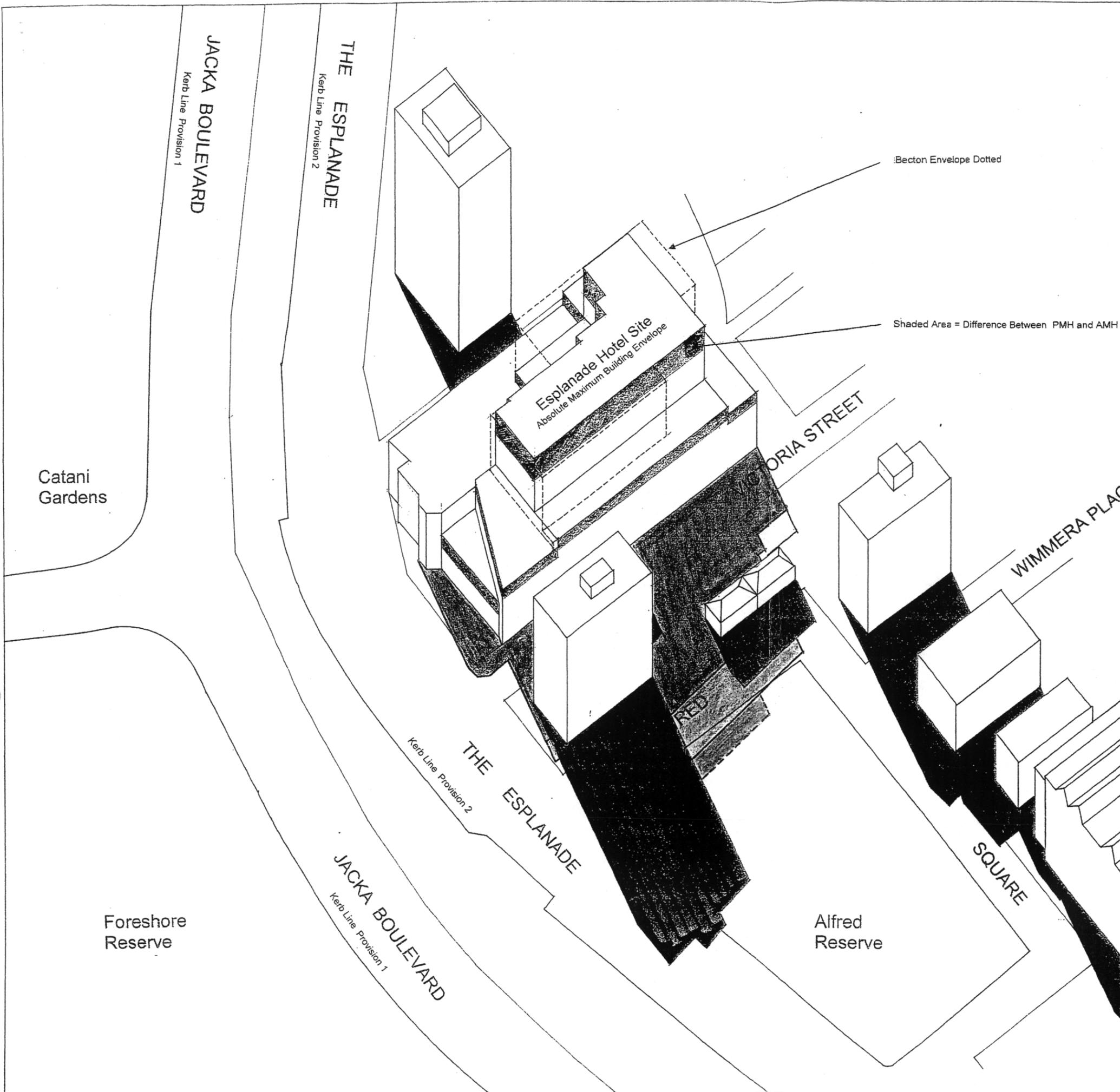
**ESPLANADE HOTEL SITE
ST KILDA
OVERSHADOWING ANALYSIS**

**1.00 PM
22 June**

Solar Azimuth	350° 04' 56"
Solar Altitude	28° 26' 27"

LEGEND

	Shadows from Existing Buildings	 NORTH
	Shadows From Preferred Maximum Building Height	
	Additional Shadowing From Absolute Maximum Building Height Envelope	
	Additional Shadowing From Becton Envelope	ROBERT FOSTER ARCHITECT



ESPLANADE HOTEL SITE ST KILDA OVERSHADOWING ANALYSIS

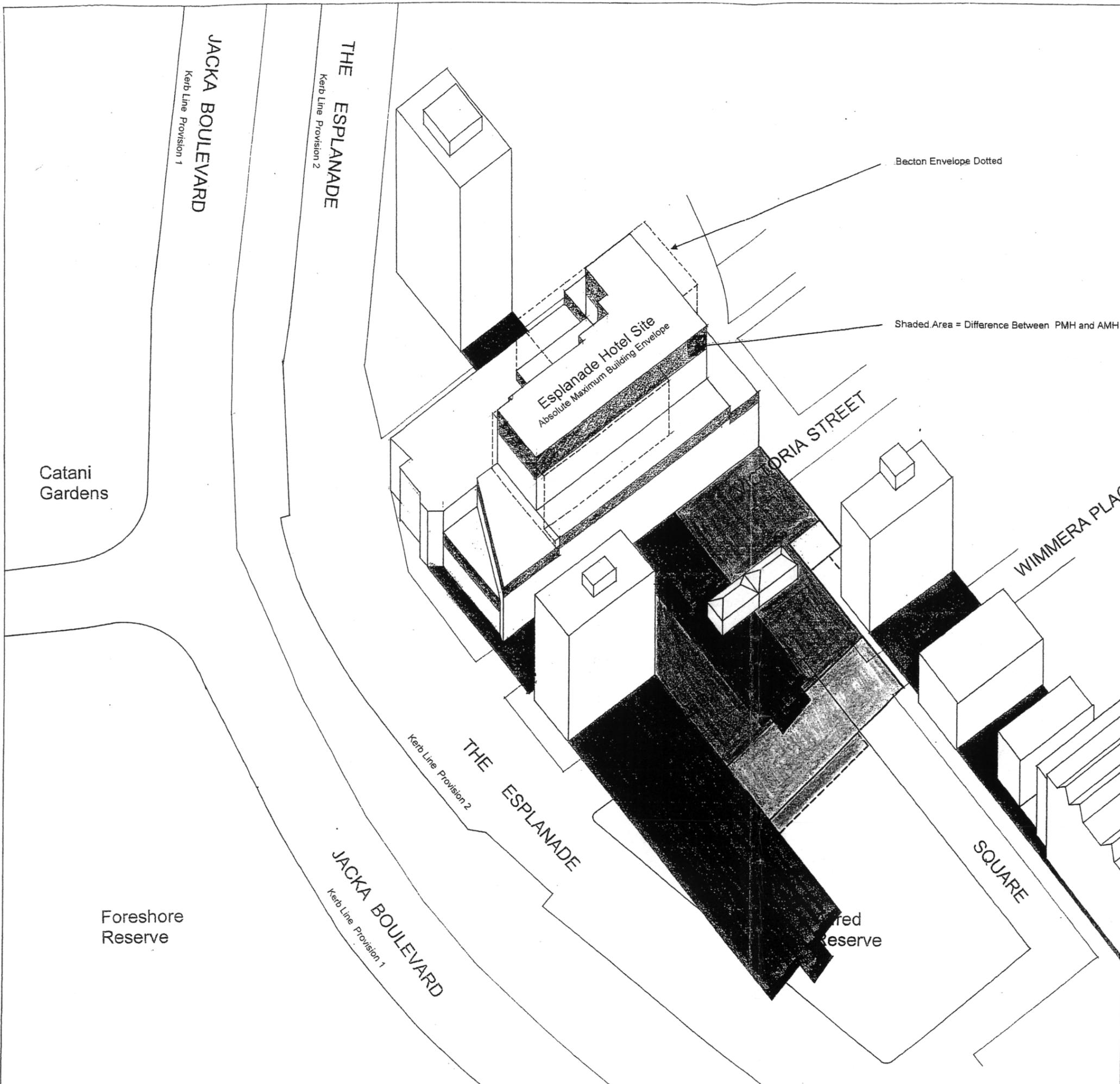
2.00 PM
22 June

Solar Azimuth	335° 12' 26"
Solar Altitude	24° 53' 04"

LEGEND

	Shadows from Existing Buildings	 NORTH
	Shadows From Preferred Maximum Building Height	
	Additional Shadowing From Absolute Maximum Building Height Envelope	 0 5 10 15 20 25 m
	Additional Shadowing From Becton Envelope	

ROBERT FOSTER
ARCHITECT



Becton Envelope Dotted

Shaded Area = Difference Between PMH and AMH

ESPLANADE HOTEL SITE ST KILDA OVERSHADOWING ANALYSIS

3.00 PM
22 June

Solar Azimuth	321° 58' 56"
Solar Altitude	18° 41' 03"

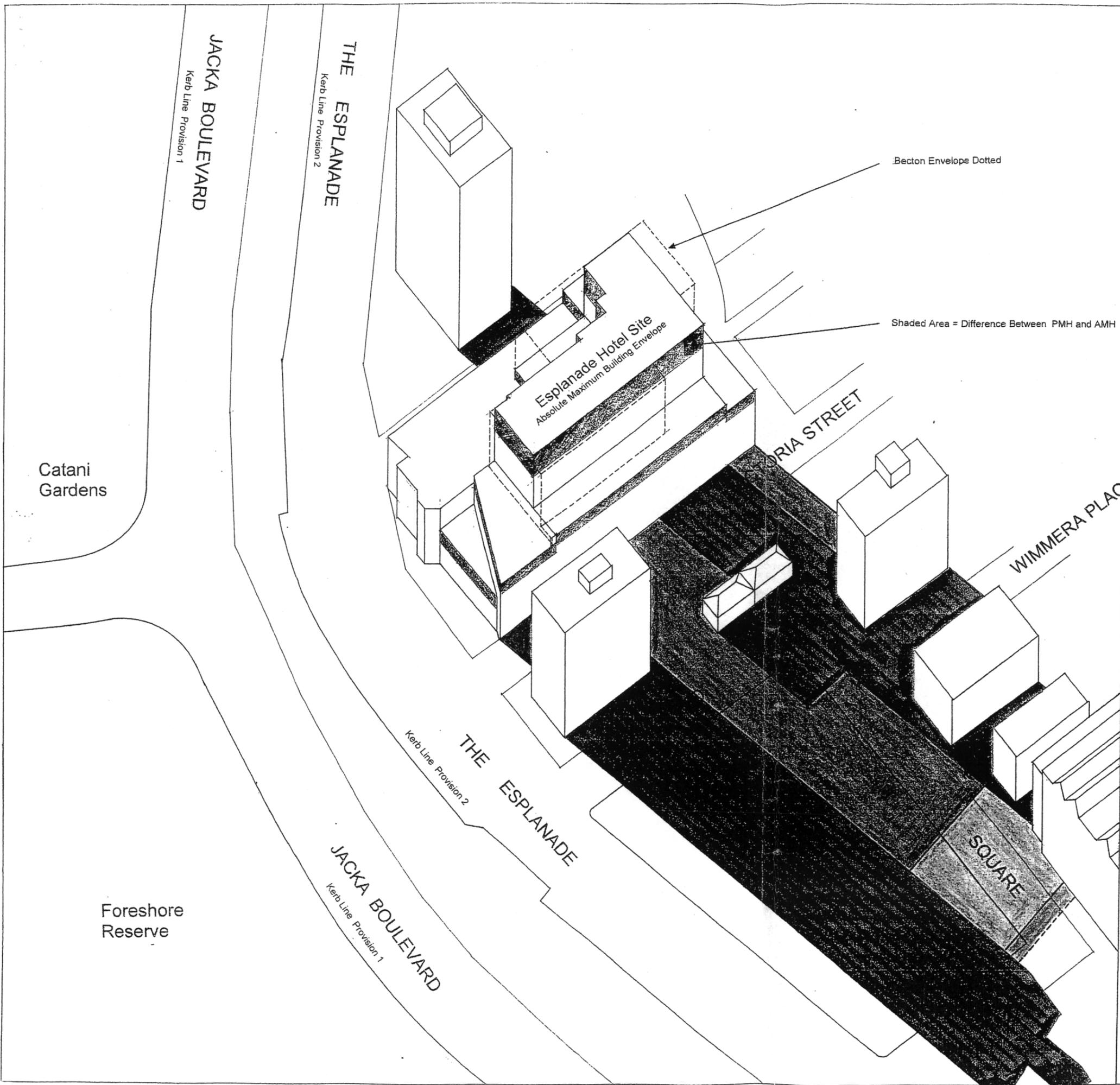
LEGEND

	Shadows from Existing Buildings
	Shadows From Preferred Maximum Building Height
	Additional Shadowing From Absolute Maximum Building Height Envelope
	Additional Shadowing From Becton Envelope

NORTH

0 5 10 15 20 25 m

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Becton Envelope Dotted

Shaded Area = Difference Between PMH and AMH

Esplanade Hotel Site
Absolute Maximum Building Envelope

ESPLANADE HOTEL SITE ST KILDA OVERSHADOWING ANALYSIS

4.00 PM
22 June

Solar Azimuth	310° 35' 08"
Solar Altitude	10° 29' 24"

LEGEND

	Shadows from Existing Buildings
	Shadows From Preferred Maximum Building Height
	Additional Shadowing From Absolute Maximum Building Height Envelope
	Additional Shadowing From Becton Envelope



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