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***Shading Mitigation Plan
Eden Park Redevelopment
Eden Park Redevelopment Board***

*4 September 2007
Reference 28164
Revision 1*

Document Control

Connell Wagner

Document ID: C:\DOCUMENTS AND SETTINGS\ILICHT.000\MY DOCUMENTS\PROJECTS\EDEN PARK\SHADING STUDY\28146 EDEN PARK SHADING MITIGATION PLAN (3 SEPTEMBER 2007) - FINAL DRAFT FOR APPROVAL.DOC

Rev No	Date	Revision Details	Typist	Author	Verifier	Approver
0	31 July 2007	Draft Issue for EPRB Review	KW	TPI/AJM	TPI	AJM
1	4 September 2007	Final Draft Issue for EPRB Approval, ACC Review and Open Public Consultation Process	KW	TPI/AJM	TPI	AJM

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1. Introduction

A shading study has been prepared to determine the potential impact of the proposed new South Stand at Eden Park with respect to shading and change in visible sky factor on neighbouring properties.

All of the properties affected by the new South Stand have classified according to the level of shading and change in visible sky factor occurring throughout the year. Properties have been further classified into those affected in the heating months, and those affected outside winter months (i.e. spring, autumn and summer)

The assessment of shading has been undertaken ignoring the permissible 30m baseline.

This report outlines the basis for financial settlement, and the financial offers to be made to those affected property owners.

This report was prepared by Connell Wagner (CW) for the Eden Park Redevelopment Board (EPRB).

This report should be read in conjunction with the Eden Park Redevelopment Shading Report Revision 2 dated 3 September 2007.

2. Classification of properties

Properties have been classified based on the reduction in sunlight hours falling on the wall facing the stadium. The threshold levels used to evaluate properties are as outlined in the table below:

		Change In Average Monthly Sunlight (Minutes Per Day)											
		Cooling Months			Heating Months						Cooling Months		
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Threshold values	Level 1	<30	<30	<30	<30	<30	<15	<15	<15	<30	<30	<30	<30
	Level 2	30	30	30	30	30	15	15	15	30	30	30	30
	Level 3	75	75	60	60	60	45	45	45	60	60	60	75
	Level 4	165	165	120	120	120	90	90	90	120	120	120	165

For properties affected in the “heating” months (April to September), there is a reasonable correlation between additional energy required for heating and the reduction of sunlight hours as a result of the proposed South Stand redevelopment. This affects most of the properties in Reimers Avenue, Royal Terrace and Bellwood Avenue.

For properties affected outside the “heating” months (October to March), there is no correlation between a loss of sunlight hours and additional energy required for heating. This is mainly due to the average outside air temperature being above 16 degrees. There are 11 properties falling into this category, mainly in Raleigh Street, Kowhai Street and 12 Cricket Avenue. For these properties the loss in amenity cannot be directly related to an increase in heating energy.

The number of properties affected in each category is as follows:

	Level 2 5-10% of sunlight hours	Level 3 10 – 20% of sunlight hours	Level 4 > 20% of sunlight hours
Category A: Properties affected in “heating months”	14	16	3
Category B: Properties affected outside “heating months”	9	3	0
Total	23	19	3

2.1 Category A properties

For these properties, the impact from a loss of sunlight can be directly related to an increase in heating energy.

The heating analysis contained in the shading study has identified that the additional cost of heating due to the effect of the loss in sunlight is between \$11 and \$64 per annum based on a standardised 150m² house (\$0.07 to \$0.46 per m² per annum).

Based on a 50 year period, this represents an additional cost of between \$550 and \$3,200 per standardised house (\$3.50 to \$23 per m²).

As energy is the only direct way of measuring a loss of amenity during the heating months, it is proposed that the following allowances be used as the basis for determining the benchmark (minimum) financial offering which should be made to each of the threshold levels.

Threshold Level	Settlement \$ per m ²
Level 2	\$3.50
Level 3	\$13.25
Level 4	\$23.00

It is recommended that the actual financial offering for Category A properties be based on practical solutions which could be applied to directly mitigate the impacts for the various threshold levels. A series of practical solutions has been developed to address the heating issues including the installation of ceiling insulation, thermal drapes and heat pumps as appropriate. The cost of each of these solutions, the degree to which each has been applied to the threshold levels list above and the financial offering proposed, can be found in Section 3 of this report.

2.2 Category B properties

Properties falling into this category cannot be directly related to an increase in heating energy. The impact of the additional shading will mainly affect daylighting levels within the interior of houses or additional shading of external yards.

For properties classified as Level 2, the loss in sunlight is up to 30 minutes per day during October to March.

For properties classified as Level 3 the loss in sunlight is up to 75 minutes per day during December, January and February and up to 60 minutes during October, November, and March.

No properties fall into Level 4 category.

It is proposed that a mitigation package is offered which represents the relative loss of amenity outside the "heating" months. In terms of directly mitigating the effects for category B properties, a series of practical solutions have been developed including the installation of solar tubes to improve internal daylighting levels, patio heaters and external paving to offset any loss of external amenity. The cost of each of these solutions, the degree to which each has been applied to the threshold levels above and the financial offering proposed, can be found in Section 3 of this report.

3. Mitigation measures

A range of mitigation measures has been developed in order to quantify the level of financial settlement to be offered to each property owner. It is not proposed that EPRB directly implement any of the mitigation measures outlined in this report, but rather make a financial settlement offer directly to each affected property owner so that they can invest that money into their property as they see fit. For the Category A properties, it is appropriate to consider measures that will either reduce the total heating energy used in houses to equal or less than the existing. For the Category B properties, measures that will improve indoor daylighting and outdoor amenity have been provided for consideration. A menu of available mitigation measures and their estimated costs are as follows:

	Supplier	Supply Cost	Installation Cost	Total Cost (incl GST)	Comments
CATEGORY A PROPERTIES					
Heat Pump					
Delonghi 3.5kW	Mitre 10	\$1,158	\$1,000	\$2,158	Installed Cost
Delonghi 5.1kW	Mitre 10	\$2,249	\$1,000	\$3,249	Installed Cost
Insulation					
Pink Batt R1.8 Ceiling (per m ²)	Mitre 10	\$11.80		\$1,770	Based on 150 m ² house
Pink Batt R2.2 Ceiling (per m ²)	Mitre 10	\$13.20		\$1,980	Based on 150 m ² house
Thermal Curtains					
Thermal backed drapes (per linear meter)	Harvey's	\$125	\$25	\$250	Based on 20 linear meters, 2m drop for whole house
CATEGORY B PROPERTIES					
Solar Tubes					
Skyflex 400	Skytube			\$830	Installed cost
Skytube400	Skytube			\$1,547	Installed cost
Patio Heaters					
Patio Heater (Promac) Black	BBQ Factory	\$499		\$499	
Patio Heater (Promac) Stainless Steel	BBQ Factory	\$599		\$599	
Outside landscaping					
Paving	Mitre 10	\$100	\$50	\$1500	Based on 10 m ² of paving

*Those costs in bold have been used to determine the financial offering in Section 3.1. Other similar models and costs included for comparative purposes only. Final costs have been rounded up to nearest \$100 for simplicity.

The following table identifies which mitigation measures have been applied to which Category and Level.

	Level 2 5-10% of daylight hours	Level 3 10 – 20% of daylight hours	Level 4 > 20% of daylight hours
Category A: Properties affected in "heating months"	Insulation R1.8	Thermal Curtains Insulation R1.8	Heat Pump 5.1kW Insulation R1.8
Category B: Properties affected outside "heating months"	Solar Tube or Paving	Patio Heater, Solar Tube or Paving	-

3.1 Financial settlement

The following financial settlement package has been based on the menu of mitigation measures detailed above. Mitigation measures appropriate to the level of impact have been selected, the cost and financial settlement to be paid in order to implement those measures should the property owner wish to do so, are detailed below.

	Level 2 5-10% of daylight hours	Level 3 10 – 20% of daylight hours	Level 4 > 20% of daylight hours
Category A: Properties affected in "heating months"	\$2000	\$3500	\$5000
Category B: Properties affected outside "heating months"	\$1500	\$3700	-

For those properties classified as Level 1, the impact from either a loss of sunlight hours or change in sky factor is considered less than minor. No mitigation package is proposed for Level 1 properties.

There are no Level 4 Category B properties; therefore no financial settlement has been calculated.

As it is not envisaged that the EPRB directly undertake any physical works with respect to the mitigation proposals, it will be the responsibility of each property owner to invest their financial settlement as they see fit.

4. Public consultation process

4.1 Selected consultation process

Seven property owners in total were chosen as a representative sample of the various classification levels 1 to 4 from the following streets:

- Reimers Avenue (5)
- Bellwood Avenue (1)
- Sandringham Road (1)

A brief meeting lasting approximately one hour was held with each property owner. Meetings were also held with representatives from both the Eden Park Neighbours Association (Mark Donnelly of Walters Road), and the Eden Park Residents Association (Jose Fowler of Bellwood Avenue). In attendance at all meetings were Tristan Ilich (Connell Wagner), and Graham Walton (Eden Park Trust Board Community Liaison Officer). The meetings were generally limited to a discussion around the shading issue, but most residents were also interested in other aspects of the redevelopment. Residents were advised that processes for dealing with other issues will be developed in due course. Most residents were particularly interested in the impact of the demolition and construction, and the consultation process which will be established. This should be accorded some priority at the appropriate time.

The format of each meeting was generally Graham Walton gave a brief introduction to the purpose of the meeting, and then handed over to Tristan Ilich to go through in detail various aspects of the shading report as they applied to each of the properties. Where required, a detailed explanation was given as to the various technical parameters being analysed and presented in the report, to ensure all residents were left with a basic understanding of the study methodology and results. Tristan also explained the basis upon which the mitigation plan was going to be developed, and the process going forward.

The purpose of these meetings was to present the findings of the shading, and to seek feedback and comments where applicable from a representative sample of property owners.

4.2 Feedback from selected public consultation process

General comments only have been recorded; further feedback will be sought during the next phase of public consultation. Overall the general response with respect to shading was positive. There was a general acceptance by those residents spoken to that the reduction in overall stadium height has reduced the overall shading impact significantly. In general, no negative feedback was received. Residents felt confident with the process being followed, the accuracy and thoroughness of the shading study, and the level of public consultation being undertaken. Residents were also pleased that the 30m baseline was not longer being used as a benchmark for determining either impact or mitigation.

Below is a summary of the general comments received from the selected residents spoken to:

- Most residents were pleased to hear that the shading impact had significantly reduced.
- With the overall reduction in stadium height, most residents felt much more comfortable with the overall re-development.
- Most residents clearly recognised that the reduction in overall stadium height has significantly reduced the shading impact.
- A few residents were interested in the visual impact the proposed new stadium would cause. We suggested to those interested to look at the marker tape which has been installed on the South lighting towers to gain a real sense of the visual impact likely to be created.
- Some properties have already been insulated, have HRV or DVS systems installed.
- One resident would have preferred EPRB to ensure mitigation works were completed rather than

- financial settlement; however they did acknowledge the difficulties and timeframes involved.
- Most of the residents were very interested in the results graphs and tables, one did suggested that for the annual sunlight hours, perhaps the percentage change should be representative on a month by month basis rather than on an annual basis. [This could be done if deemed necessary]
 - One resident queried some of the peculiar trends in the graphs (i.e. properties shading other properties, some houses affected while next door not affect etc). These trends were explained in detail by Tristan, many relating to site orientation and proximity and relationship to neighbouring properties.
 - Most residents were pleased to see that good progress was being made with respect to the redevelopment.

Specific feedback was received from both the Eden Park Neighbours Association (Mark Donnelly), and the Eden Park Residents Association (Jose Fowler). A summary of those comments is outlined below:

<p>Mark Donnelly</p>	<p>General discussion held with Mark regarding shading report and consultation process.</p> <p>Mark suggested additional step be included in the consultation process, whereby all residents (those affected and those who are now not affected) are given the opportunity to review and make comment on the shading study and mitigation plan.</p> <p>Mark also suggested that a public meeting be held to allow residents to ask questions and to seek clarification on the shading report and mitigation plan. These suggestions were adopted by the EPRB, and this process will now run in parallel with the councils internal review process. All comments and feedback will be collated and reviewed by council before final approval is given.</p> <p>Mark had already spoken to a number of residents with whom Tristan Ilich and Graham Walton had met with previously, and the general feedback he was getting was positive. Mark made particular comment with respect to the depth and accuracy into which the shading study has gone to, i.e. analysis for every property, for each hour, of every day for the entire year. This has given the residents greater confidence in the overall methodology and process being followed.</p> <p>Mark also acknowledged that by excluding the 30m baseline in any analysis means that everyone is being treated on a fair and reasonable basis.</p>
<p>Jose Fowler</p>	<p>Jose was pleased to know that the 30m baseline had not been used as a benchmark for either impact or settlement.</p> <p>Discussion was had regarding other aspects of the redevelopment including demolition and construction.</p> <p>Jose was generally interested in the overall impact from the shading, specifically members of the EPRA.</p> <p>General feedback on the shading study was positive.</p>

4.3 Open public consultation process

By the public issue of this mitigation plan and accompanying shading study report, residents now have the opportunity to review both reports and how it may affect them. A copy of the shading study and the mitigation plan has been sent to all those properties affected, plus those who are now not affected. An electronic copy of the Shading Study Report and Mitigation Plan will be placed on the Eden Park website and will be available for download. Property owners are invited to provide constructive feedback (both positive and negative) to either the Eden Park Redevelopment Board or Auckland City.

Residents will have 1 month to make comment and or provide constructive feedback in writing. All feedback will be collated and reviewed by the EPRB and Auckland City. Any amendments will be incorporated before final issue to Auckland City for their approval.

4.4 Public meeting

Prior to undertaking the shading study, two public meetings were held on 28 June and 3 July 2007. The purpose of these public meetings was to outline the shading study process, together with a general update on the redevelopment in general.

A further public meeting is planned to present the findings of the Shading Study Report and Mitigation Plan to those residents who wish to attend. The purpose of this meeting will be to give each affected property owner, plus those property owners who are now not affected, the opportunity to ask any questions regarding their property. This meeting will not include any discussion regarding the type and level of settlement. Following the formal part of the public meeting, residents will be able to ask questions on a one by one basis if required.

4.5 Auckland City Council review and approval process

Auckland City Council is required to review and approve a Shading Mitigation Plan (this document) in accordance with Resource Consent condition 57. Auckland City is also required to review and approve a new Shading Study based on the revised redevelopment scheme. The attached Shading Study dated 3 September 2007 supersedes all previous shading study reports submitted under the granted Resource Consent (refer consent condition 57(i) for details).

Once the open public consultation process concludes, Auckland City Council will review all comments received and request any amendments be made to either the Shading Study or Mitigation Plan before formally approving both documents in accordance with consent condition 57. As per consent condition 58a, EPRB will then have 1 month to make Mitigation Offers to those residents deemed affected in accordance the Shading Mitigation Plan. Property owners will have 6 months to accept the Mitigation Offer.

5. Resource Consent Conditions

5.1 Compliance schedule

EPRB is required to comply with conditions 57 (i), (ii), (iii), (iv), (v), (vi), (vii), 57a, 58a, 58b. Compliance with these conditions, in so far as this Mitigation Plan and accompanying Shading Study report applies, is outlined below:

Resource Consent Condition Ref	Compliance statement
57	Refer Shading Mitigation Plan dated 3 September 2007 (this document).
57 (i)	Refer Appendix A of the Shading Study Report dated 3 September 2007 for a plan showing affected properties
57 (ii)	Refer to Section 3 of the Shading Mitigation Plan (this document) for a description of the mitigation measures together with details of the proposed financial settlement proposed.
57 (iii)	It is proposed that a financial settlement package be offered to each affected property owner based on their level of impact. This financial settlement is based on a range of mitigation measures which are intended to either directly or indirectly offset those impacts identified in the Shading Study Report. Given that a financial settlement package is being offered as opposed to EPRB undertaking direct mitigation works to each affected property, the decision and therefore benefit of the mitigation proposals will be at the discretion of each property owner.
57 (iv)	As it is unlikely that no physical works will be undertaken by the EPRB with respect to the mitigation proposals, 'implementation of the mitigation proposals' relates only to the offer of a financial settlement package as detailed in this Mitigation Plan.
57 (v)	As it is unlikely that no physical works will be undertaken by the EPRB with respect to the mitigation proposals, 'completion of the mitigation proposals' relates only to the payment of the financial settlement to the affected property owners.
57 (vi)	A 'Shading Mitigation Acceptance and Refusal Register' will be prepared by the EPRB, and will be submitted to Auckland City Council in accordance with Resource Consent condition 58a.
57 (vii)	A copy of the 'Shading Mitigation Acceptance and Refusal Register' will be issued to the Eden Park Trust Board and Auckland City Council for reference by future property owners.
57a	Compliance to be confirmed 12 months following completion of construction as per condition.
58a	Compliance with this condition is currently in progress.
58b	As it is unlikely that no physical works will be undertaken by the EPRB with respect to the mitigation proposals, 'structural or any other changes required including building or resource consents' is no longer applicable. This condition should be removed.