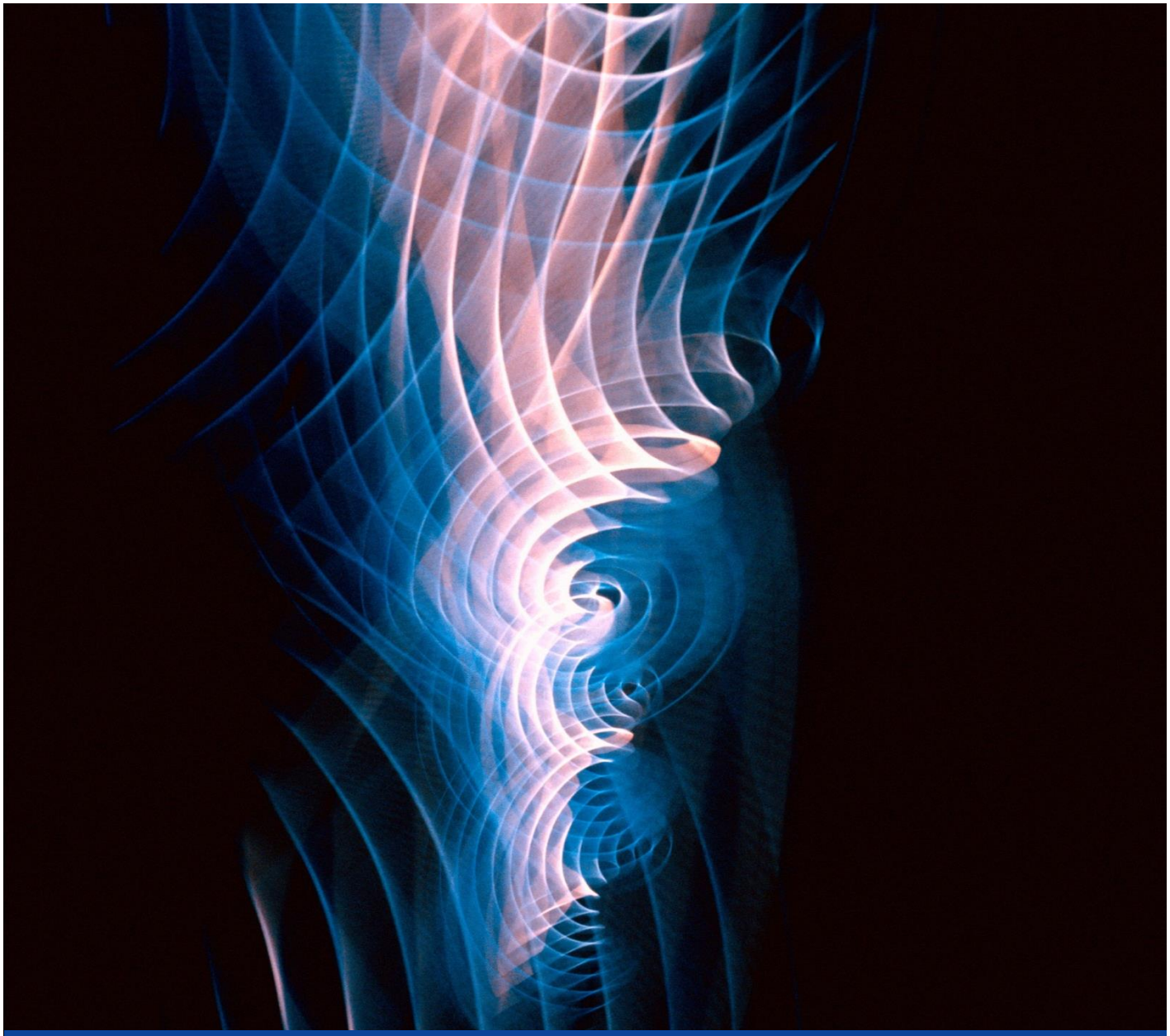

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WSP

HARBORD DIGGERS REDEVELOPMENT

Acoustic Report - Section 96

09/06/2014 Revised: 16/06/2015

Quality Management

Issue/revision	Issue 1	Revision 1	Revision 2	Revision 3
Remarks	Issue	Revised for comments		
Date	09/06/2014	16/06/2015		
Prepared by	K Lloyd	K Lloyd		
Signature				
Checked by	A Campbell	A Campbell		
Signature				
Authorised by	A Campbell	A Campbell		
Signature				
Project number	ACG1414600			
Report number				
File reference				

Harbord Diggers Redevelopment
Acoustic Report - Section 96

16/06/2015

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1 Introduction

WSP have been appointed to review design changes to the Harbord Diggers development as part of the Section 96 submission for the development.

A previous Noise Impact Assessment has been undertaken by Acoustic Logic Consultancy (Harbord Diggers Redevelopment, Noise Impact Assessment dated 1/08/2014, reference 20130272.3/0108A/R1/JS) and was accepted as part of the Development Approval conditions.

Within the Noise Impact Assessment, criteria for noise emissions from the Childcare facility are defined in line with the Association of Australian Acoustical Consultants (AAAC) Guideline Child Care Centre Acoustic Assessment ('the guideline')

The results of the Noise Impact Assessment requires 'line of sight' awnings to outdoor play areas. Within the Section 96 proposed alterations, these awnings are replaced by alternative mitigation measures.

With the exception of the proposed Child Care modifications, the conclusions of the Acoustic Logic Noise Impact Assessment (dated 01/08/14) approved under DA2014/0875 are still applicable to the development as modified.

This report documents additional design undertaken and measures implemented to ensure continued compliance with the criteria stated in the Noise Impact Assessment.

1.1 Criteria

Noise Emissions from the Childcare centre have been detailed in the previously approved Noise Impact Assessment prepared by Acoustic Logic Consultancy.

This criteria has been taken in line with the Australian Acoustical Consultants (AAAC) Guideline Child Care Centre Acoustic Assessment and is reproduced below.

- Background noise levels by more than 10dB(A) at nearby residences if children are outside for no more than 2 hours per day.
- Background noise level by more than 5dB(A) at nearby residences if children are outside for more than 2 hours per day.

This "background + 10dB(A)" assessment is typically adopted by the Land and Environment Court (eg in *Mesabo Pty Limited v Mosman Municipal Council* [2004] NSWLEC 492) in the absence of any specific council control and is also recommended by the Association of Australian Acoustical Consultants (AAAC).

Location	Time of day	Background Level dB(A)L_{90}	Noise Emission Objective dB(A)$L_{eq\ (15min)}$
Nearest Residents (maximum 2 hours in external areas)	Day (7am to 6pm)	43	53
Nearest Residents (exceeding 2 hours in external areas)	Day (7am to 6pm)	43	48

Figure 1-1 – Outdoor play areas noise emission objective at residential receivers - Extract from Acoustic Logic Noise Impact Assessment

The play areas are expected to be used for more than 2 hours in each day. Therefore the criteria utilised in this assessment is taken as the lower requirement of 48dB $L_{Aeq,15min}$.

2 Development design

The facility is being fitted out for a maximum of 90 children. The facility will be broken into two groups; 0-3 age group on the upper ground and 2-5 age group on the lower ground.

2.1 Outdoor play area occupancy

The Tenant of the childcare facility (Explore and Develop) have provided a table of proposed use of the outdoor play areas. The full tables of expected use are provided in Appendix A.

The tables indicate that the outdoor play areas will be used for more than 2 hours in a day with the following maximum occupancy:

- Upper ground outdoor play area:
  - 4 children in the 0-1 age group and
  - 12 children in the 2-3 age group
  - Half the children in the undercover section and half in the open
- Upper ground outdoor play area:
  - 8 children in the 2-3 age group and
  - 20 children in the 3-5 age group
  - Half the children in the undercover section and half in the open

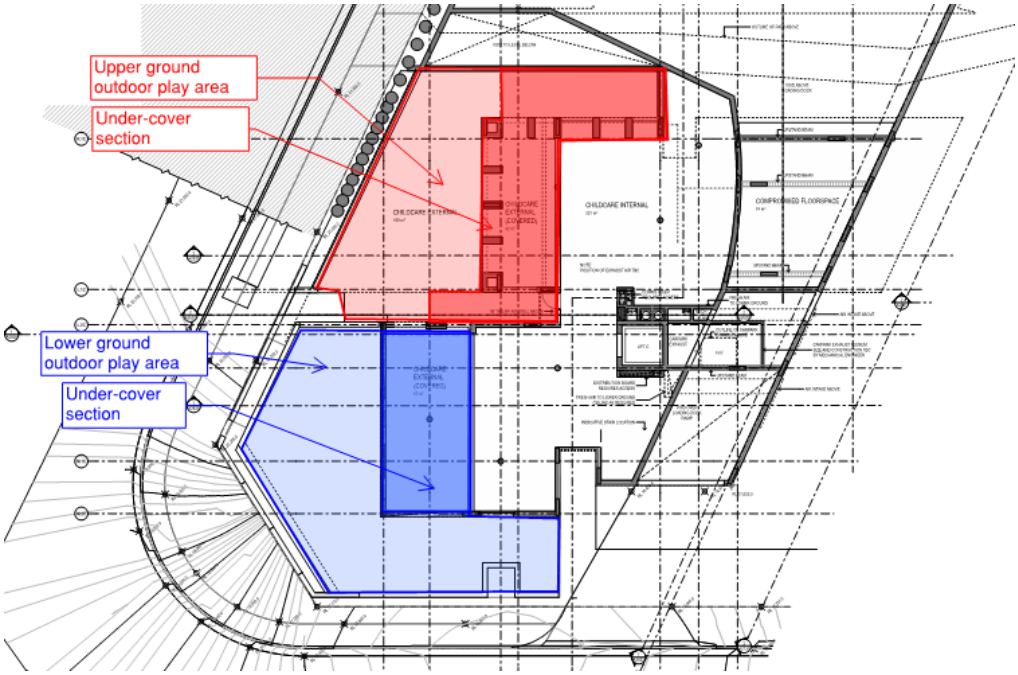

Figure 2-1 - Outdoor play areas

2.2 Residential receiver locations

The nearest and most affected residential receivers utilised in the assessment are shown in Figure 2-2 below. The guideline states that the criteria are applicable at the façade of any affected residence or at a height of 1.5m on a balcony.

The receiver locations to demonstrate compliance have been chosen as the following:

1. Apartment C-101 balcony
2. Apartment C-101 balcony
3. Apartment C-102 façade
4. Apartment C-102 façade
5. Apartment C-102 balcony
6. Apartment C-102 façade
7. Apartment B-201 façade
8. Apartment B-201 balcony

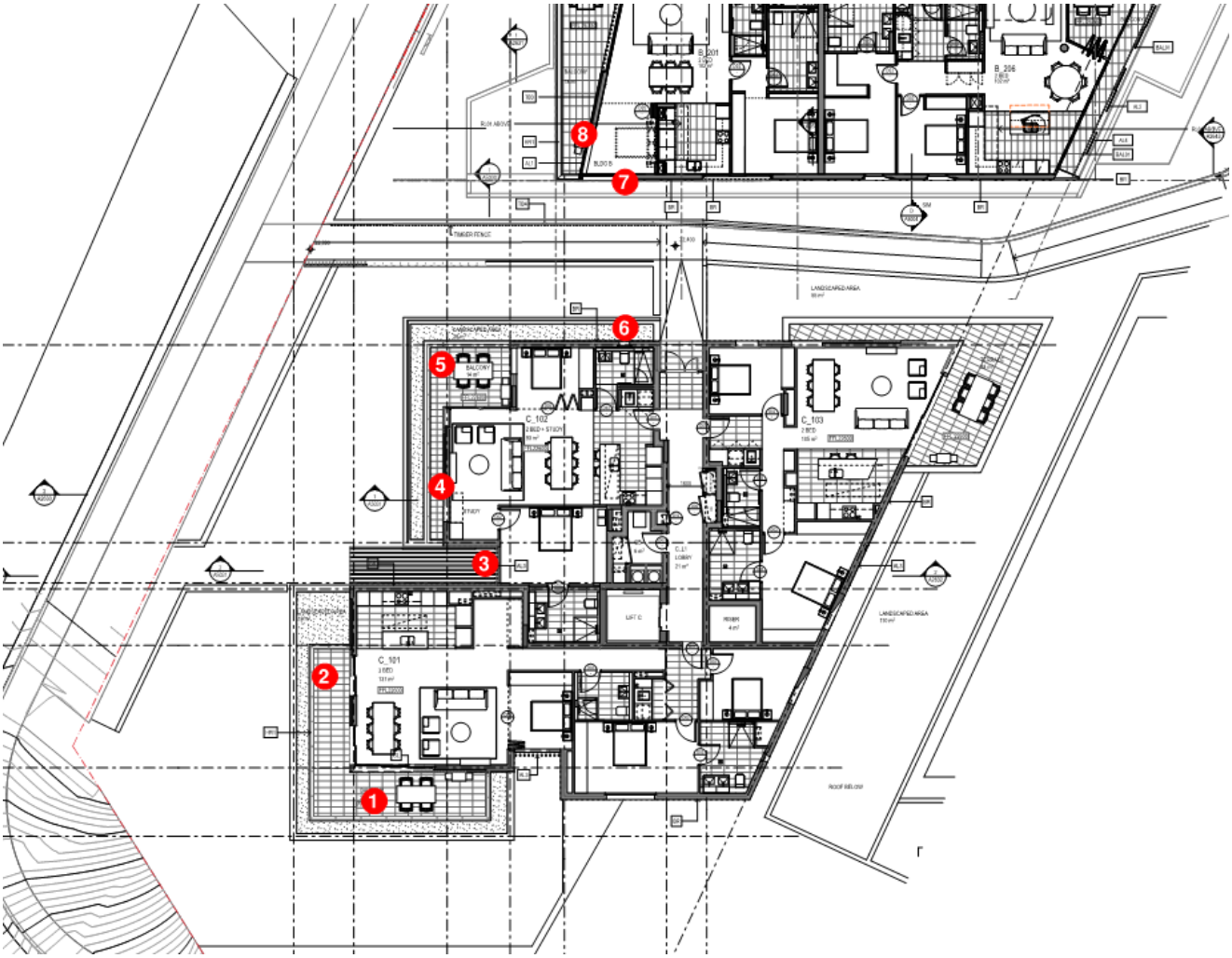

Figure 2-2 - Residential receivers

3 Model

A model of the facility has been undertaken in Odeon, a dedicated acoustic 3D modelling software.

This software was chosen as it allows flexibility with the surface finishes (particularly in the undercover areas) to further reduce noise emissions.

The following section outlines the parameters utilised in the modelling of the facility and the resultant mitigation measures designed.

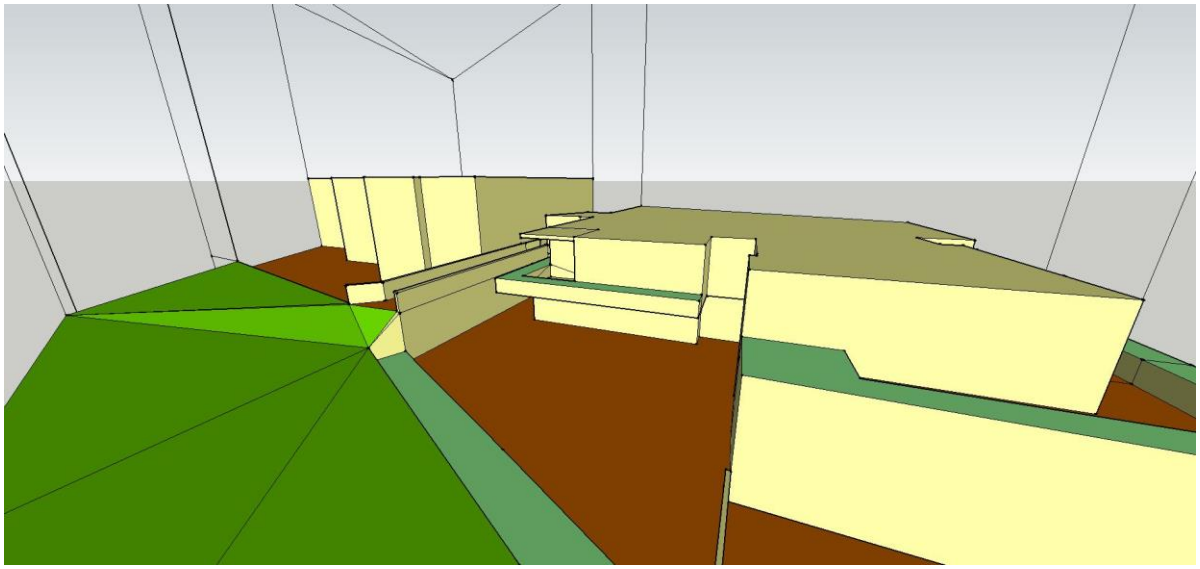

Figure 3-1 - Image of 3D model

3.1 Mitigation measures

The revised strategy to meet Childcare noise limitations is presented below.

- Inclusion of 600mm high glazed balustrades above planters or balustrades around apartments C_102 and B_201. Total of 1600mm high barriers above floor level.
- A glazed wall with timber supports will extend along the first half of the walkway for a height of 900mm above the balustrade (total of 1900mm above the walkway)
- An awning above the entrance as shown in Figure 3-2 below.
- Awning or roof to the North of Building C as shown in Figure 3-2 below.
- An acoustically absorptive treatment (rated NRC ≥ 0.6) to the soffit of the balcony of apartment C_102.
- An acoustically absorptive treatment (rated NRC ≥ 0.6) to the soffit of the childcare centre undercrofts.

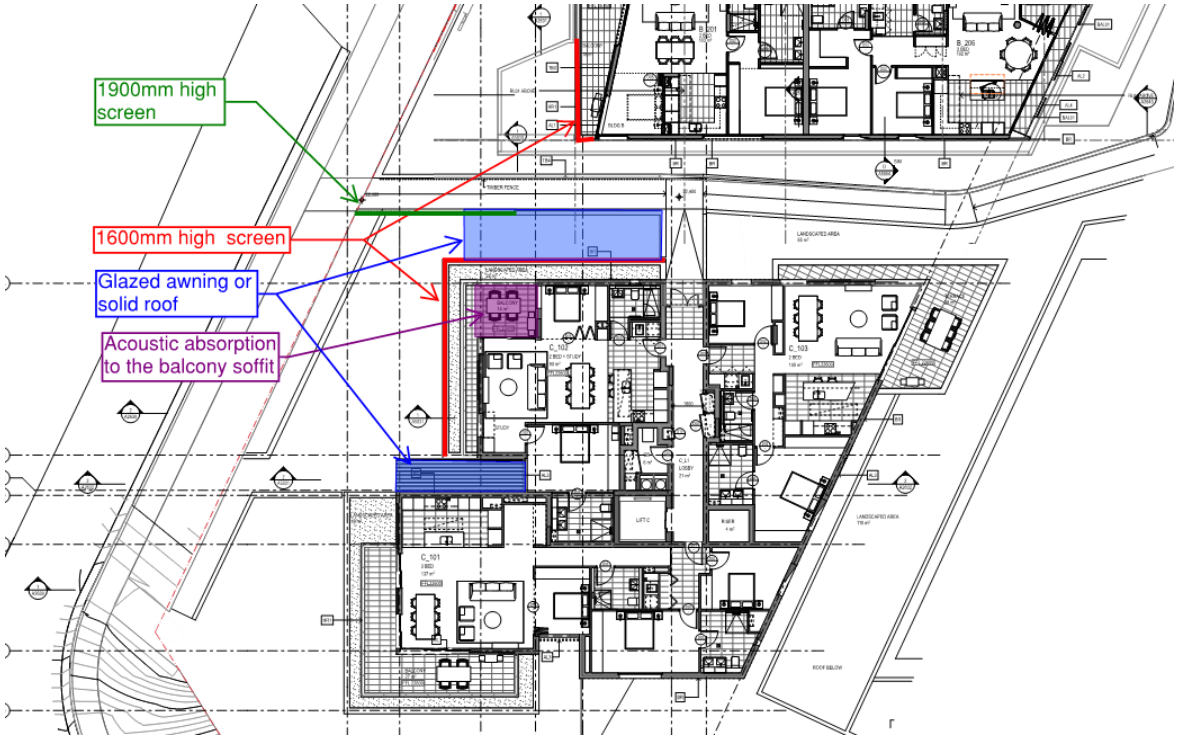

Figure 3-2 - Required treatment to the childcare centre and surrounds

3.2 Source noise levels

The AAAC Guideline for Child Care Centre Acoustic Assessments recommends source noise levels, reproduced in Table 3-1 below.

Table 3-1 - Noise data of outdoor play areas from AAAC Guidance

Number of Children	Sound Power Level, dBA
10 Children aged 0 to 2 years	77 – 80
10 Children aged 2 to 3 years	83 – 87
10 Children aged 3 to 6 years	84 – 90

As the proposed development will have a mixture of different aged children playing outdoors, the following sound power levels have been used to predict noise impacts at surrounding residential locations.

Table 3-2 – Noise levels

	Number of Children	Sound Power Level, dBA
Upper ground – undercover	8	85
Upper ground - outside	8	85
Lower ground – undercover	14	90
Lower ground – outside	14	90

4 Assessment and results

Noise modelling has been conducted to predict noise impacts from outdoor play areas to surrounding residential locations based on;

- Location and configuration of the outdoor play areas,
- Local topography
- Mitigation measures detailed in section 0,
- Noise source levels of children playing applied as area sources for four areas detailed in section 3.2,

The results of modelling and compliance with established criterion are presented in Table 4-1.

Table 4-1 - Predicted Noise Levels due to Outdoor Play Areas

Receiver location		Target noise level $L_{eq,\ 15\text{-}min}$ dBA	Predicted noise level $L_{eq,\ 15\text{-}min}$ dBA	Compliant
1	Apartment C-101 balcony	48	41	Yes
2	Apartment C-101 balcony	48	45	Yes
3	Apartment C-102 façade	48	47	Yes
4	Apartment C-102 façade	48	44	Yes
5	Apartment C-102 balcony	48	47	Yes
6	Apartment C-102 façade	48	43	Yes
7	Apartment B-201 façade	48	42	Yes
8	Apartment B-201 balcony	48	11	Yes

Noise levels associated with outdoor play areas are predicted to comply with the established AAAC criteria at all times based on the supplied information and assumptions.

5 Summary

WSP have been appointed to review design changes to the Harbord Diggers development as part of the Section 96 submission for the development.

A previous Noise Impact Assessment has been undertaken by Acoustic Logic Consultancy (Harbord Diggers Redevelopment, Noise Impact Assessment dated 1/08/2014, reference 20130272.3/0108A/R1/JS) and was accepted as part of the Development Approval conditions.

With the exception of the proposed Child Care modifications, the conclusions of the Acoustic Logic Noise Impact Assessment (dated 01/08/14) approved under DA2014/0875 are still applicable to the development as modified.

Criteria for Childcare facility outdoor play areas is given within this Noise Impact Assessment in line with the Australian Acoustical Consultants (AAAC) Guideline Child Care Centre Acoustic Assessment (48dB $L_{Aeq,15min}$).

The results of the Noise Impact Assessment required 'line of sight' awnings to Child Care Centre outdoor play areas. Within the Section 96 proposed alterations, these awnings are replaced by alternative mitigation measures; barriers to balconies, reduced awning areas, barrier wall along walkway.

An assessment of the childcare outdoor play areas taking into consideration the number of and age of the children in each play area and new mitigation measures. The model predicts noise levels associated with outdoor play areas comply with the established AAAC criteria at all times based on the supplied information and assumptions.

Appendix A Outdoor playground use

Outdoor play area use as supplied by Explore and Develop.

Table A-1 - Proposed Playground use - Upper ground floor outdoor area

Time of Day	0 - 1 Age Group (Total of 8)	1 - 2 Age Group (Total of 12)	2 - 3 Age Group (Total of 12)	Total Babies using the undercover and outside area	Total Babies using the outdoor space open to the sky at any one time
7.30am					
8.00am					
8.30am					
9.00am	4	6	6	16	8
9.30am	4	6	6	16	8
10.00am			6	6	3
10.30am			6	6	3
11.00am					
11.30am					
12.00pm					
12.30pm					
1.00pm					
1.30pm					
2.00pm					
2.30pm	4	6		10	5
3.00pm	4	6		10	5
3.30pm			6	6	3
4.00pm			6	6	3
4.30pm			6	6	3
5.00pm					
5.30pm					
6.00pm					

Table A-2 - Proposed Playground use - Lower ground floor outdoor area

Time of Day	2 to 3 Age Group (Total of 15)	3 - 4 Age Group (Total of 20)	4 - 5 Age Group (Total of 20)	Total Children using the undercover and outside area	Total Children using the outdoor space open to the sky at any one time
7.30am					
8.00am					
8.30am					
9.00am	8	10	10	28	14
9.30am	7	10	10	27	14
10.00am	8	10	10	28	14
10.30am	7	10	10	27	14
11.00am					
11.30am					
12.00pm					
12.30pm					
1.00pm					
1.30pm					
2.00pm					
2.30pm		10	10	20	10
3.00pm	8	10	10	28	14
3.30pm	7	10	10	27	14
4.00pm	8	10	10	28	14
4.30pm	7	10	10	27	14
5.00pm					
5.30pm					
6.00pm					

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