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Proposed Mixed Use Development,
Cabarita

PRELIMINARY ENVIRONMENTAL NOISE IMPACT ASSESSMENT

13 December 2007

crgref: 07655a report



1. INTRODUCTION

Jay Carter, Acoustical Consultant has been engaged by W A Stockwell Pty Ltd to undertake an acoustic impact assessment of a proposal to develop a mixed use facility in Cabarita. The location of the subject site is shown in Figure 1.1 below.

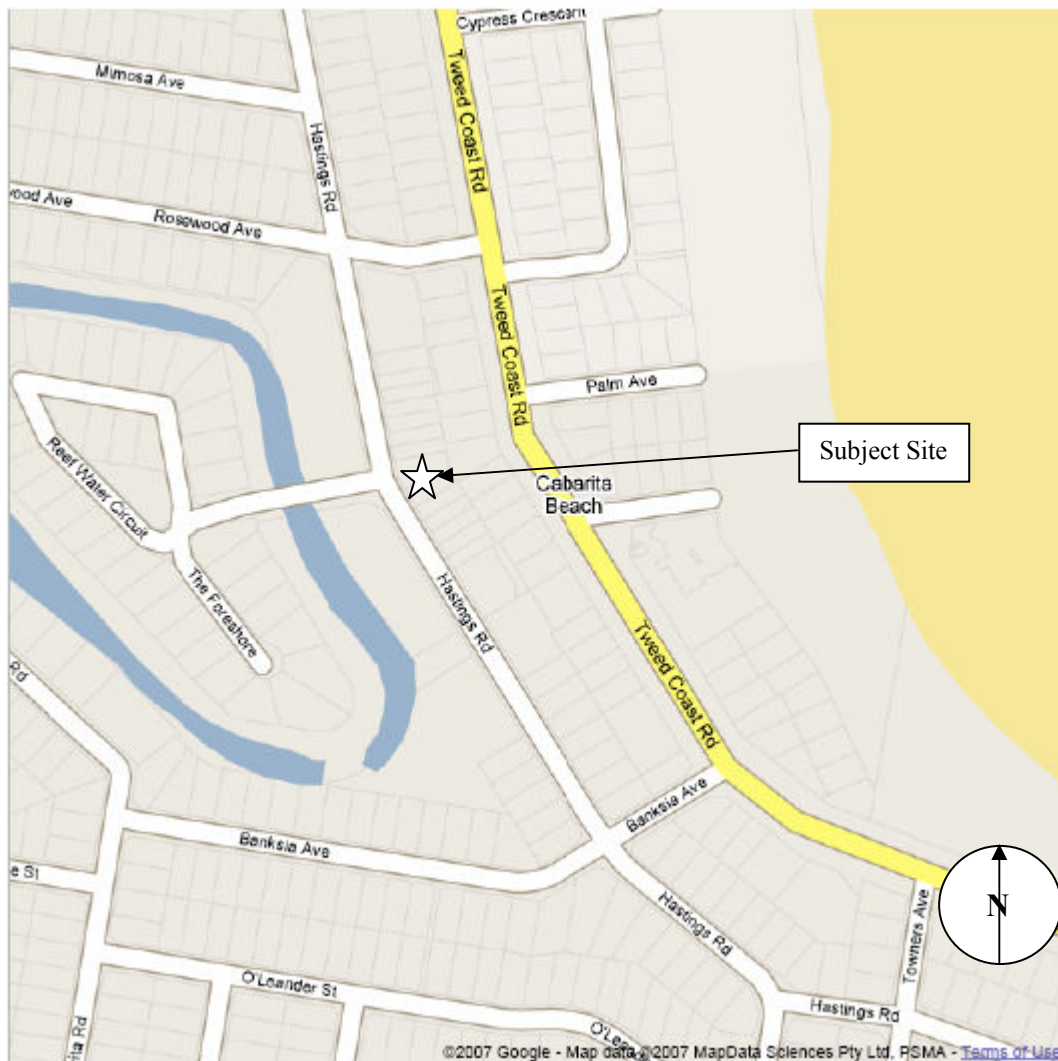


Figure 1.1 – Location of Subject Site

2. THE PROPOSAL

The subject site is located on blocks located between the Tweed Coast Road and Hastings Road, on land that falls away from Tweed Street down to Hastings Road. The arrangement is proposed as follows:

- **Lower ground level:** Access off Hastings Road into basement parking for residential component and some supermarket parking. The loading dock is also proposed off Hastings Road. At grade parking is proposed for the northern portion of the development;
- **Upper ground level:** Supermarket towards the southern portion of the site, with specialty stores and a kiosk;
- **Mezzanine level:** Car parking accessed off internal ramp;
- **Level 1:** Two bed apartments facing Tweed Coast Road and Hastings Road with large communal recreation space on the Hastings Road side;
- **Level 2:** Roof terrace fronting Tweed Coast Road.

The site is adjacent to other commercial premises to the immediate north on the Tweed Coast Road (eastern) side of the site, vacant land to the immediate south, a childcare centre to the immediate south-west of the site (on Hastings Rd). Further two storey apartments are located across Hastings Road to the west.

We are advised by the Project Planners that the Town Plan assigns Hastings Road as being within the commercial precinct, with the intent to divert future commercial traffic down Hastings Road.

For site location and site layout, refer to Figures 2.1 to 2.9 below.

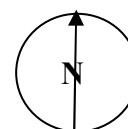


Figure 2.1 – Subject Site and Locale

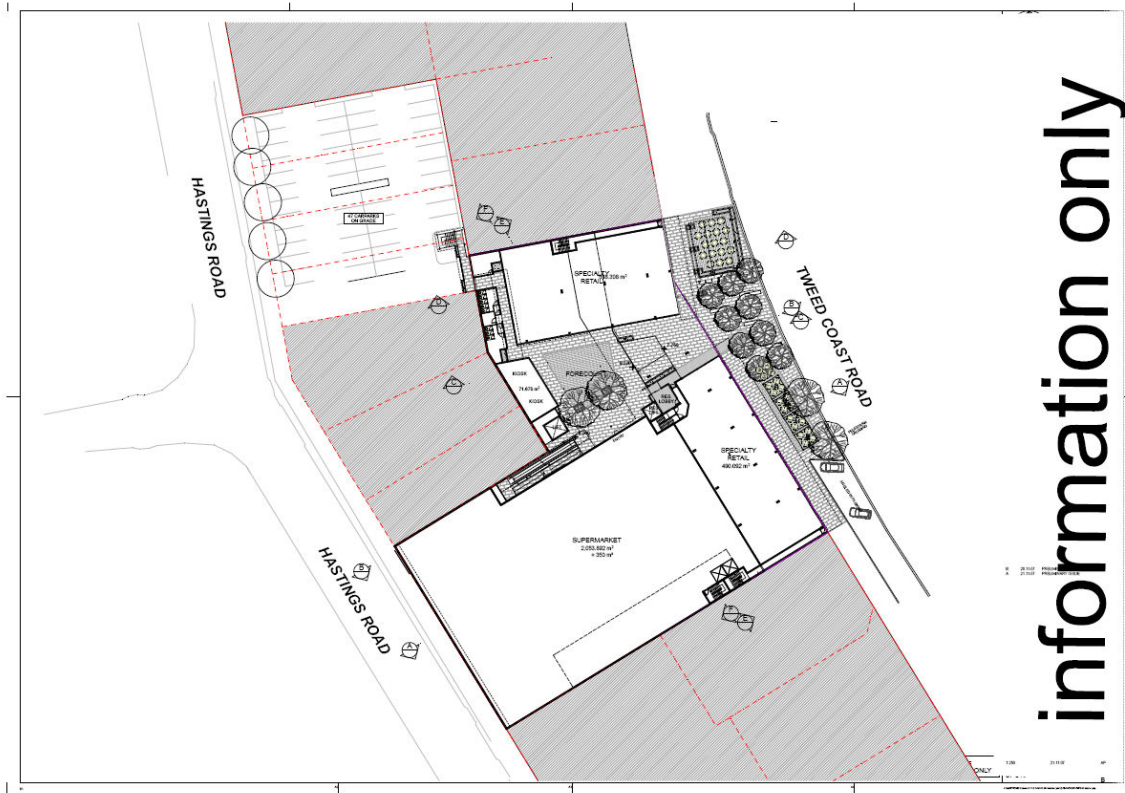


Figure 2.2 – Layout of Subject Site

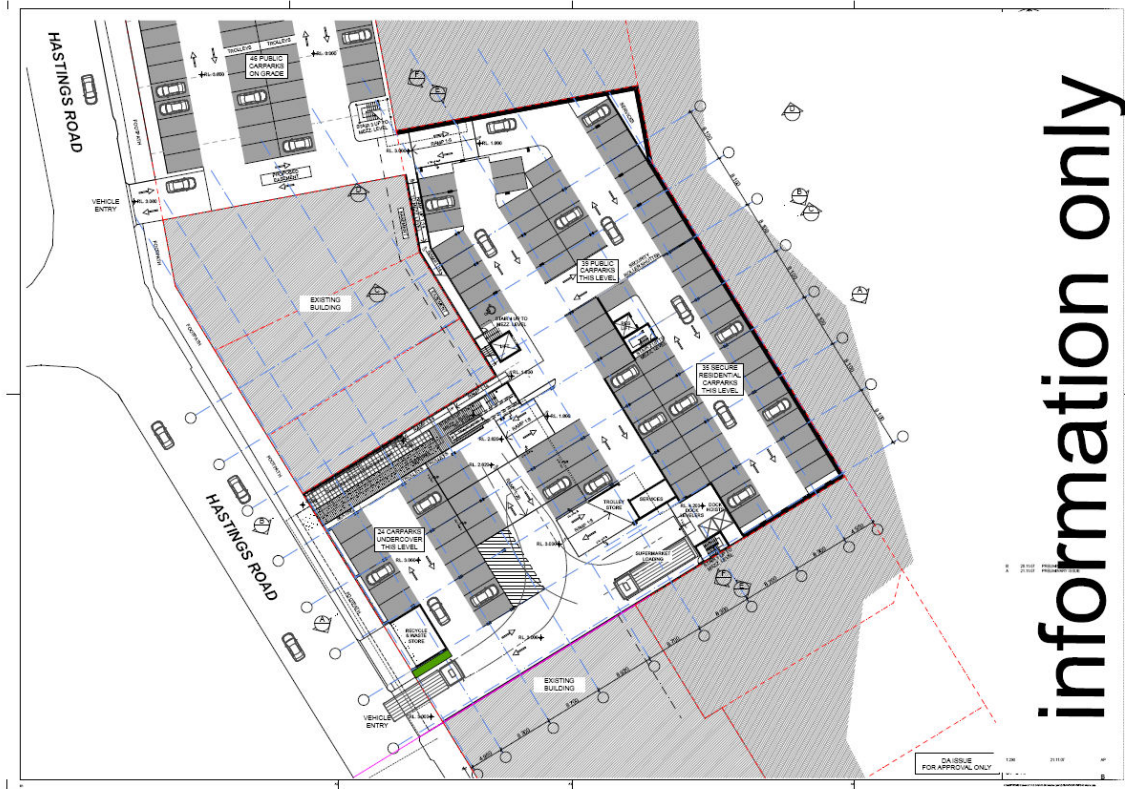


Figure 2.3 – Layout of Lower Ground Level

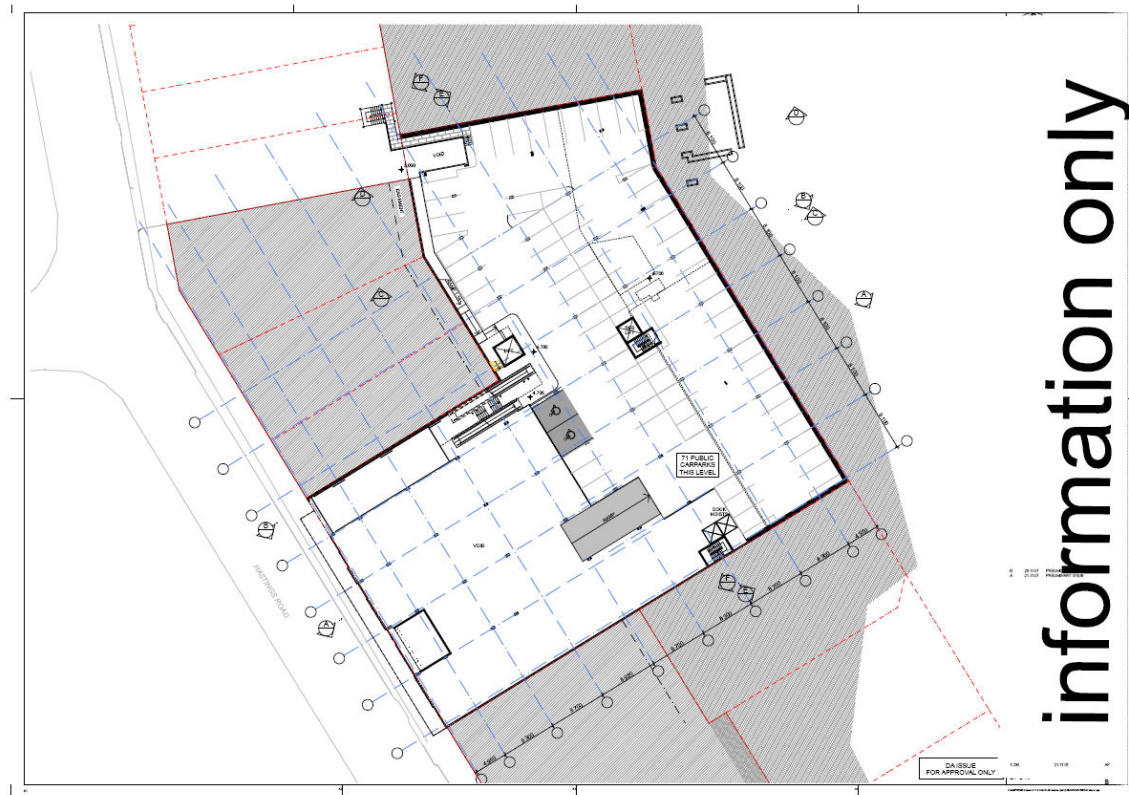


Figure 2.4 – Layout of Mezzanine Level

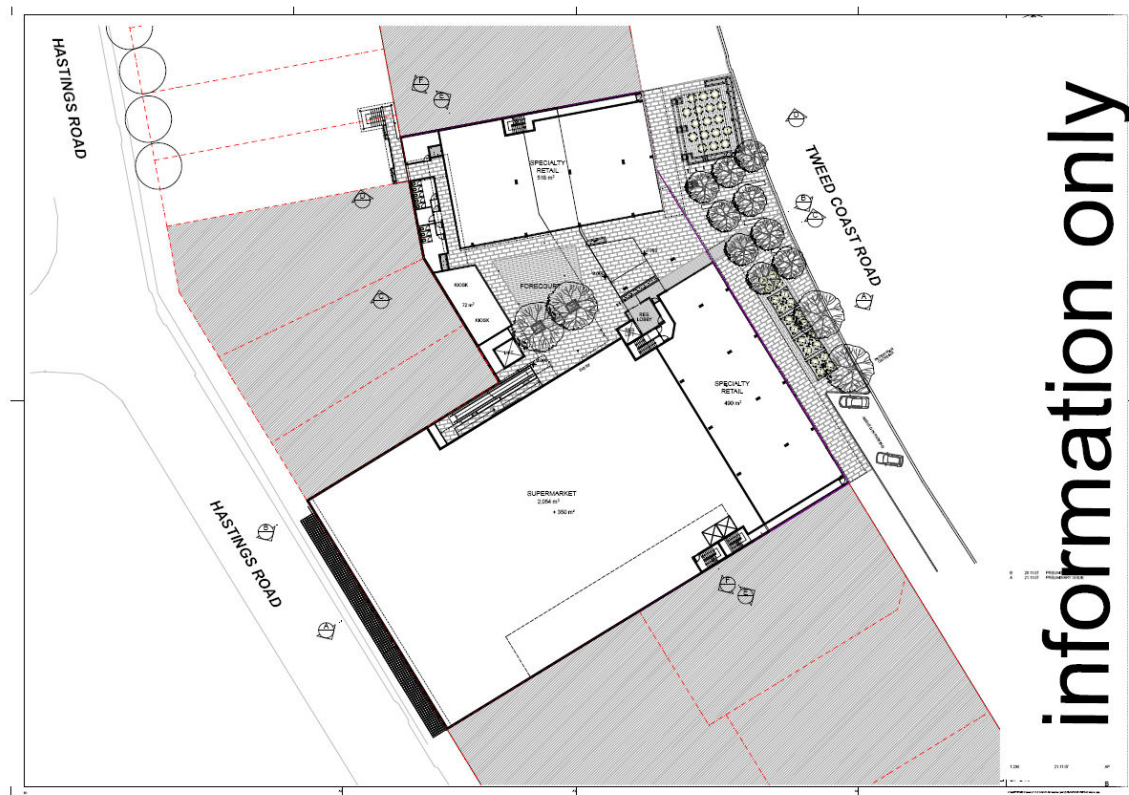


Figure 2.5 – Layout of Upper Ground Level



Figure 2.6 – Layout of Level 1



Figure 2.7 – Layout of Level 2



Figure 2.8 – Layout of Roof Level

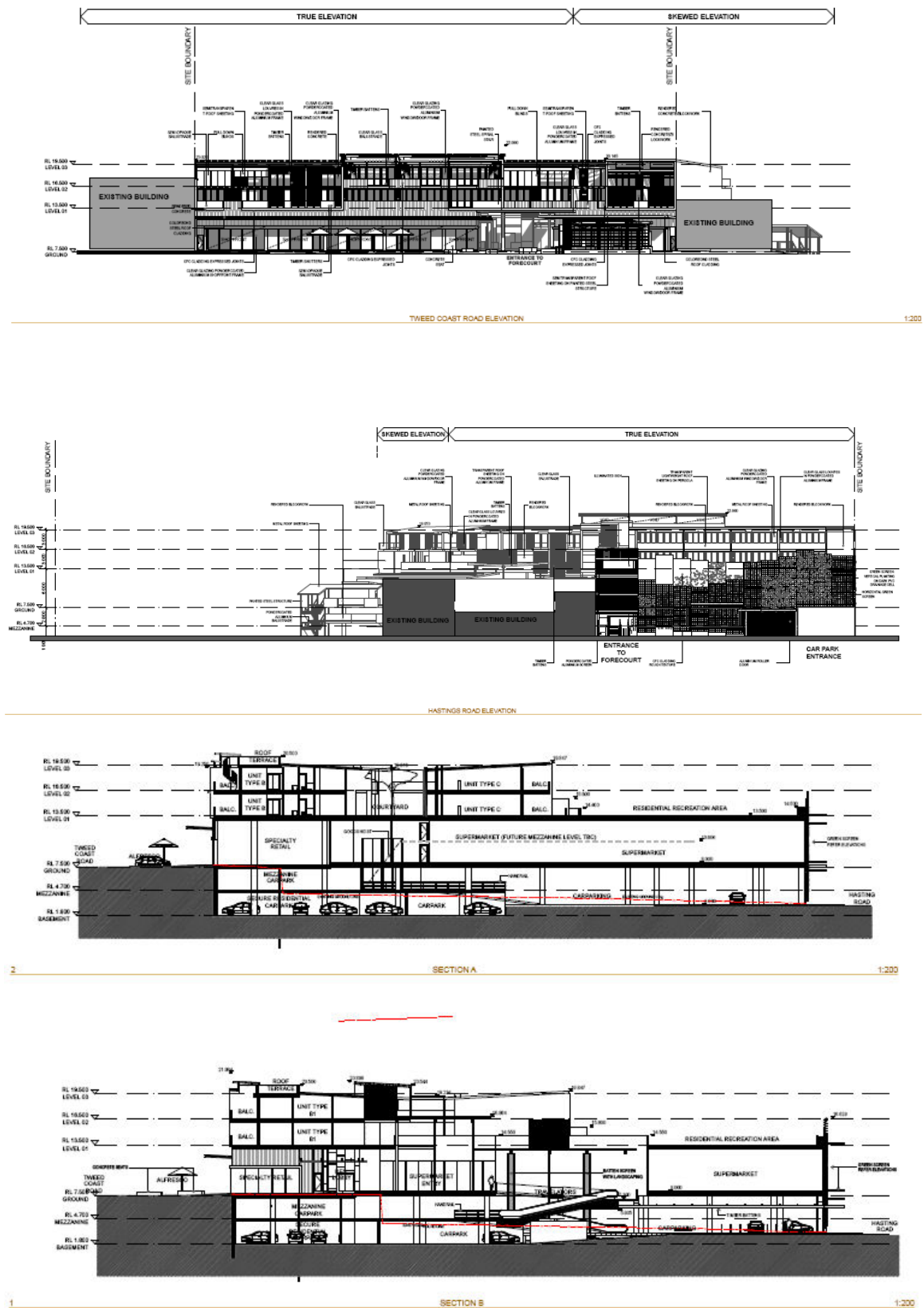


Figure 2.9 – Sections

3. NOISE LIMIT CRITERIA

Commercial Activity

On-site noise associated with both proposed onsite and offsite commercial activity impacting both onsite and offsite dwellings is regulated by the NSW Industrial Noise Policy.

The assessment procedure has two components:

- Control of intrusive noise impacts – The limit criteria for this assessment is as follows:
 $L_{Aeq, 15 \text{ min}} \leq \text{rating background level}^1 + 5 \text{ dB};$
- Maintaining noise level amenity for nearby residential premises. This is achieved by ensuring that the proposed development complies with the noise limit criteria set in Table 2.1 of the Policy. If we assume that the area is of an urban² nature (as defined in the Policy), the following limits apply:
 - Daytime (7 am – 6 pm Mon-Sat; 8 am – 6 pm Sun) 60 dB(A) L_{eq} ;
 - Evening (6 pm – 10 pm) 50 dB(A) L_{eq} ;
 - Night (remaining periods) 45 dB(A) L_{eq} .

Vehicle Movements Associated with Proposal

Noise from the extra vehicles traversing Hastings Road generated by the proposed use is assessed against NSW RTA's "Environmental Criteria for Road Traffic Noise". The criteria applicable to the proposal is as follows:

TYPE OF DEVELOPMENT	CRITERIA		
	DAY (7 am– 10 pm) dB(A)	NIGHT (10 pm– 7 am) dB(A)	WHERE CRITERIA ARE ALREADY EXCEEDED
8. Land use developments with potential to create additional traffic on collector road	$L_{Aeq(1hr)}$ 60	$L_{Aeq(1hr)}$ 55	Where feasible and reasonable, existing noise levels should be mitigated to meet the noise criteria. Examples of applicable strategies include appropriate location of private access roads; regulating times of use; using clustering; using 'quiet' vehicles; and using barriers and acoustic treatments. In all cases, traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dB.

Table 1: Noise limit criteria for extra vehicle movements on Hastings Road

¹ The rating background level is the overall single figure background level representing each assessment period (day/evening/night over the whole monitoring period. Refer to Table 3 for ambient noise levels.

² The Policy states that an area of an urban nature has commercial or industrial activities in the locale.

Road Traffic Noise Impacting Proposed Apartments

Noise from traffic on Tweed Coast Road impacting the proposed apartments is assessed against NSW RTA's "Environmental Criteria for Road Traffic Noise". The criteria applicable to the proposal is as follows:

As the Tweed Coast Road is deemed a Freeway / Arterial road, the following criteria (re: Table 1, part 2, page 6 of the EPA document), applies to the proposed residential component:

TYPE OF DEVELOPMENT	CRITERIA		
	DAY (7 am–10 pm) dB(A)	NIGHT (10 pm–7 am) dB(A)	WHERE CRITERIA ARE ALREADY EXCEEDED
1. New freeway or arterial road corridor	$L_{Aeq(15hr)}$ 55	$L_{Aeq(5hr)}$ 50	The new road should be designed so as not to increase existing noise levels by more than 0.5 dB. Where feasible and reasonable, noise levels from existing roads should be reduced to meet the noise criteria. In some instances this may be achievable only through long-term strategies such as improved planning, design and construction of adjoining land use developments; reduced vehicle emission levels through new vehicle standards and regulation of in-service vehicles; greater use of public transport; and alternative methods of freight haulage.
2. New residential land use developments affected by freeway/arterial traffic noise	$L_{Aeq(15hr)}$ 55	$L_{Aeq(5hr)}$ 50	Where feasible and reasonable, existing noise levels should be reduced to meet the noise criteria via judicious design and construction of the development. Locations, internal layouts, building materials and construction should be chosen so as to minimise noise impacts.

Table 2: Extract from the New South Wales EPA document "Environmental Criteria for Road traffic Noise" relating to residential development adjoining freeways or arterial routes.

Further to the above outdoor criteria, Councils typically accept that for developments that cannot achieve the outdoor criteria at all facades (e.g. at top floor levels, that have an unobstructed line of sight to the road), indoor criteria taken from AS/NZS 2107:2000 'Acoustics – Recommended Design Sound Level and Reverberation Times for Building Interiors' is applied. The noise levels applicable to residential uses in the Standard are as follows:

Type of Occupancy / Activity	Recommended Design Sound Level, L_{Aeq} , dB(A)	
	Satisfactory	Maximum
7. RESIDENTIAL BUILDINGS		
Houses and apartments near major roads –		
Living areas	35	45
Sleeping areas	30	40
Work areas	35	45
Apartment common areas (e.g. foyer, lift lobby)	45	55

Table 3: Extract from Australian Standard AS/NZS 2107:2000 ‘Acoustics – Recommended Design Sound Level and Reverberation Times for Building Interiors’

4. EXISTING ACOUSTIC ENVIRONMENT

The existing acoustic environment was assessed through logger measurement on the Tweed Coast Road side of the site, and a series of attended measurements on the Hastings Road side of the site. Equipment used and measurement methodology are as follows:

4.1 Equipment Used

Equipment used in the noise survey was as follows:

- Rion NC 73 Calibrator;
- Rion NL21 Environmental Noise Logger.

4.2 Noise Measurement Methodology

A noise logger was located to the south of the subject site. The logger was set to record noise levels in 15 minute blocks, and logged continuously between Wednesday 28th November to Tuesday 4th December 2007. This site was chosen to reflect ambient noise levels at the eastern side of the site, which is primarily affected by road traffic noise from Tweed Coast Road.

A series of one hour attended surveys were conducted on Wednesday 28th at 3.00pm, and again on Saturday 8th December on Hastings Road at 7.00am, midday, 6pm, and midnight, and is considered representative of the lowest ambient noise environment experienced by occupants of the dwellings across Hastings Road from the subject site.

The ambient noise level recording was conducted generally in accordance with Australian Standard AS1055 1997 ‘Acoustics – Description & Measurement of Environmental Noise’.

The operation of the sound level logging equipment was field calibrated before and after the measurement session and was found to be within 0.1dB of the reference signal. All instrumentation used in this assessment hold current calibration certificate from a certified NATA calibration laboratory.

Weather conditions at the start time of the survey were generally fine, with a temperature of approximately 25° C at the start time of the survey.

5. RESULTS

5.1 Ambient Noise Measurement & Overall Noise Limit Criteria

Results of attended average minima background noise measurements on Hastings Road are presented below.

Time Period	Rating Background Noise Level
Daytime (7am to 6pm)	42
Evening (6pm to 10pm)	38
Night (10 pm to 7am)	30

Table 4: Measured average minima background noise levels at Hastings Road measurement location

It should be noted that the above levels are not Rating Background Noise Levels, but are average minima levels. This method of assessing background was used, due to time constraints that prevented a full background noise survey to the western side of the site.

By considering the background levels presented in Table 4 above, and the amenity criterion detailed in Section 3, above the following criteria is applicable to the use, when assessed at the dwellings across Hastings Road, and at the proposed apartments facing west:

- Daytime (7am to 6pm) 47 dB(A) Leq (average minima background + 5 dB)
- Evening (6pm to 10pm) 43 dB(A) Leq (average minima background + 5 dB)
- Night (10pm to 7am) 35 dB(A) Leq (average minima background + 5 dB)

5.2 Typical Noise Source Levels From Proposed Onsite Activity

The source noise levels used in the assessment are as follows (note that noise sources have been corrected for the impulsive or tonal nature of the noise event as required by Australian Standard AS 1055):

Activity/Noise Source	Noise Level SPL dB(A) Leq @ 1m
Car door closure	73
Rigid truck reversing	88
Semi trailer airbrake	91
Truck unloading in dock using electric pallet jack	83
Patron dining	70

Table 5: Typical source noise levels associated with onsite activity

5.3 Predicted Noise Impact Levels – Onsite Activity

We predict the following noise impact levels at the dwellings to the west of the site, and at proposed apartments above:

Activity/Noise Source	Predicted Noise Impact Level SPL dB(A) Leq	
	West Across Road	Proposed Units Above
Patron activity Kiosk	< 20	50
Truck reversing to dock	62	48
Truck airbrake dock	63	51
Unloading truck at dock with pallet jack	50	40
Car door closure at grade carpark	51	39
Car door closure enclosed carpark	35	31

Table 6: Predicted noise impact levels associated with onsite activity

For example calculations, refer to the calculation sheets in the Appendix to this report.

As no mechanical plant is proposed at this stage, we have not assessed for impacts associated with mechanical plant operation. This assessment should be conducted at detailed design stage – we note that there is a plantroom in the design, which will need to be acoustically treated to contain noise from plant within.

5.4 Predicted Noise Impact Levels – Extra Vehicle Movements on Hastings Road

We are advised by Opus Qantec McWilliam Pty Ltd that Hastings Road currently carries approximately 1,100 vehicles per day, with the proposed development expected to generate an extra 4,250 movements per day. The rise in road noise impact levels (based upon peak hour levels of 10% of the daily traffic volume) is predicted to be 8 dB, which significantly exceeds the allowable 2 dB rise in noise level resulting from the extra traffic generated. This level must be balanced by the fact that Council are encouraging commercial traffic to use Hastings Road rather than Tweed Coast Road, and that the proposed development is the first large scale development to be proposed.

Refer to the attached calculation sheets for road noise prediction modeling.

5.5 Predicted Noise Impact Levels – Tweed Coast Road Traffic Impacting Proposed Apartments

We are advised by Opus Qantec McWilliam Pty Ltd that the Tweed Coast Road currently carries approximately between 6,000 to 9,000 vehicles per day, with the estimate being closer to 6,000 vehicles per day. Council have advised that the RTA apply a 3 % growth factor to predict ultimate traffic volumes in areas of high growth.

Assuming a current traffic volume of 7,000 vehicles per day, and by applying the 3% growth rate, a volume of 9,700 vehicles per day is predicted for a ten year horizon.

A CoRTN based road traffic noise model (“TNoise”) was used to calculate ultimate road noise impacts from Tweed Coast Road. The following impact levels are predicted at the facades facing Tweed Coast Road, and at the communal recreation space on Level 1:

	Predicted Road Traffic Noise Impact Level, SPL dB(A)		
	Leq 24hr	Leq 15hr	Leq 9hr
Eastern Facade	61	62	59
Communal Recreation Area western side	36	37	34

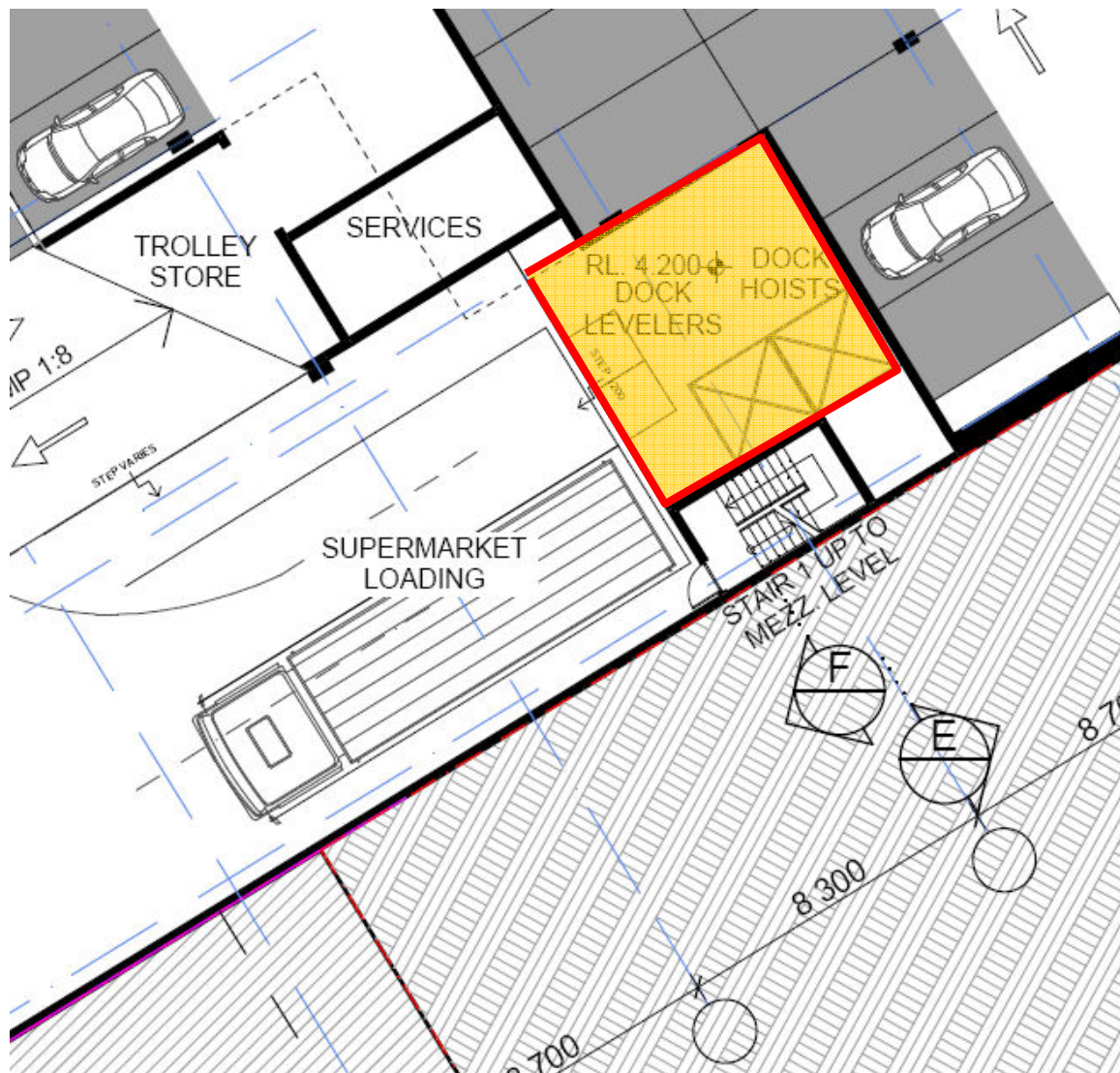
Table 7: Predicted road traffic noise impact levels from Tweed Coast Road

Note that the predicted road noise impact levels were based upon the measured relationship between the 24 hour Leq level, and the 15 and 9 hour levels.

6. RECOMMENDATIONS

We recommend the following to mitigate noise levels:

- The loading dock servicing the retail have acoustically absorptive linings installed in the dock area on the ceiling, and down the walls, extending down to 1.5m above ground level. Refer to Sketch No. 6.1 for detail ;
- Goods deliveries and waste collection be limited to daytime only (e.g. between 7am and 6pm);
- The western portion of the at grade car parking area be allocated to staff parking, to reduce the number of car door closures and vehicle movements in this location. Refer to Sketch No. 6.2 for detail;
- Mechanical plant associated with the retail components be designed and installed to comply with the noise limit criteria specified in Section 3 of this report. We note that the plant room is located immediately adjacent to a proposed unit, therefore, a very high level of attenuation is likely to be required. This may involve acoustically attenuated ventilation openings into the plantroom, and high performance roof/ceilings;
- Upon detailed design, proposed apartments be checked to ensure that indoor noise levels from road traffic noise from Tweed Coast Road comply with the indoor sound level criteria in Australian Standard AS/NZS 2107:2000 '*Acoustics – Recommended Design Sound Level and Reverberation Times for Building Interiors*', when calculated using the methodology in Australian Standard AS3671 1989 '*Road Traffic Noise Intrusion – Building Siting and Construction*'.



LEGEND

- Acoustically absorptive wall and ceiling linings be installed inside the loading dock area. Absorption should be a minimum 50mm thick, 22kg/m² fibreglass batts, fitted to the entire ceiling, and down all walls to within 0.5m above floor level. Ceiling absorption batts may have a perforated foil facing, whilst we recommend that the wall batts have a hard perforated facing (e.g. sheetmetal) having an open space area of no less than 12 % (this will protect the batts from mechanical damage).

Figure 6.1 – Recommended Acoustically Absorptive Lining Treatment



Figure 6.2 – Recommended Staff Car Spaces

7. CONCLUSIONS

Road traffic noise impact levels at the façade of the proposed apartments are predicted to be of a moderate order, due to the ultimate volume of approximately 9,000 vehicles per day. This impact can be controlled at the facades of the apartments, through glazing treatments and air conditioning. Noise impacts at the communal recreation area are predicted to be well below the criteria, due to the screening that the proposed building (and adjacent buildings) provides. As the apartments have not yet reached detailed design level, we have recommended that they be reviewed to achieve the noise levels specified in AS/NZS 2107:2000 '*Acoustics – Recommended Design Sound Level and Reverberation Times for Building Interiors*'. The likely outcome is a requirement for glazings at slightly higher than standard acoustical performance, and air conditioning.

We are advised by the Project Planner that Council have defined Hastings Street as being part of the commercial precinct, and that Council are encouraging commercial traffic to use Hastings Street to avoid congestion on Tweed Coast Road. At this point, little new commercial development has occurred since the introduction of this plan by Council, and therefore, road traffic volumes are relatively low (in the order of 1,100 vehicles per day). This project is the first major development in the locale, and therefore, it is not possible to achieve the Council criteria for road noise generated by extra traffic on Hastings Street, as the proposed development has only one access location, and is expected to generate approximately 4,250 vehicles per day.

As the design evolves, further acoustical analysis will be required to ensure that apartments achieve the indoor noise criteria for road traffic noise intrusion, and that mechanical plant achieves the noise limit criteria specified in section 3, above.

Report compiled by:



Jay Carter BSc
Director

Receiver to West Across Hastings Road			Proposed Apartments Above		
Patron activity in Kiosk Area	75	dB(A) @ 1m	Patron activity in Kiosk Area	70	dB(A) @ 1m
Distance to receiver	60	m	Distance to receiver	8.5	m
Distance attenuation	-35.6	dB(A)	Distance attenuation	-18.6	dB(A)
Obstructions	-30	dB(A)	Obstructions	-4	dB(A)
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at façade	11.9	dB(A)	Impact at façade	49.9	dB(A)
Truck reversing into dock	88	dB(A) @ 1m	Truck reversing into dock	88	dB(A) @ 1m
Distance to receiver	18	m	Distance to receiver	34	m
Distance attenuation	-25.1	dB(A)	Distance attenuation	-30.6	dB(A)
Directivity	-3	dB(A)	Directivity	-12	dB(A)
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at façade	62.4	dB(A)	Impact at façade	47.9	dB(A)
Semi trailer airbrake at dock	91	dB(A) @ 1m	Semi trailer airbrake at dock	91	dB(A) @ 1m
Distance to receiver	21	m	Distance to receiver	34	m
Distance attenuation	-26.4	dB(A)	Distance attenuation	-30.6	dB(A)
Directivity	-4	dB(A)	Directivity	-12	dB(A)
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at façade	63.1	dB(A)	Impact at façade	50.9	dB(A)
Unloading truck with pallet jack at dock	83	dB(A) @ 1m	Unloading truck with pallet jack at dock	83	dB(A) @ 1m
Distance to receiver	36	m	Distance to receiver	34	m
Distance attenuation	-31.1	dB(A)	Distance attenuation	-30.6	dB(A)
Obstructions	-4	dB(A)	Obstructions	-15	dB(A)
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at façade	50.4	dB(A)	Impact at façade	39.9	dB(A)
Car door closure at grade carpark	73	dB(A) @ 1m	Car door closure at grade carpark	73	dB(A) @ 1m
Distance to receiver	17	m	Distance to receiver	21	m
Distance attenuation	-24.6	dB(A)	Distance attenuation	-26.4	dB(A)
Obstructions	0	dB(A)	Obstructions	-10	dB(A)
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at façade	50.9	dB(A)	Impact at façade	39.1	dB(A)
Car door closure enclosed carpark	73	dB(A) @ 1m	Car door closure enclosed carpark	73	dB(A) @ 1m
Distance to receiver	18	m	Distance to receiver	10	m
Distance attenuation	-25.1	dB(A)	Distance attenuation	-20.0	dB(A)
Obstructions	-15	dB(A)	Obstructions	-25	dB(A)
Façade reflection	2.5	dB(A)	Façade reflection	2.5	dB(A)
Impact at façade	35.4	dB(A)	Impact at façade	30.5	dB(A)

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TNOISE -- TWEED

Page 1.

Eastern Apartments Overlooking Tweed Coast Road

Segment	Abbrev	Leq	Seg Group	Group Total
1 Tweed Coast Road	tcr	61.4		

Total is the Leq(24hour) = 61.4 dB(A)

INPUT DATA Seg 1
tcr

Total Flow (veh/18h) 5350
Heavy Vehicles (%) 3
SPEED:
Average (km/h) 50
Origin (Zone or Est) Z
Road RL (m) 7.5
Road Gradient (%) 1
ROAD SURFACE:
Surface Type (B,C,P) b
Texture Depth (mm) 1
Dist Road-Rec (m) 12
Absorbing Ground (%) 0
Av Prop Ht (m) 4.98
Angle View (deg) 170
SPECIAL ADJUSTMENT?
Value (=dBA)
Comment
BARRIERS ?
1-Dist Road-Barr (m)
Barrier RL (m)
Description
2-Dist Road-Barr (m)
Barrier RL (m)
Description
3-Dist Road-Barr (m)
Barrier RL (m)
Description
REFLECTORS ONLY ?
Refl Angle View (deg)
COMBINED REFL BARR?
Reflector RL (m)
Reflector Tilt (deg)
DistanceBetween (m)
Either on Embankment?

Ground RL at Receiver: 7.5
Height of Receiver above ground: 10.8
Road Surface Corrections supplied by: CRTN
Building Facade at Receiver: Yes
User's overall adjustment to CRTN: 0.0
Leq factor: 24hr: -3.5

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TNOISE -- TWEED

Page 2.

CORRECTIONS	Seg 1 tcr
Total Flow 18h (Ch3)	62.9
Low Flow 18h (Ch12)	0.0
Heavy Vehicles (Ch4)	-1.7
{SpChange.km/h} (Ch5)	-0.8
Road Gradient (Ch6)	0.3
Road Surface (CRTN)	-1.0
Dist Road-Rec (Ch7)	-1.4
{h.metres} (Ch7)	10.3
Av Prop Ht (Ch8)	0.0
Angle View (Ch10)	-0.2
Special (User)	0.0
BARRIERS	
Barrier Absent (Ch8)	
1 Pot Barr Corr (Ch9)	
{PathDiff.metres} (P21)	
Description	
2 Pot Barr Corr (Ch9)	
{PathDiff.metres} (P21)	
Description	
3 Pot Barr Corr (Ch9)	
{PathDiff.metres} (P21)	
Description	
Barr Multiple Effect:	
Barr Numbers	
Pot Barr Corr (P35)	
REFLECTORS	
Ref Angle of View (P26)	
COMBINED REFL/BARR	
Correction (P36)	
{V} (P36)	
{W} (P36)	
{Alpha} (P36)	
{Delta1} (P36)	
{Delta2} (Ch13)	
{Delta3} (Ch13)	
{Delta4} (Ch14)	
{Delta5} (Ch15)	

Building facade at receiver: +2.5
User's overall adjust to CRTN: 0
Leq factor: 24hr = -3.5

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TNOISE -- TWEEDREC

Page 1.

Communal Recreation Area Overlooking Hastings Road

Segment	Abbrev	Leq	Seg Group	Group Total
1 Tweed Coast Road	tcr	36.1		

Total is the Leq(24hour) = 36.1 dB(A)

INPUT DATA	Seg 1 tcr
Total Flow (veh/18h)	5350
Heavy Vehicles (%)	3
SPEED:	
Average (km/h)	50
Origin (Zone or Est)	Z
Road RL (m)	7.5
Road Gradient (%)	1
ROAD SURFACE:	
Surface Type (B,C,P)	b
Texture Depth (mm)	1
Dist Road-Rec (m)	50
Absorbing Ground (%)	0
Av Prop Ht (m)	2.25
Angle View (deg)	180
SPECIAL ADJUSTMENT?	
Value (=dB(A))	
Comment	
BARRIERS ?	
1-Dist Road-Barr (m)	12
Barrier RL (m)	19.5
Description	
2-Dist Road-Barr (m)	
Barrier RL (m)	
Description	
3-Dist Road-Barr (m)	
Barrier RL (m)	
Description	
REFLECTORS ONLY ?	
Ref Angle View (deg)	
COMBINED REFL/BARR?	
Reflector RL (m)	
Reflector Tilt (deg)	
DistanceBetween (m)	
Either on Embankment?	

Ground RL at Receiver:	13.5
Height of Receiver above ground:	1.8
Road Surface Corrections supplied by:	CRTN
Building Facade at Receiver:	Yes
User's overall adjustment to CRTN:	0.0
Leq factor: 24hr:	-3.5

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TNOISE -- TWEEDREC

Page 2

CORRECTIONS		Seg 1
		tr
Total Flow 18h	(Ch3)	62.9
Low Flow 18h	(Ch12)	0.0
Heavy Vehicles	(Ch4)	-1.7
{SpChange,km/h}	(Ch5)	-0.8
Road Gradient	(Ch6)	0.3
Road Surface	(CRTN)	-1.0
Dist Road-Rec	(Ch7)	-6.0
{h,metres}	(Ch7)	7.3
Av Prop Ht	(Ch8)	0.0
Angle View	(Ch10)	0.0
Special	(User)	0.0
BARRIERS		
Barrier Absent	(Ch8)	0.0
1 Pot Barr Corr	(Ch9)	-30.9
{PathDiff,metres}	(P21)	3.536
Description		
2 Pot Barr Corr	(Ch9)	
{PathDiff,metres}	(P21)	
Description		
3 Pot Barr Corr	(Ch9)	
{PathDiff,metres}	(P21)	
Description		
Barr Multiple Effect:		
Barr Numbers		
Pot Barr Corr	(P35)	
REFLECTORS		
Refl Angle of View (P26)		
COMBINED REFL/BARR		
Correction	(P36)	
{Y}	(P36)	
{W}	(P36)	
{Alpha}	(P36)	
{Delta1}	(P36)	
{Delta2}	(Ch13)	
{Delta3}	(Ch13)	
{Delta4}	(Ch14)	
{Delta5}	(Ch15)	

Building facade at receiver: +2.5
User's overall adjust to CRTN: 0
Leq factor: 24hr = -3.5

