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# 1-13A MARSHALL AVE, ST LEONARDS

## Acoustic Assessment for Development Application

3 July 2014

Loftex Properties

TG788-01F02 (r1) Acoustic Assessment for DA

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# 1 Introduction

Renzo Tonin & Associates was engaged to conduct a noise assessment for Stage 2 of the proposed multi-storey residential development at 1-13A Marshall Avenue, St Leonards from existing road traffic along the Pacific Highway and rail noise and vibration associated with the North Shore passenger rail line.

Noise surveys have been conducted by Renzo Tonin & Associates between 5th April and 12th April 2011 at the development site to determine the existing levels of traffic and rail affecting the site. These levels were used to predict noise levels within the residential dwellings, and then assessed against the recommended internal noise and vibration criteria for the project.

From our assessment of the proposed development, the following potential acoustic and vibration issues were identified:

- Traffic noise associated with nearby Pacific Highway,
- Local traffic noise associated with Marshall Ave and ,
- Rail Noise and Vibration associated with the CityRail North Shore Line.
- Existing mechanical plant located on neighbouring commercial buildings.

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001.

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001. Appendix A contains a glossary of acoustic terms used in this report.

# 2 Criteria

## 2.1 Airborne Traffic Noise

The airborne traffic noise criteria for this development are based on the following documents:

- State Environment Planning Policy (Infrastructure 2007), "ISEPP"
- Department of Planning publication "Development Near Rail Corridors & Busy Roads – Interim Guideline" 2008

The Annual Average Daily Traffic (AADT) volume for the Pacific Highway, according to RMS ISEPP Maps is greater than AADT 40,000 vehicles per day.

Therefore an acoustic assessment in accordance with the ISEPP is mandatory (>40,000 AADT), in accordance with the RMS Traffic Volume Maps for Infrastructure SEPP and the criteria set out in Clause 102 of the ISEPP has used when determining suitable internal traffic noise limits for the proposed development.

Table 1 below summaries the airborne traffic noise criteria recommended for the proposed developments.

Table 1 – Recommended Internal Noise Criteria for Road Traffic Noise

| Occupancy | Windows & Doors Condition | Design Noise Level | |
|---|---|---|---|
| | | Day, LAeq (15hour) | Night, LAeq (9hour) |
| Bedrooms | Closed | - | 35 |
| | Open | - | 45 |
| All Other Habitable Areas | Closed | 40 | 40 |
| | Open | 50 | 50 |

Notes:

Day and Night assessment periods are defined as follows.

1. Day is defined as 7:00am to 10:00pm
2. Night is defined as 10pm to 7am

## 2.2 Airborne Rail Noise

The existing rail line impacting on the proposed development is the CityRail North Shore Line. This is a dedicated line passenger train with no freight rail. The trains operating near the development site are generally slow-moving as they pull into and out of St Leonard train station.

The airborne rail noise criteria for this development are based on the following documents:

- State Environment Planning Policy (Infrastructure 2007) "ISEPP"
- Department of Planning publication "Development Near Rail Corridors & Busy Roads – Interim Guideline" 2008

The noise criteria outlined in the documents listed were considered and Table 2 below summaries the airborne traffic noise criteria determined suitable for this development.

Table 2 – Recommended Internal Noise Criteria for Rail Noise

| Occupancy | Windows & Doors Condition | Design Noise Level | |
|---|---|---|---|
| | | Day, LAeq (15hour) | Night, LAeq (9hour) |
| Bedrooms | Closed | - | 35 |
| | Open | - | 45 |
| All Other Habitable Areas | Closed | 40 | 40 |
| | Open | 50 | 50 |

Notes:

Day and Night assessment periods are defined as follows.

1. Day is defined as 7:00am to 10:00pm
2. Night is defined as 10pm to 7am

### 2.2.1 Rail Vibration

The Department of Planning publication “Development Near Rail Corridors & Busy Roads – Interim Guideline”, Section 3.6.3 outlines the following documents which recommend train vibration criteria for residential buildings.

- Assessing Vibration: A technical guideline (EPA 2006)
- German Standard DIN 4150, Part 3 1999
- British Standard BS 7385 Part 2 1993
- Australian Standard AS2670.2 1990

The above documents have been reviewed and the criterion for assessment of vibration from train pass-bys affecting the proposed development is quantified using the following Standard:

- Assessing Vibration: A technical guideline (EPA 2006)

Table 2.4 of the Department of Environment Climate Change and Water’s document “Assessing Vibration: A technical guideline (EPA 2006)” presents acceptable vibration dose values for intermittent vibration.

Table 3 – Acceptable VDVs for intermittent vibration m/s1.75

| Period | Preferred VDV m/s1.75 |
|---|---|
| Day time (7am – 10pm) | 0.2 |
| Night time (10pm – 7am) | 0.13 |

# 3 Existing Measured Noise Levels

## 3.1 Traffic Noise

### 3.1.1 Traffic Flow

Existing traffic volumes for the Pacific Highway St Leonards are based on traffic counts undertaken by permanent Roads and Maritime Services (RMS) monitors [ref: 00.906].

Table 4 – Existing Traffic Volumes

| Location | Source | Period | Direction | Volume |
|---|---|---|---|---|
| Pacific Highway – (Reserve Rd, St Leonards) | RMS Station 00.906 AADT data 2002 | AADT (24 hours) | Combined | 42,556 |

## 3.2 Existing Traffic Noise Levels

### 3.2.1 Long-term Noise Survey

An RTA Technology Environmental Noise Logger was set up for the ambient noise survey from Tuesday 5th April to Tuesday 12th April 2011. The logger was installed in the rear yard of 13A Marshall Ave, St Leonards backing on to Marshall Lane.

The noise logger record noise levels on a continuous basis and store data every fifteen minutes. The dates of measurement and the results obtained from the logger surveys are shown in Appendix C.

### 3.2.2 Short-term Traffic Noise Survey

The Pacific Highway is located one block to the north of the proposed development at 1-13A Marshall Ave, St Leonards. This road has an annual average daily traffic (AADT) volume of around 42,500, thus invoking the ISEPP.

Traffic noise levels were measured at the boundary of the site with Berry Road and also along the Pacific Highway on 12th April 2011. These noise levels were correlated with the results of long-term monitoring and used to predict traffic noise levels at the facade of the development, especially at higher levels were there is no shielding from the road.

The design external traffic noise levels are presented below.

Table 5 – Predicted External Traffic Noise Levels

| Facade | Time Period, T | Traffic Noise Level LAeq,T |
|---|---|---|
| Proposed Building Facade Overlooking | Day time (7am to 10pm) | 68 |

| Facade | Time Period, T | Traffic Noise Level LAeq,T |
|---|---|---|
| Pacific Highway (levels 3 +) | Night time (10pm to 7am) | 59 |
| Proposed Building facade Marshall Lane (Level 1-2) | Day time (7am to 10pm) | 56 |
| | Night time (10pm to 7am) | 47 |
| Proposed Canberra Ave Facade | Day time (7am to 10pm) | 62 |
| | Night time (10pm to 7am) | 55 |
| Proposed Marshall Ave Facade | Day time (7am to 10pm) | 59 |
| | Night time (10pm to 7am) | 52 |

### 3.2.3 Calculated Noise Levels

Results from the noise surveys were used to calculate internal noise levels within the proposed development. Noise calculations were performed using glazing design software developed in this office which takes into account external noise levels, facade transmission loss and room sound absorption characteristics.

## 3.3 Train Noise and Vibration Measurements

The North Shore railway line is located approximately 25m from the eastern boundary of the site. Train noise and vibration levels were recorded at location of the proposed eastern boundary of the site at 1 Marshall Avenue. Operator-attended noise and vibration measurements were conducted on site on 19th April 2011.

Weather conditions were fine and sunny during the operator-attended surveys with negligible wind speeds at the monitoring locations. All instruments were calibrated before and after measurement. No significant drift in calibration was observed.

These noise levels were used in conjunction with rail timetables published by Sydney trains to predict traffic noise levels at the facades of the development. The design external train noise levels are presented below

Table 6 – Predicted External Train Noise Levels - Building B

| Facade | Time Period, T | Design Train Noise Level LAeq,T |
|---|---|---|
| Canberra Ave | Day time (7am to 10pm) | 64 |
| | Night time (10pm to 7am) | 53 |
| Marshall Ave | Day time (7am to 10pm) | 62 |
| | Night time (10pm to 7am) | 54 |
| Marshall Lane | Day time (7am to 10pm) | 60 |
| | Night time (10pm to 7am) | 49 |

## 3.4 Rail Vibration Survey

Train vibration levels were measured using the Sinus SoundBook multi-channel analyser and Endevco accelerometers. An accelerometer was fixed to a steel spike hammered into the ground above the existing retaining wall corresponding to the worst effected boundary of the development (Location 1) as shown in Appendix C.

The table below shows the measured Vibration Dose Value (VDV) measured at the proposed development site due to existing operations.

Table 7 – Calculated Vibration Dose Value (VDV)

| Location | Assessment Period | Calculated VDV m/s1.75 |
|---|---|---|
| 1 Marshall Ave, St Leonards | Day time (7am - 10pm) | 0.034 |
| | Night time (10pm - 7am) | 0.023 |

The measured VDV at the boundary of the site is well below both the daytime and night time criteria as presented in Table 3.

Details of location and survey periods are included in Appendix C.

## 3.5 Calculated Noise Levels

Results from the noise surveys were used to calculate internal noise levels within the proposed development. Noise calculations were performed using glazing design software developed in this office which take into account external noise levels, facade transmission loss and room sound absorption characteristics.

# 4 Acoustic Treatment - Glazing

The following table presents the recommended glazing selections for facades of the proposed development at 1-13A Marshall Ave, St Leonards. The required acoustic rating of the glazing assembly presented in the table below represents the required acoustic rating of the glazed system as a whole. This includes glass, frames, junctions and seals.

Table 8 – Recommended Glazing Treatment

| Facade | Occupancy | Required Acoustic Rating of Glazing Assembly |
|---|---|---|
| Low Rise Building | | |
| North Facade (Levels 1-2) | Bedrooms | Rw 28 |
| | Living Areas | Rw 28 |
| North Facade (Levels 3 and above) | Bedrooms | Rw 34 |
| | Living Areas | Rw 34 |
| Southern Facade facing Marshall Ave | Bedrooms | Rw 28 |
| | Living Areas | Rw 28 |
| Western Facade | Bedrooms | Rw 28 |
| | Living Areas | Rw 28 |
| Eastern Facade | Bedrooms | Rw 28 |
| | Living Areas | Rw 28 |
| Building C | | |
| North Facade (Levels 1-2) | Bedrooms | Rw 28 |
| | Living Areas | Rw 28 |
| North Facade (Levels 3 and above) | Bedrooms | Rw 34 |
| | Living Areas | Rw 34 |
| Southern Facade facing Marshall Ave | Bedrooms | Rw 28 |
| | Living Areas | Rw 28 |
| Western facade (Levels 1-6) | Bedrooms | Rw 28 |
| | Living Areas | Rw 28 |
| Western facade (Levels 7+) | Bedrooms | Rw 32 |
| | Living Areas | Rw 32 |
| Eastern Facade | Bedrooms | Rw 32 |

| Facade | Occupancy | Required Acoustic Rating of Glazing Assembly |
|---|---|---|
| | Living Areas | Rw 32 |

By way of explanation, the Sound Insulation Rating Rw is a measure of the noise reduction property of the partition, a higher rating implying a higher sound reduction performance.

Note that the Rw rating of systems measured as built on site (R'w Field Test) may be up to 5 points lower than the laboratory result.

NOTES FOR GLAZING CONSTRUCTIONS:

The information in this table is provided for the purpose of Council approvals process and cost planning and shall not be used for construction unless otherwise approved in writing by the acoustic consultant.

The design in this table is preliminary and a comprehensive assessment shall be conducted prior to Construction Certification.

The glazing supplier shall ensure that installation techniques will not diminish the Rw performance of the glazing when installed on site.

All openable glass windows and doors shall incorporate full perimeter acoustic seals equivalent to Q-Lon, which enable the Rw rating performance of the glazing to not be reduced.

The above glazing thicknesses should be considered the minimum thicknesses to achieve acoustical ratings. Greater glazing thicknesses may be required for structural loading, wind loading etc.

GENERAL

The information provided in this table is subject to modification and review without notice.

The advice provided here is in respect of acoustics only. Supplementary professional advice may need to be sought in respect of fire ratings, structural design, buildability, fitness for purpose and the like.

## 4.1 Typical Glazing Constructions to Achieve Acoustic Ratings

The following table presents typical glazing constructions to achieve the minimum acoustic ratings presented in Table 8, above.

Table 9 – Typical Glazing Constructions to Achieve Acoustic Ratings

| Rw Rating | Typical Glazing System |
|---|---|
| Rw 28 | Minimum 6mm monolithic glass in an aluminium double sliding window frame. Standard weather seals installed |
| Rw 32 | Minimum 6.38mm laminated glass in an aluminium double sliding window frame. Q-lon seals perimeter seals are installed |
| Rw 34 | Minimum 10.38mm laminated glass in a aluminium sliding window with acoustic fin seals |

The table presented above is intended as a guide only and should not be used for construction.

It is the responsibility of the sub-contractor to provide laboratory test reports for the glazed systems proposed for installation at the development site to show compliance with the acoustic ratings presented in Table 8.

The client is advised not to commence detailing or otherwise commit to partition construction systems which have not been tested in an approved laboratory or for which an opinion only is available. Testing of partition construction systems is a component of the quality control of the design process and should be viewed as a priority because there is no guarantee the forecast results will be achieved thereby necessitating the use of an alternative which may affect the cost and timing of the project. No responsibility is taken for use of or reliance upon untested partition construction systems, estimates or opinions.

## 4.2 Alternate Ventilation

In accordance with the Department of Planning publication “Development Near Rail Corridors & Busy Roads – Interim Guideline” 2008:

*If internal noise levels with windows or doors open exceed the criteria by more than 10dBA, the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia*

The indoor sound levels (windows open) criteria outlined in Table 1, cannot be achieved with windows and doors opened on facades facing north above Level 3 for both buildings, and the eastern facade of Building C. We understand that air conditioning is to be provided within all habitable rooms within the development, including those facades listed above.

Windows and doors of all other apartments within the development can be kept open as noise levels comply with the windows open criteria outlined in Table 1.

# 5 External noise emission from building services

The NSW Environment Protection Authority (EPA sets out noise criteria in its Industrial Noise Policy (INP) to control the noise emission from industrial sources. The applicable noise limits, according to the policy, are determined as follows:

Table 10– LAeq Design Criterion for Noise Production (EPA INP)

| Time of Day | Column 1 | Column 2 | Column 3 | Column 4 |
|---|---|---|---|---|
| | Rating Background Level (RBL) L90 | Instrusiveness Criterion (RBL+5) | Amenity Criterion (Acceptable) | Project Specific Design Criterion LAeq |
| Day (7am to 6pm) | 46 | 51 | 60 | 51 |
| Evening (6pm to 10pm) | 44 | 49 | 50 | 49 |
| Night (10pm to 7am) | 40 | 45 | 45 | 45 |

Explanatory notes:

Column 3 – Recommended LAeq noise level based on 'Urban' area in Section 2.2, Table 2.1 Amenity Criteria (Recommended LAeq noise levels from industrial noise sources) of the EPA's INP.

Column 4 – Project Specific Design Criterion based on EPA's INP. Lower of Columns 2 and 3.

Where necessary, noise amelioration treatment will be incorporated in the design to ensure that noise levels comply with the recommended EPA's INP noise emission criteria noted above.

Mechanical plant has the potential to impact on surrounding existing commercial/retail premises, proposed residential premises, including other buildings within the proposed development.

Although at this stage details of mechanical plant have not been finalised, the following in-principal advice are provided.

Acoustic assessment of mechanical services equipment will need to be undertaken during the detail design phase of the development to ensure that they shall not either singularly or in total emit noise levels which exceed the noise limits in EPA's Industrial Noise Policy;

As noise control treatment can affect the performance of the mechanical services system, it is recommend that consultation with an acoustic consultant be made during the initial phase of mechanical services system design in order to reduce the need for revision of mechanical plant and noise control treatment;

- procurement of 'quiet' plant,
- strategic positioning of plant away from sensitive neighbouring premises, maximising the intervening shielding between the plant and sensitive neighbouring premises,

- commercially available silencers or acoustic attenuators for air discharge and air intakes of plant;
- acoustically lined and lagged ductwork;
- acoustic screens and barriers between plant and sensitive neighbouring premises; and/or
- partially-enclosed or fully-enclosed acoustic enclosures over plant.

Mechanical plant noise emission can be controllable by appropriate mechanical system design and implementation of common engineering methods that may include any of the following:

Mechanical plant shall have their noise specifications and their proposed locations checked prior to their installation on site; and

Fans shall be mounted on vibration isolators and balanced in accordance with Australian Standard 2625 “Rotating and Reciprocating Machinery – Mechanical Vibration”.

# 6 Internal Sound Insulation

As a minimum requirement, walls and floors of the residential development shall comply with Building Code of Australia (BCA). Soil and waste pipes shall comply with the minimum requirements of the Building Code of Australia (BCA). Appendix B presents a summary of acoustic provisions outlined in Part F5 of the BCA.

## 6.1 Acoustic Criteria

### 6.1.1 BCA 2014 Requirements

The acoustic provisions for inter-tenancy walls in Class 2 buildings are outlined in the Building Code of Australia and the following is an extract from the BCA:

*F5.2 Determination of airborne sound insulation ratings*

*A form of construction required to have an airborne sound insulation rating must –*

*a. have the required value for weighted sound reduction index (Rw) or weighted sound reduction index with spectrum adaptation term (Rw + Ctr) determined in accordance with AS/NZS 1276.1 or ISO 717.1 using results from laboratory measurements; or*

*b. comply with Specification F5.2.*

*F5.3 Determination of impact sound insulation ratings*

*a. A floor in a building required to have an impact sound insulation rating must –*

*i. have the required value for weighted normalised impact sound pressure level with spectrum adaptation term (Ln,w+CI) determined in accordance with AS/ISO 717.2 using results from laboratory measurements; or*

*ii. comply with Specification F5.2.*

*b. A wall in a building required to have an impact sound insulation rating must –*

*i. for a Class 2 or 3 building be of discontinuous construction;*

*c. For the purposes of this part, discontinuous construction means a wall having a minimum 20 mm cavity between 2 separate leaves, and*

*i. for masonry, where wall ties are required to connect leaves, the ties are of the resilient type; and*

*ii. for other than masonry, there is no mechanical linkage between leaves except at the periphery.*

*F5.4 Sound insulation rating of floors*

*d. A floor in a Class 2 or 3 building must have an Rw + Ctr (airborne) not less than 50 and an Ln,w+CI (impact) not more than 62 if it separates –*

*i. sole-occupancy units; or*

*ii. a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification.*

*F5.5 Sound insulation rating of walls*

*a. A wall in a Class 2 or 3 building must –*

*iii. have an Rw + Ctr (airborne) not less than 50, if it separates sole-occupancy units; and*

*iv. have an Rw (airborne) not less than 50, if it separates a sole-occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like, or parts of a different classification; and*

*v. comply with F5.3(b) if it separates:*

*1. a bathroom, sanitary compartment, laundry or kitchen in one sole-occupancy unit from a habitable room (other than a kitchen) in an adjoining unit; or*

*2. a sole-occupancy unit from a plant room or lift shaft.*

*b. A door may be incorporated in a wall in a Class 2 or 3 building that separates a sole-occupancy unit from a stairway, public corridor, public lobby or the like, provided the door assembly has an Rw not less than 30.*

*c. Where a wall required to have sound insulation has a floor above, the wall must continue to –*

*vi. the underside of the floor above; or*

*vii. a ceiling that provides the sound insulation required for the wall.*

*F5.6 Sound insulation rating of services*

*d. If a duct, soil, waste or water supply pipe, including a duct or pipe that is located in a wall or floor cavity, serves or passes through more than one sole-occupancy unit, the duct or pipe must be separated from the rooms of any sole-occupancy unit by construction with an Rw+Ctr (airborne) not less than –*

*viii. 40 if the adjacent room is a habitable room (other than a kitchen); or*

*ix. 25 if the adjacent room is a kitchen or non-habitable room.*

*e. If a storm water pipe passes through a sole-occupancy unit it must be separated in accordance with (a).*

# 7 Conclusion

Renzo Tonin & Associates have completed an assessment of the potential traffic noise and rail noise impacts on the proposed residential and commercial development site at 1-13A Marshall Ave, St Leonards.

The study of external noise and vibration intrusion into the subject development has found that appropriate controls can be incorporated into the building design to achieve a satisfactory accommodation environment consistent with the intended quality of the building and relevant standards.

In order to control airborne traffic and train noise intrusion and comply with the nominated criteria, glazing recommendations have been made in Section 4 above.

# APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

| | |
|---|---|
| Adverse weather | Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter). |
| Ambient noise | The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far. |
| Assessment period | The period in a day over which assessments are made. |
| Assessment point | A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated. |
| Background noise | Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below). |
| Decibel [dB] | The units that sound is measured in. The following are examples of the decibel readings of every day sounds:<br>0dB The faintest sound we can hear<br>30dB A quiet library or in a quiet location in the country<br>45dB Typical office space. Ambience in the city at night<br>60dB CBD mall at lunch time<br>70dB The sound of a car passing on the street<br>80dB Loud music played at home<br>90dB The sound of a truck passing on the street<br>100dBThe sound of a rock band<br>115dBLimit of sound permitted in industry<br>120dBDeafening |
| dB(A) | A-weighted decibels. The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the “A” filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. |
| Frequency | Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz. |
| Impulsive noise | Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise. |
| Intermittent noise | The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more. |
| $L_{Max}$ | The maximum sound pressure level measured over a given period. |
| $L_{Min}$ | The minimum sound pressure level measured over a given period. |
| $L_1$ | The sound pressure level that is exceeded for 1% of the time for which the given sound is measured. |
| $L_{10}$ | The sound pressure level that is exceeded for 10% of the time for which the given sound is measured. |

| | |
|---|---|
| $L_{90}$ | The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A). |
| $L_{eq}$ | The "equivalent noise level" is the summation of noise events and integrated over a selected period of time. |
| Reflection | Sound wave changed in direction of propagation due to a solid object obscuring its path. |
| SEL | Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations. |
| Sound | A fluctuation of air pressure which is propagated as a wave through air. |
| Sound absorption | The ability of a material to absorb sound energy through its conversion into thermal energy. |
| Sound level meter | An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels. |
| Sound pressure level | The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone. |
| Sound power level | Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power. |
| Tonal noise | Containing a prominent frequency and characterised by a definite pitch. |

# APPENDIX B Assessment and Design Methodology

## B.1 SEPP (Infrastructure) 2007

*87 Impact of rail noise or vibration on non-rail development*

*2. This clause applies to development for any of the following purposes that is on land in or adjacent to a rail corridor and that the consent authority considers is likely to be adversely affected by rail noise or vibration:*

*f. a building for residential use,*

*g. a place of public worship,*

*h. a hospital,*

*i. an educational establishment or child care centre.*

*3. Before determining a development application for development to which this clause applies, the consent authority must take into consideration any guidelines that are issued by the Director-General for the purposes of this clause and published in the Gazette.*

*4. If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:*

*j. in any bedroom in the building - 35 dB(A) at any time between 10 pm and 7am,*

*k. anywhere else in the building (other than a garage, kitchen, bathroom or hallway) - 40 dB(A) at any time.*

*102 Impact of road noise or vibration on non-road development*

*5. This clause applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transitway or any other road with an annual average daily traffic volume of more than 40,000 vehicles (based on the traffic volume data published on the website of the RTA) and that the consent authority considers is likely to be adversely affected by road noise or vibration:*

*l. a building for residential use,*

*m. a place of public worship,*

*n. a hospital,*

*o. an educational establishment or child care centre.*

*6. Before determining a development application for development to which this clause applies, the consent authority must take into consideration any guidelines that are issued by the Director-General for the purposes of this clause and published in the Gazette.*

*7. If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:*

*p. in any bedroom in the building - 35 dB(A) at any time between 10 pm and 7am,*

*q. anywhere else in the building (other than a garage, kitchen, bathroom or hallway) - 40 dB(A) at any time.*

*8. In this clause, "freeway", "tollway" and "transitway" have the same meanings as they have in the Roads Act 1993*

### 7.1.1 Department of Planning publication 'Development near rail corridors and busy roads – Interim guideline'

The Guideline provides direction for developments that may be impacted by rail corridors and/or busy roads and consideration for the Guideline is a requirement for development specified under the Infrastructure SEPP.

The Guideline recommends an acoustic traffic assessment be undertaken for roads having an AADT of greater than 20,000 and less than 40,000 vehicles per day and states an assessment is mandatory for roads having an AADT of greater than 40,000 vehicles per day. It also identifies assessment zones in which a rail noise and vibration assessment is required.

Table 3.1 of the Guideline summaries noise criteria for noise sensitive developments

| Residential Buildings | | |
|---|---|---|
| Type of occupancy | Noise Level dBA | Applicable time period |
| Sleeping areas (bedroom) | 35 | Night 10 pm to 7 am |
| Other habitable rooms (excl. garages, kitchens, bathrooms & hallways | 40 | At any time |
| Non–Residential Buildings | | |
| Type of occupancy | | Recommended Max Level dBA |
| Educational Institutions including child care centres | | 40 |
| Places of Worship | | 40 |
| Hospitals | - wards | 35 |
| | -other noise sensitive areas | 35 |

Note: airborne noise is calculated as Leq (9h) (night) and Leq (15h)(day). Ground-borne noise is calculated as Lmax (slow) for 95% of rail pass-by events.

# APPENDIX C Noise Survey Results

## C.1 Location and Results of the Short-term Noise Surveys

Results of short-term traffic noise measurements along Pacific Highway and Berry Rd, St Leonards are presented below

Table 11 – Short-term Traffic Noise Measurements

| Location | Date | Time period | Measured LAeq (15min) |
|---|---|---|---|
| Pacific Highway (2m from curb – facade reflected) | 12th April 2011 | 11:30am- 11:45am | 76 dB(A) |
| Cnr of Berry Road and Marshall Ave | 12th April 2011 | 11:50am – 12:05pm | 66 dB(A) |

Table 12 – Short-term Rail Noise Measurements - Train Passbys

| Location | Date | Time | Train | Measured SEL |
|---|---|---|---|---|
| 1 Marshall Ave, St Leonards | 12th April 2011 | 3.25pm | Passenger | 66 dB(A) |
| | | 3.27pm | Passenger | 76 dB(A) |
| | | 3.27pm | Passenger | 65 dB(A) |
| | | 3.31pm | Passenger | 74 dB(A) |
| | | 3.32pm | Passenger | 65 dB(A) |
| | | 3.33pm | Passenger | 71 dB(A) |
| | | 3.36pm | Passenger | 76 dB(A) |
| | | 3.39pm | Passenger | 69 dB(A) |
| | | 3.40pm | Passenger | 65 dB(A) |
| | | 3.43pm | Passenger | 68 dB(A) |
| | | 3.44pm | Passenger | 67 dB(A) |
| | | 3.48pm | Passenger | 73 dB(A) |
| | | 3.50pm | Passenger | 65 dB(A) |
| | | 3.52pm | Passenger | 66 dB(A) |
| | | 3.55pm | Passenger | 72 dB(A) |
| | | 3.56pm | Passenger | 67 dB(A) |
| | | 3.58pm | Passenger | 76 dB(A) |
| | | 4.01pm | Passenger | 76 dB(A) |

## C.2 Location and Results of the Long-term Noise Surveys

Unattended noise monitoring location 1: Rear yard of 13A Marshall Ave, St Leonards

Survey Period: Tuesday 5th April to Tuesday 12th April 2011

# APPENDIX D Figures


Figure 1 - Site Location and Measurement Locations

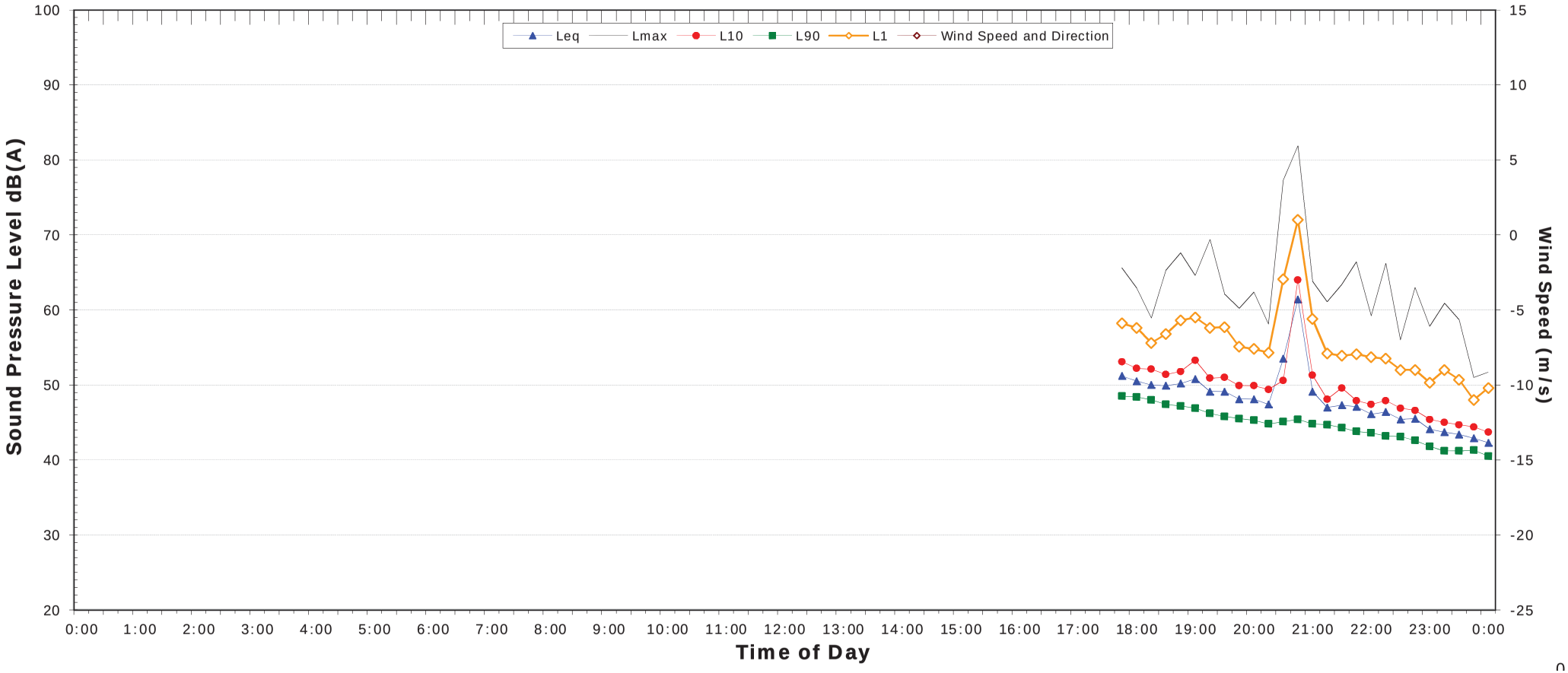
Long Term monitoring location

Short Term monitoring locations

# EXISTING AMBIENT NOISE LEVELS

## 13A marshall Ave, St Leonards

## Tuesday, 5 April 2011




| NSW Industrial Noise Policy (Free Field) | | | |
|---|---|---|---|
| Descriptor | Day | Evening | Night[2] |
| | 7am-6pm | 6pm-10pm | 10pm-7am |
| $L_{90}$ | - | 43.8 | 39.3 |
| Leq (see note 3) | - | 52.2 | 44.4 |

**NOTES:**

*1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.*

*2. "Night" relates to period from 10pm on this graph to 7am on the following graph.*

*3. Graphed data measured in free-field; tabulated results facade corrected*

*4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)*

| NSW ECRTN Policy (1m from facade) | | (see note3) |
|---|---|---|
| Descriptor | Day | Night[2] |
| | 7am-10pm | 10pm-7am |
| $L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$ | 54.6 | 46.9 |
| $L_{eq\ 1hr}$ upper 10 percentile | 58.9 | 51.0 |
| $L_{eq\ 1hr}$ lower 10 percentile | 49.4 | 43.4 |

| Night Time Maximum Noise Levels | | | (see note 4) |
|---|---|---|---|
| Lmax (Range) | 65.0 | to | 70.7 |
| Lmax - Leq (Range) | 16.5 | to | 24.7 |

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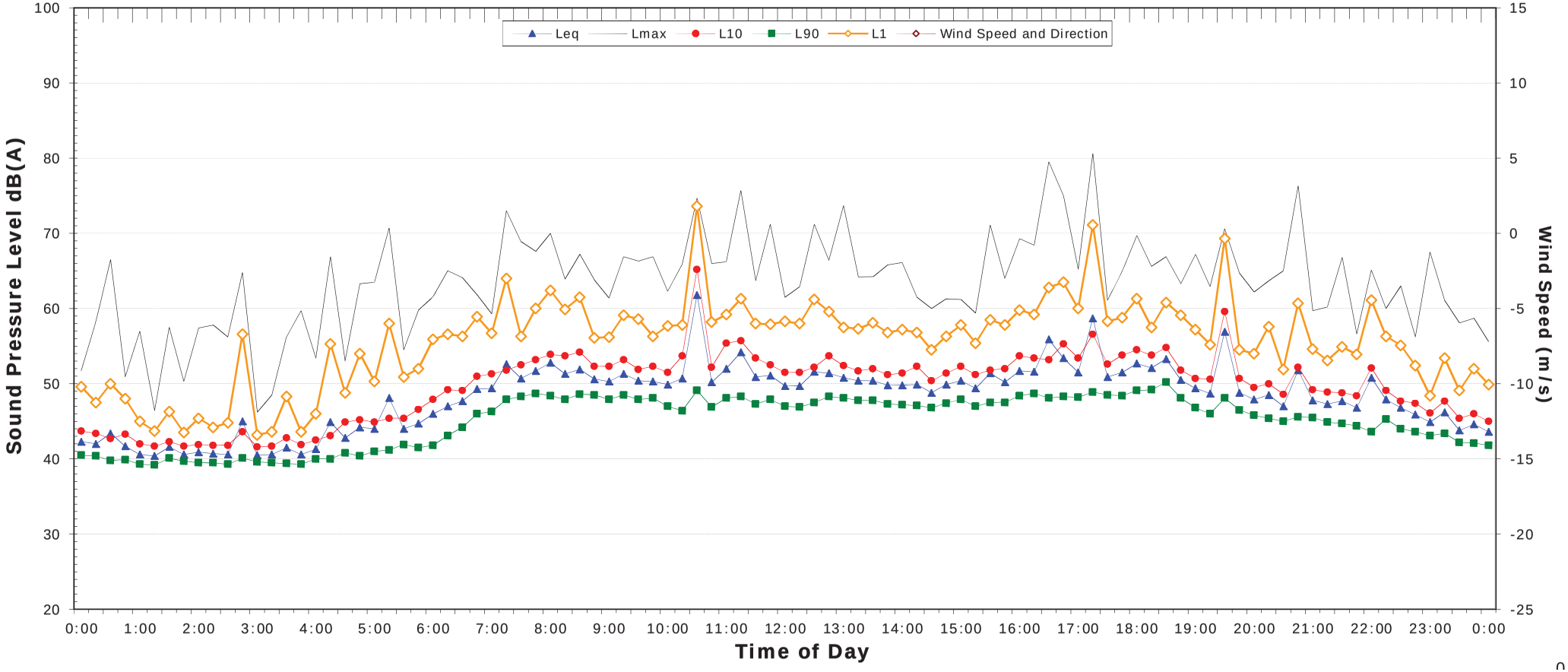
TF293-01S01 (rev 0).xls

# EXISTING AMBIENT NOISE LEVELS

## 13A marshall Ave, St Leonards

## Wednesday, 6 April 2011




| NSW Industrial Noise Policy (Free Field) | | | |
|---|---|---|---|
| Descriptor | Day | Evening | Night[2] |
| | 7am-6pm | 6pm-10pm | 10pm-7am |
| $L_{90}$ | 47.0 | 44.4 | 39.7 |
| Leq (see note 3) | 52.6 | 50.7 | 45.4 |

**NOTES:**

*1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.*

*2. "Night" relates to period from 10pm on this graph to 7am on the following graph.*

*3. Graphed data measured in free-field; tabulated results facade corrected*

*4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)*

| NSW ECRTN Policy (1m from facade) | | (see note3) |
|---|---|---|
| Descriptor | Day | Night[2] |
| | 7am-10pm | 10pm-7am |
| $L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$ | 54.6 | 47.9 |
| $L_{eq\ 1hr}$ upper 10 percentile | 58.4 | 52.9 |
| $L_{eq\ 1hr}$ lower 10 percentile | 51.3 | 43.4 |

| Night Time Maximum Noise Levels | | | (see note 4) |
|---|---|---|---|
| Lmax (Range) | 66.1 | to | 78.6 |
| Lmax - Leq (Range) | 16.2 | to | 28.2 |

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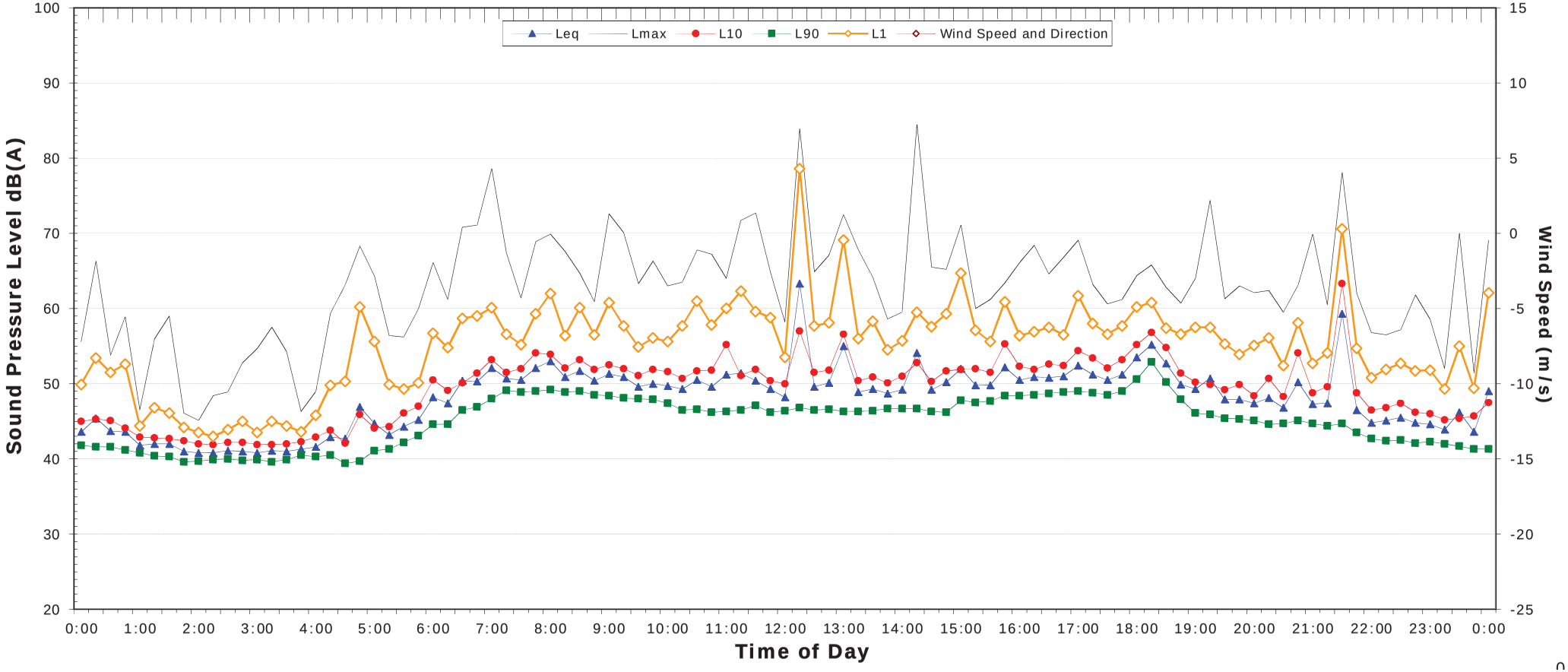
# EXISTING AMBIENT NOISE LEVELS

## 13A marshall Ave, St Leonards

## Thursday, 7 April 2011




| NSW Industrial Noise Policy (Free Field) | | | |
|---|---|---|---|
| Descriptor | Day | Evening | Night[2] |
| | 7am-6pm | 6pm-10pm | 10pm-7am |
| $L_{90}$ | 46.3 | 43.5 | 40.1 |
| Leq (see note 3) | 52.3 | 51.5 | 45.7 |

**NOTES:**

*1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.*

*2. "Night" relates to period from 10pm on this graph to 7am on the following graph.*

*3. Graphed data measured in free-field; tabulated results facade corrected*

*4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)*

| NSW ECRTN Policy (1m from facade) | | (see note3) |
|---|---|---|
| Descriptor | Day | Night[2] |
| | 7am-10pm | 10pm-7am |
| $L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$ | 54.6 | 48.2 |
| $L_{eq\ 1hr}$ upper 10 percentile | 59.1 | 53.1 |
| $L_{eq\ 1hr}$ lower 10 percentile | 51.0 | 44.1 |

| Night Time Maximum Noise Levels | | | (see note 4) |
|---|---|---|---|
| Lmax (Range) | 70.0 | to | 73.7 |
| Lmax - Leq (Range) | 16.2 | to | 26.7 |

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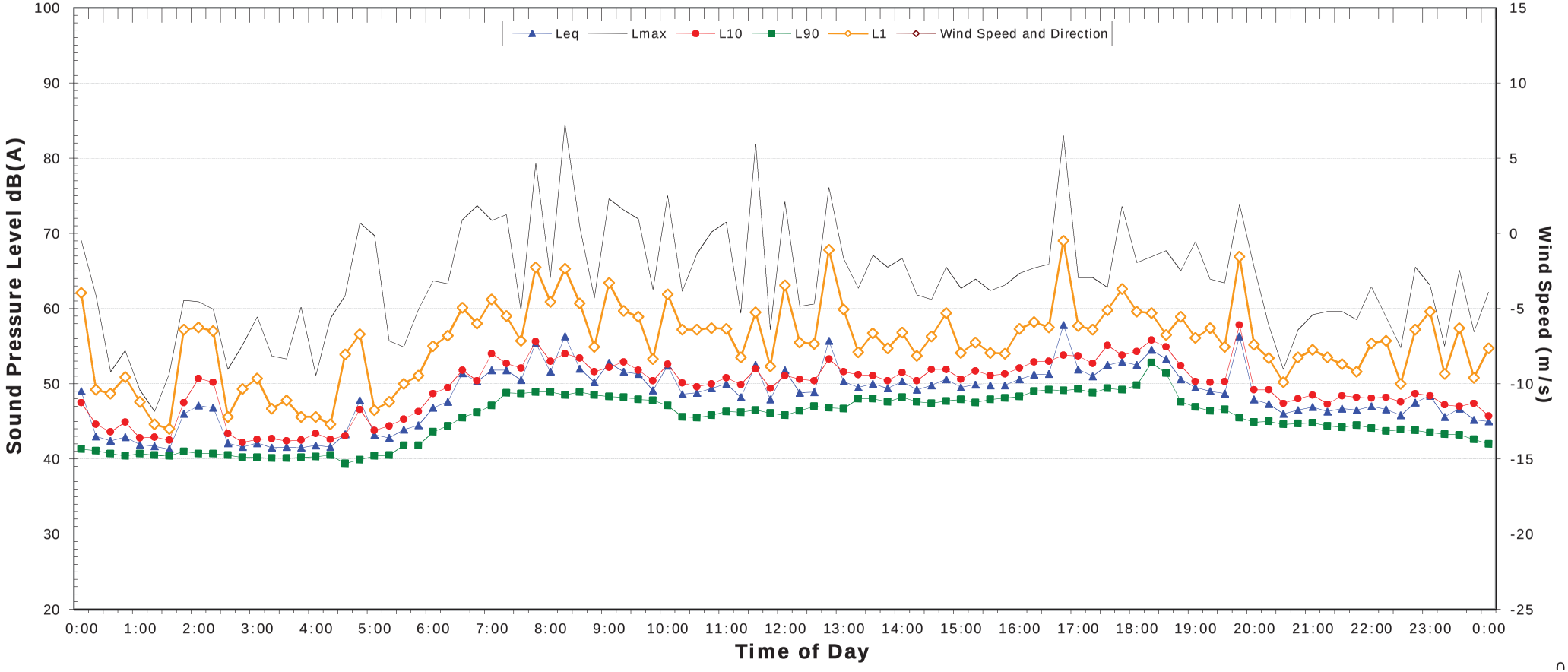
Template QTT-01 (rev 65) Logger Graphs

# EXISTING AMBIENT NOISE LEVELS

## 13A marshall Ave, St Leonards

## Friday, 8 April 2011




| NSW Industrial Noise Policy (Free Field) | | | |
|---|---|---|---|
| Descriptor | Day | Evening | Night[2] |
| | 7am-6pm | 6pm-10pm | 10pm-7am |
| $L_{90}$ | 46.1 | 44.2 | 39.6 |
| Leq (see note 3) | 51.7 | 50.3 | 44.7 |

**NOTES:**

*1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.*

*2. "Night" relates to period from 10pm on this graph to 7am on the following graph.*

*3. Graphed data measured in free-field; tabulated results facade corrected*

*4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)*

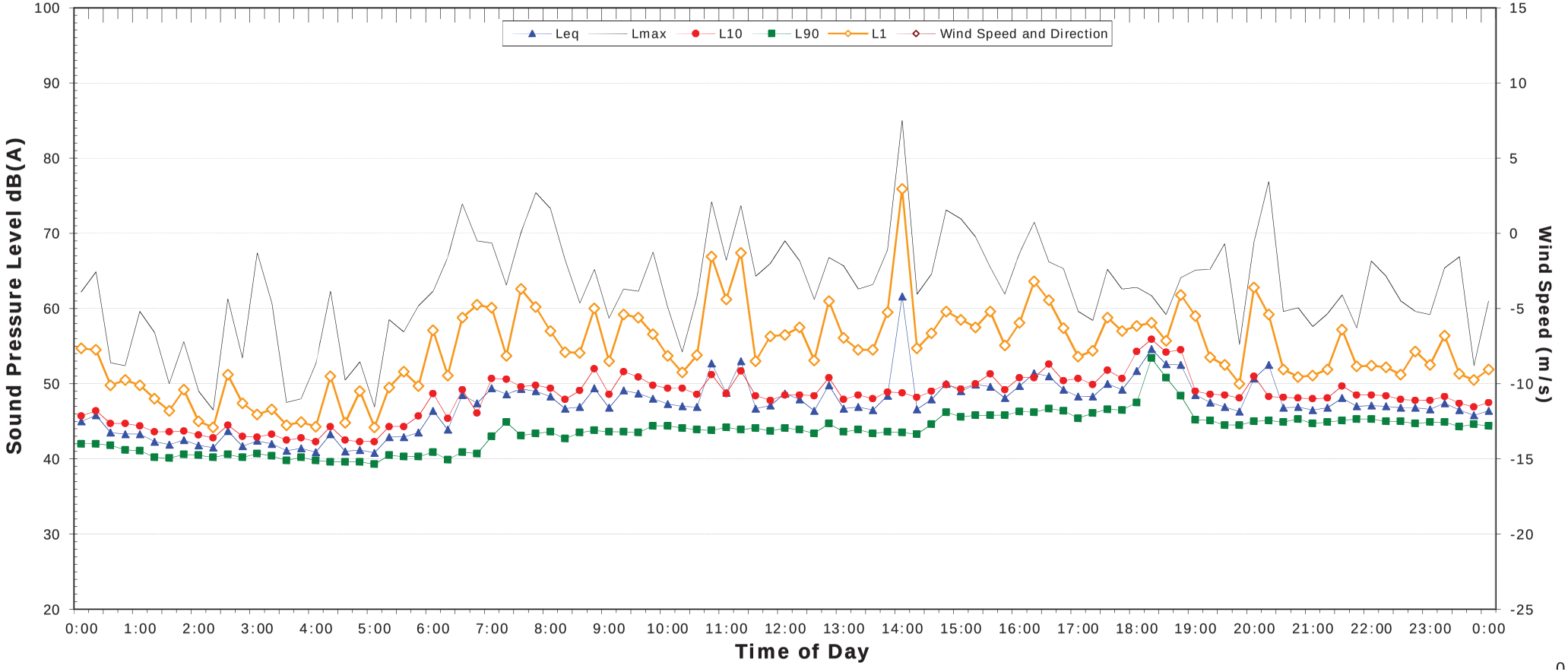
| NSW ECRTN Policy (1m from facade) | | (see note3) |
|---|---|---|
| Descriptor | Day | Night[2] |
| | 7am-10pm | 10pm-7am |
| $L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$ | 53.8 | 47.2 |
| $L_{eq\ 1hr}$ upper 10 percentile | 56.3 | 50.2 |
| $L_{eq\ 1hr}$ lower 10 percentile | 49.2 | 43.9 |

| Night Time Maximum Noise Levels | | | (see note 4) |
|---|---|---|---|
| Lmax (Range) | 65.1 | to | 73.9 |
| Lmax - Leq (Range) | 18.1 | to | 26.2 |

# EXISTING AMBIENT NOISE LEVELS

## 13A marshall Ave, St Leonards

## Saturday, 9 April 2011




| NSW Industrial Noise Policy (Free Field) | | | |
|---|---|---|---|
| Descriptor | Day | Evening | Night[2] |
| | 7am-6pm | 6pm-10pm | 10pm-7am |
| $L_{90}$ | 43.4 | 44.5 | 41.1 |
| Leq (see note 3) | 50.4 | 49.8 | 45.3 |

**NOTES:**

*1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.*

*2. "Night" relates to period from 10pm on this graph to 7am on the following graph.*

*3. Graphed data measured in free-field; tabulated results facade corrected*

*4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)*

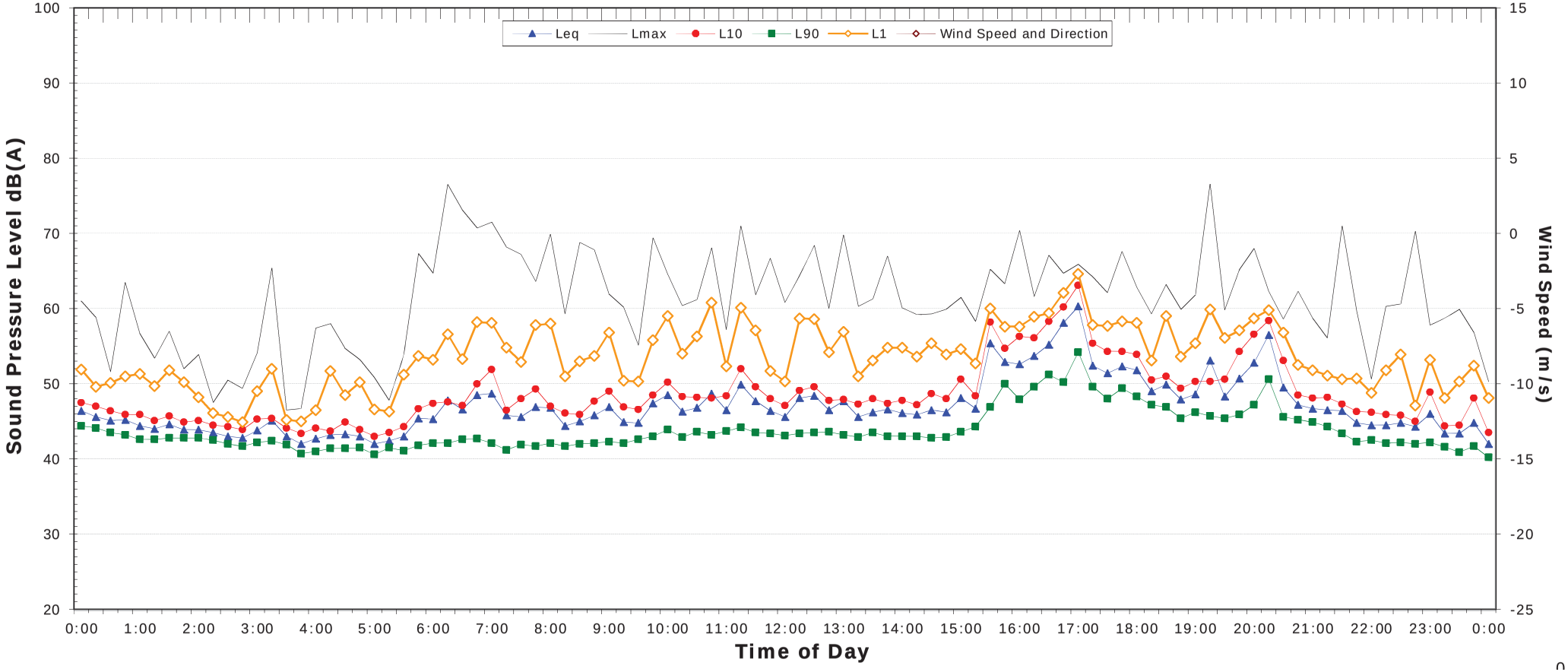
| NSW ECRTN Policy (1m from facade) | | (see note3) |
|---|---|---|
| Descriptor | Day | Night[2] |
| | 7am-10pm | 10pm-7am |
| $L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$ | 52.8 | 47.8 |
| $L_{eq\ 1hr}$ upper 10 percentile | 57.1 | 50.5 |
| $L_{eq\ 1hr}$ lower 10 percentile | 49.9 | 45.4 |

| Night Time Maximum Noise Levels | | | (see note 4) |
|---|---|---|---|
| Lmax (Range) | 65.4 | to | 76.5 |
| Lmax - Leq (Range) | 15.1 | to | 28.5 |

# EXISTING AMBIENT NOISE LEVELS

## 13A marshall Ave, St Leonards

## Sunday, 10 April 2011




| NSW Industrial Noise Policy (Free Field) | | | |
|---|---|---|---|
| Descriptor | Day | Evening | Night[2] |
| | 7am-6pm | 6pm-10pm | 10pm-7am |
| $L_{90}$ | 42.0 | 42.5 | 37.2 |
| Leq (see note 3) | 50.7 | 50.2 | 44.1 |

**NOTES:**

*1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.*

*2. "Night" relates to period from 10pm on this graph to 7am on the following graph.*

*3. Graphed data measured in free-field; tabulated results facade corrected*

*4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)*

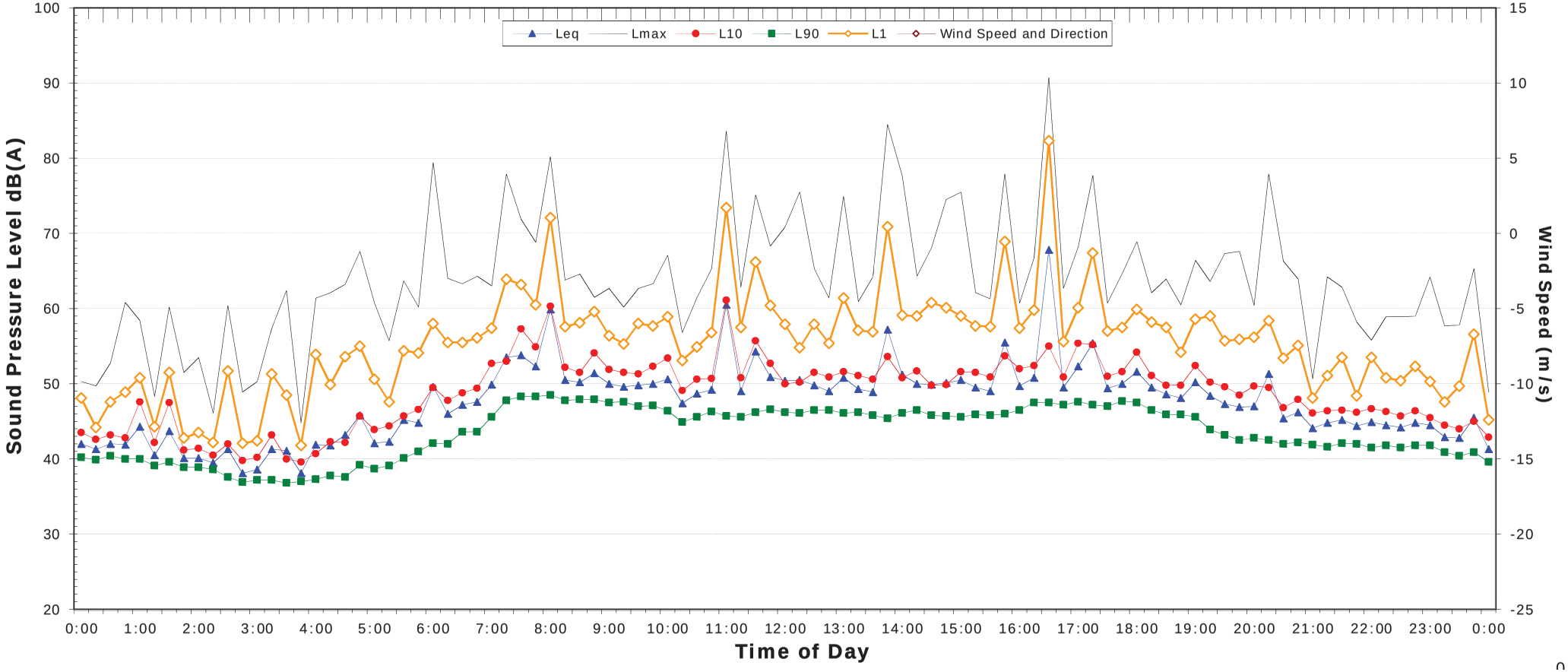
| NSW ECRTN Policy (1m from facade) | | (see note3) |
|---|---|---|
| Descriptor | Day | Night[2] |
| | 7am-10pm | 10pm-7am |
| $L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$ | 53.1 | 46.6 |
| $L_{eq\ 1hr}$ upper 10 percentile | 58.3 | 50.4 |
| $L_{eq\ 1hr}$ lower 10 percentile | 48.1 | 42.1 |

| Night Time Maximum Noise Levels | | | (see note 4) |
|---|---|---|---|
| Lmax (Range) | 67.6 | to | 79.4 |
| Lmax - Leq (Range) | 16.4 | to | 33.1 |

# EXISTING AMBIENT NOISE LEVELS

## 13A marshall Ave, St Leonards

## Monday, 11 April 2011




| NSW Industrial Noise Policy (Free Field) | | | |
|---|---|---|---|
| Descriptor | Day | Evening | Night[2] |
| | 7am-6pm | 6pm-10pm | 10pm-7am |
| $L_{90}$ | 45.6 | 41.6 | 37.6 |
| Leq (see note 3) | 54.9 | 47.6 | 44.0 |

**NOTES:**

*1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.*

*2. "Night" relates to period from 10pm on this graph to 7am on the following graph.*

*3. Graphed data measured in free-field; tabulated results facade corrected*

*4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)*

| NSW ECRTN Policy (1m from facade) | | (see note3) |
|---|---|---|
| Descriptor | Day | Night[2] |
| | 7am-10pm | 10pm-7am |
| $L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$ | 56.4 | 46.5 |
| $L_{eq\ 1hr}$ upper 10 percentile | 62.5 | 50.6 |
| $L_{eq\ 1hr}$ lower 10 percentile | 48.8 | 42.7 |

| Night Time Maximum Noise Levels | | | (see note 4) |
|---|---|---|---|
| Lmax (Range) | 65.3 | to | 74.0 |
| Lmax - Leq (Range) | 15.3 | to | 27.3 |

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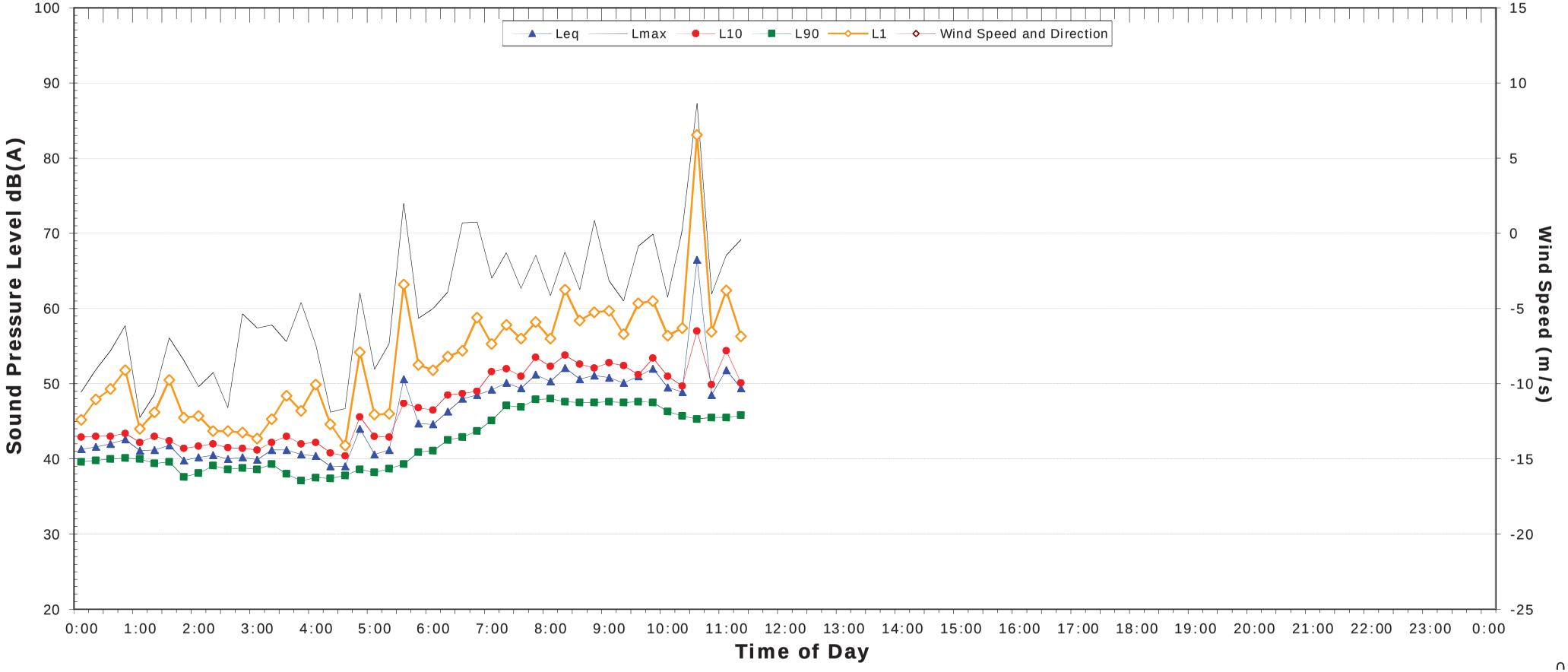
# EXISTING AMBIENT NOISE LEVELS

## 13A marshall Ave, St Leonards

## Tuesday, 12 April 2011




| NSW Industrial Noise Policy (Free Field) | | | |
|---|---|---|---|
| Descriptor | Day | Evening | Night[2] |
| | 7am-6pm | 6pm-10pm | 10pm-7am |
| $L_{90}$ | - | - | - |
| Leq (see note 3) | - | - | - |

**NOTES:**

*1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.*

*2. "Night" relates to period from 10pm on this graph to 7am on the following graph.*

*3. Graphed data measured in free-field; tabulated results facade corrected*

*4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)*

| NSW ECRTN Policy (1m from facade) | | (see note3) |
|---|---|---|
| Descriptor | Day | Night[2] |
| | 7am-10pm | 10pm-7am |
| $L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$ | 58.2 | - |
| $L_{eq\ 1hr}$ upper 10 percentile | 63.3 | - |
| $L_{eq\ 1hr}$ lower 10 percentile | 51.9 | - |

| Night Time Maximum Noise Levels | | | (see note 4) |
|---|---|---|---|
| Lmax (Range) | - | to | - |
| Lmax - Leq (Range) | - | to | - |

Data File: TF293-01S01 (rev 0).xls

Template QTT-01 (rev 65) Logger Graphs

# Accessibility Review
# Development Application

Embassy Tower
Marshall Ave, St Leonards

**Prepared for:**

Loftex

**Prepared by:**

Francis Lenny
McKenzie Group Consulting
ABN: 30 140 159 486

**Telephone:** 07 3834 9818

**Email:** flenny@mckenzie-group.com.au

**Job Number:** 70393

**Revision No:** 2.0

**Date:** 24th November 2015

TABLE OF CONTENTS



| Date | Revision Number | No. of pages | Issue of Description of Amendment | Checked By | Approved By | Date Approved |
|---|---|---|---|---|---|---|
| 19/11/15 | 1 | 13 | DA Review | NJ | FL | 19/11/15 |
| 24/11/15 | 2 | 11 | Updated DA review | NJ | FL | 24/11/15 |
| 30/11/15 | 3 | 11 | Updated DA review | NJ | FL | 30/11/15 |
| | | | | | | |

## 1.0 INTRODUCTION

Loftex engaged the services of McKenzie Group as Accessibility and DDA consultants for this project. As members of the Access Consultants Association of Australia (ACAA) and within the project scope, McKenzie Group staff use expert accessibility knowledge to ensure the project complies with the Building Code of Australia (BCA) and meets the spirit and intent of the Disability Discrimination Act (DDA; 1992). Throughout a project McKenzie Group staff apply the principles of universal accessibility and the relevant technical requirements of the AS1428 series for access and mobility; the Access to Premises Standard (2010) and applicable associated documentation.

This report has been prepared as a desktop review of the proposed design in relation to compliance with the Lane Cove Council DCP, the current Deemed-To-Satisfy accessibility provisions of the Building Code of Australia (including referenced standards), the State Environmental Planning Policy No 65 - Design Quality of Residential Apartment Development (SEPP 65) & Apartment Design Guide; AS 4299 -1995 Adaptable Housing, the Commonwealth Disability (Access to Premises – Buildings) Standards 2010 & the Disability Discrimination Act 1992.

### 1.1 PROJECT DESCRIPTION

The proposed development comprises of a basement carpark, retail facilities and two residential towers (one low-rise and one high-rise tower).

The site is located on Marshall Avenue on the corner of Canberra Avenue, St Leonards NSW.

### 1.2 Purpose of Report

This DA stage report provides a compliance overview of the project with respect to the nominated legislation with recommendations on achieving compliance with legislation noted under Section 3 below, within the project scope.

### 1.3 Executive Summary

This Access Report has been prepared to confirm that the proposed development application for 1-13A Marshall Avenue, St Leonards complies or is capable of complying with the requirements of the AS1428 series, Building Code of Australia (BCA), DDA Access to Premises Standards and ultimately the Commonwealth Disability Discrimination Act (DDA). In addition, it confirms that the proposal complies with the applicable requirements of Part F of Lane Cove Council's DCP.

The development has been reviewed to ensure that ingress and egress, paths of travel, circulation areas, toilets, adaptable units, visitable units and parking comply with the relevant statutory guidelines.

In general, the proposed development has demonstrated an appropriate degree of accessibility. The Development Application drawings indicate that compliance with statutory requirements, pertaining to site access, common area access, accessible parking and adaptable units, can be readily achieved. A variation to Council's requirement to provide 80% of the apartments as visitable is also supported.

The recommendations in this report should form part of the ongoing detailed design development of the project.

## 2.0 Key Accessibility Issues

All accessibility issues have been addressed on the drawings. Recommendations associated with detailed items are located within the body of this report.

## 3.0 Legislative and statutory requirements

Residential towers Class 2

The State Environmental Planning Policy No 65 – Design Quality of Residential Apartment Development was revised in July 2015 & now references the Apartment Design Guide (ADG). The ADG recommends that 20% of apartments incorporate the Livable Housing Guidelines Silver Level design features. It also recommends that adaptable housing be provided in accordance with the relevant council policy

The Lane Cove DCP contains a requirement to provide 20% adaptable & 80% visitable apartments as part of the proposed development

In summary, 20 % of the apartments provided have been designed to meet both AS 4299 adaptable housing & concurrently the silver level of the Livable Housing design guidelines

In addition, it is proposed to provide 100% of the apartments as visitable for persons with an ambulant disability, in conjunction with fully accessible toilet facilities on common property, in lieu of 80% of the apartments as visitable per Council's DCP

Refer to Appendix A for a full analysis of this proposed alternative approach.

Common areas class 2, 6 & 7a

The Disability Discrimination Act (DDA - 1992) is Federal Government legislation enacted in 1993 that seeks to ensure all new building infrastructure, refurbishments, services and transport projects provide functional, equitable and independent accessibility. The DDA is a complaints based legislation, which is administered by the Australian Human Rights Commission (AHRC). For any built environment the key requirement of the DDA is to ensure functionality, equity and independence of movement by people with disabilities, their companions, family and carer givers.

A key component of compliance to the DDA is the use of the Access to Premises Standard (2010) and the Australian Standards 1428 series (AS 1428) design for access and mobility. The AS 1428 series details technical requirements related to design for access and mobility.

The Building Code of Australia has adopted key accessibility and DDA legislation into the 2011 and subsequent BCA. In particular adherence to the Access to Premises Standard (2010) *(APS)*; AS1428.1 2009; AS1428.4.1 2009 and AS2890.6 2009 has become mandatory.

## 4.0 Documents

The following documentation was used in the assessment and preparation of this updated report:

| Drawing No | Revision Date | Title |
|---|---|---|
| DA001 | 16.9.15 | Site plan |
| DA003a | 16.9.15 | Basement Level 3 plan |
| DA004a | 16.9.15 | Basement Level 2 plan |
| DA005a | 16.9.15 | Basement Level 1 plan |
| DA007 | 16.9.15 | Level 1 Overall plan |
| DA011 | 16.9.15 | Low rise building – ground floor plan |
| DA012 | 16.9.15 | Low rise building – level 1 |

| | | |
|---|---|---|
| DA013 | 16.9.15 | Low rise building – level 2 |
| DA014 | 16.9.15 | Low rise building – level 3 |
| DA015 | 16.9.15 | Low rise building – level 4 |
| DA016 | 16.9.15 | Low rise building – level 5 |
| DA017 | 16.9.15 | Low rise building – level 6 |
| DA019 | 16.9.15 | High rise building – ground level plan |
| DA020 | 16.9.15 | High rise building – level 1 plan |
| DA021 | 16.9.15 | High rise building – level 2 plan |
| DA022 | 16.9.15 | High rise building – level 3 plan |
| DA023 | 16.9.15 | High rise building – level 4-8 plan |
| DA024 | 16.9.15 | High rise building – level 9-10 plan |
| DA025 | 16.9.15 | High rise building – level 11-16 plan |
| DA026 | 16.9.15 | High rise building – level 16-27 plan |
| DA066 | 16.9.15 | Adaptable Apartments Sheet 1 |
| DA067 | 16.9.15 | Adaptable Apartments Sheet 2 |
| DA068 | 16.9.15 | Adaptable Apartments Sheet 3 |
| DA069 | 16.9.15 | Adaptable Apartments Sheet 4 |

## 5.0 Issues and Recommendations:

The following issues and recommendations are set out in tabular format. The comment/issue identifies the issues followed by recommendations and whether relevant to BCA or DDA compliance. For Development Application, compliance with DA and/or capable of compliance is also indicated. 'Capable of Compliance' indicates that compliance can be achieved subject to ongoing design as the project progresses. SEPP denotes when planning legislation determines the design approach that needs to be followed. To assist understanding the context of the stated issue, some general recommendations relating to each section are included in italics.

### 5.1 Car Parking

Accessible car parking spaces have been indicated shown in relation to the retail element of the development – refer to note below

| Comment/issue | Recommendation | BCA/ DDA |
|---|---|---|
| In accordance with Table D3.5 of the BCA, accessible carparking is required to be provided as follows. | | BCA |
| ➢ Class 2 – no requirements under BCA, but State (SEPP) & Council (DCP) nominate requirements | Numbers detailed in the parking schedule (DA003a) confirm that the numbers provided meet the requirement in relation to adaptable housing (20% minimum requirement is provided) | BCA |
| ➢ Class 6 parts of the building require: 1 space per 50 | There is no need to designate any of the Retail car bays as an accessible car parking bay as there are only 3 retail car parking bays provided. | BCA |
| Accessible parking spaces require a vehicular path of travel height of 2200m and a height above the parking space of 2500mm. | It is understood minimum space height clearances are achieved. | BCA |
| 2 x visitor parking spaces have been provided as accessible; 54 visitor spaces are proposed for the development | This meets Council's DCP requirement of 1 accessible space per 100 visitor spaces as per Part F, Clause 3.5<br>This meets Council's DCP requirement of 1 accessible space per 100 visitor spaces as per Part R, Table 1.<br>Council's DCP requirement of 1 accessible space per 10 visitor spaces as per Part R, Table 2, requires confirmation, as it differs dramatically from the other DCP requirements also referenced above | |

### 5.2 External Approaches, Walkways and Kerbs

Access is required from the allotment boundary to the principal pedestrian entrance; from another accessible building connected by a pedestrian link and any required accessible car parking space.

| Comment/issue | Recommendation | BCA/ DDA |
|---|---|---|
| The current design indicates that compliance is capable of being achieved | It is recommended that if feasible External and internal ramp/walkway grades are reviewed and adjusted to build in construction tolerance; for example ramps amended to 1:15, and walkways to 1:21 | BCA<br>capable of compliance |

### 5.3 Entrances

Access for persons with a disability is to be provided to and within all areas normally used by the occupants.

Access must be provided via the main principal entrance and:

- Not less than 50% of all pedestrian entrances including the principal entrance, and
- In buildings with a floor area >500m², a non-accessible entrance must not be located more than 50 m from an accessible entrance.

| Comment/issue | Recommendation | BCA/ DDA |
|---|---|---|

| Comment/issue | Recommendation | BCA/ DDA |
|---|---|---|
| Step free entrances will be provided to all residential & retail areas. | | BCA capable of compliance |
| All entry doors are indicated to comply | | BCA |

***Key entrance recommendations:***
- *Entry requires minimum single door leaf width clearance of 850mm (920mm door size).*
- *Circulation space of 1450mm required either side of entry.*
- *All glazed doors must be marked with contrasting marking not less than 75mm wide for full width of doors with lowest edge at 900-1000mm.*

### 5.4 Lifts

Multiple passenger lifts are proposed providing compliant access to areas within the development and carpark levels.

| Comment/issue | Recommendation | BCA/ DDA |
|---|---|---|
| • Any lift travelling >12m requires a minimum compartment size of 1400mm wide x 1600mm depth<br>• Any lift travelling <12m requires a minimum compartment size of 1100mm wide x 1400mm depth.<br>• Fitout must comply with AS1735.12-1999 | • Current design indicates compliance is achieved - Further detailed review to be undertaken as the design progresses | BCA |

***Key lift design recommendations:***

- Lift dimensions to be 1100mm x 1400mm (up to 12m) or 1400mm x 1600mm (>12m minimum). Lift doorway opening clearance to be 900mm
- *Fitout out of lifts to include: Handrail 600mm (min) length; at height between 850-950mm, Tactile and Braille symbols on control buttons and panels, Automatic auditory information detailing lift stops. Control buttons set back from corner.*

### 5.5 Stairs

All stairs (excluding fire-isolated stairs) must be provided with handrails both sides, nosing strips and TGSIs.

| Comment/issue | Recommendation | BCA/ DDA |
|---|---|---|
| All general circulation stairs are to be designed to comply with AS1428.1-2009 i.e. clear width not less than 1m, handrails both sides, TGSIs and nosings. | Further review as the design progresses | BCA capable of compliance |

***Key stair design recommendations:***

- *Common use stairs require AS1428 series compliant handrails, tread features and TGSI.*
- *Tactile ground surface indicators (TGSI) shall be installed for the full width of the path of travel*
- *TGSI's shall be located at both the top and bottom of the stairs*

### 5.6 Ramps

All ramps along a continuous accessible path of travel must be provided with handrails both sides, kerb rails, landings and TGSIs as required.

| Comment/issue | Recommendation | BCA/ DDA |
|---|---|---|
| • Ramps are to be designed to meet the applicable parts of Clause 10 of AS1428.1-2009. | • Further review will take place as the design progresses to determine landing sizes, gradients, clear width, provision of handrails and TGSIs | BCA capable of compliance |
| | • recommend that, if possible the 1:14 ramps indicated are regraded to 1:15 to allow for construction tolerance | |
| | • Ramp length to be <9m or provide landings.<br>• Ensure landings have a minimum dimension of 1500mm x 1500mm to enable directional turns<br>• Landings at doorways are required to be of sufficient size to address door circulation requirements, for example as detailed on Drawing DA012 for a front approach door the door circulation shall achieve a minimum 1450mm length<br>• Provide details of ramp for further review of compliance | BCA capable of compliance |

### 5.7 Internal Walkways

Internal walkways should be designed with the following features:

- Suitable circulation spaces to enable turning into adjacent doorways,
- Adequate passing spaces, and
- Turning areas at corridor or room terminators

| Comment/issue | Recommendation | BCA/ DDA |
|---|---|---|
| • Where corridor widths are <1800mm, Passing bays or turning spaces are to be provided where direct line of sight is not available to accommodate two wheelchairs<br>• All public paths of travel are to comply:<br>o Passing bays of 1800mm x 2000mm are to be provided every 20m where there is no direct line of sight<br>o Where a person is required to make a 90° turn, a turning space of 1500mm x 1500mm is required<br>• Turning spaces are required at corridor | • Generally corridors are detailed as a minimum width of 1540 mm which provides adequate turning spaces and corridor terminations.<br>• Where there is no/limited 'direct line of sight' these corridors are to provide a passing bay to comply | BCA compliance indicated |

| Comment/issue | Recommendation | BCA/ DDA |
|---|---|---|
| terminations and are to be 1540mm width x 2070mm length | | |

***Key internal walkway and surface recommendations:***

- *Walkways to be provided with passing bays (1800 x 2000mm) every 20m.*
- *Minimum width of internal walkway 1000mm.*
- *Path of travel in front of doorways or those accessed from a frontal approach required to be 1450mm width (minimum).*
- *Path of travel in front of doorways accessed from the latch side to be 1240mm minimum width.*
- *Landing spaces at directional changes of: at 90° - 1500mm x 1500mm (corner can be truncated); at 180°- 1540mm x 2070mm.*
- *Turning space at corridor terminations to be 1540mm width x 2070mm length.*

### 5.8 Internal Doorways

Future detailed design should provide compliant door circulation space to all doors where appropriate.

A door schedule should be submitted for review in the next phase of design.

| Comment/issue | Recommendation | BCA/ DDA |
|---|---|---|
| • Communal facilities generally - | • Provide a clear open width of 850mm to bin stores/refuse rooms, recreation areas. | capable of compliance |
| • All doors within accessible areas are to comply | • Door clear width and features are to comply with the below recommendations | capable of compliance |
| • Adequate door circulation spaces need to be provided along a continuous accessible path of travel in accordance with AS1428.1-2009. | Please review the door circulation space, in particular latch side clearance to the doorway that intersects the accessible ramp at lowrise building level 1 (DA012) | capable of compliance |

***Key internal doorway recommendations:***

- *All doors require 850mm clearance width (920mm doors) inc. active leaf of double doors.*
- *Latch side clearance of 510mm to inward opening doors; 530mm to outward opening doors.*
- *Circulation space of 1450mm required either side of doors that are approached from the front. Circulation space of 1240mm required in front of inward opening doors approached from latch side.*
- *All glazed doors must be marked with contrast marking no less than 75mm wide for full width of doors at 910-1000mm height.*

### 5.9 Sanitary Facilities

| Comment/issue | Recommendation | BCA/ DDA |
|---|---|---|
| • Ensure the Unisex accessible sanitary facilities have a minimum compartment of 1900 mm x 2300 mm | Capable of compliance | BCA |

***Key sanitary facility recommendations***

- *Minimum room dimension with WC and basin: 1900mm x 2630mm or 2330mm x 2200mm.*
- *Provide AS1428 series compliant fixtures inclusive of shelf, clothes hooks, full length mirror*

### 5.10 Signage

Accessible way finding should highlight the pathway from entrance to lifts/stairs, amenities and to key components of the facility.

| Comment/issue | Recommendation | BCA/ DDA/TP |
|---|---|---|

***Key Signage design recommendations:***

- *Recommend accessible way finding signage is:*
  - *Located at appropriate viewing heights*
  - *Perpendicular to the path of travel or beside identifiable features (e.g. door faces)*
  - *Of suitable colour contrast*
  - *Of compliant notation inclusive of use of the international symbol of access.*
- *Signage to accessible sanitary facilities requires identification with the international symbol of access, raised tactile and Braille signage and letters RH or LH to indicate side of transfer to the WC pan.*

### 5.11 Additional Site Specific Components

| Comment/issue | Recommendation | BCA/ DDA |
|---|---|---|
| Adaptable units | The width of a number of the bathrooms in the adaptable apartments is detailed at 2300 mm; we recommend this dimension is reviewed and adjusted to 2350 mm if possible, to allow for construction tolerance | BCA |

### 5.12 Emergency Evacuation

| Comment/issue | Recommendation | BCA/ DDA |
|---|---|---|
| • Consider implementation of an emergency evacuation plan for people with disabilities. | • note | DDA |

### 6.0 COMPLIANCE SUMMARY

The recommendations in this report have been provided to assist in the creation of a universally accessible environment within the development proposed.

In summary, we are satisfied that the DA design documentation complies or is capable of complying with the spirit and intent of Disability Discrimination Act (DDA), SEPP 65 (including Silver level design requirements of Version 3 of the Livable Housing Design Guidelines, Lane Cove DCP, the principles of universal accessibility and the relevant technical requirements of the AS1428 series for access and mobility; the Access to Premises Standard (2010) and applicable associated documentation for the purposes of the development application process.

If you have any further queries in relation to the reports and recommendations contained please contact Francis Lenny on 07 3834 9818.

**Report Provided by:**

**Francis Lenny**
**MSc Accessibility and Inclusive Design**
Accredited Member - Association of Consultants in Access Australia

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**ACN 140 159 486**

# APPENDIX A – EXPERT OPINION REPORT

# DDA Expert Opinion
## Embassy Tower
## St Leonards, NSW

**Prepared for: Loftex**

**Prepared by:**

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**Job Number:** 68396

**Revision No:** 1.0

# EXPERT OPINION ASSESSMENT

**PROJECT:** **EMBASSY TOWER**

**ADDRESS:** 1-13A MARSHALL AVENUE, ST LEONARDS, NSW

## EXECUTIVE SUMMARY

The following report is a review of the proposed visitable toilets within the Embassy Tower Development design as it applies to the prescribed requirements of Lane Cove Council's DCP and the spirit and intent of the Disability Discrimination Act (DDA) with regards to visitability.

The purpose of this expert opinion is to support the approach of the project Access Consultant regarding the provision of visitable toilets within the development.

It is our professional opinion that the proposed solution to provide 'ambulant toilets' within 100% of the residential units in lieu of 'visitable toilets' within 80% of the units, is a better outcome. We support this approach to visitable housing and believe that the departure from the Lane Cove DCP is acceptable given that the proposed solution provides a more functional and dignified outcome that will meet the range of needs by all occupants.

## INTRODUCTION

This advice has been formulated by McKenzie Group Consulting DDA and Accessibility services and has been prepared by Angela Chambers and reviewed/authorised by Francis Lenny.

The following report has been prepared on the basis of a desktop review of the project documentation undertaken on 23 January 2014.

## PROJECT DESCRIPTION

The proposed development comprises of two (2) residential buildings – “low rise” and “high rise” - including three (3) levels of basement carparks.

The development contains a total of 269 residential units. The low rise building contains 52 units over seven (7) levels. The high rise building contains 217 units over 29 levels.

In addition, Levels 1 and 3 of the high rise development contain commercial office/retail tenancies.

## KEY ISSUES SEEKING EXPERT OPINION

The following area has been identified as an issue of non-compliance as prescribed by the Lane Cove Development Control Plan (Amendment 5 – 3 April) Part F Access and Mobility and includes:

- The proposal to not provide visitable toilets within a minimum of 80% of the residential units

## DEFINITIONS

For the purposes of this report, the following definitions apply:

### Visitable Toilet

As per Clause 1.4.12 of AS4299-1995, a visitable toilet is

> *A toilet which has a space of minimum 1250mm in front of the toilet x 900mm wide clear of door swings and fixtures (Refer below Figure 1)*

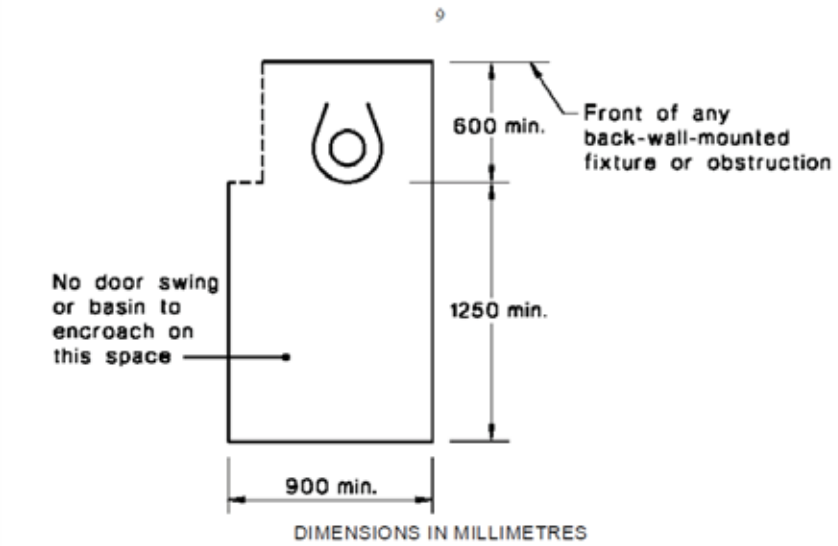


FIGURE 1.1 VISITABLE TOILET

**Figure 1: Visitable Toilet (Extract from AS4299-1995)**

**Ambulant Toilet**

In line with the requirements of Clause 16 of AS1428.1-2009, an ambulant toilet caters for a person with an ambulant disability which provides a clear space of 900mm x 900mm in front of the pan clear of door swing or fixtures (refer Figure 2). (Note: grabrails will not be installed).

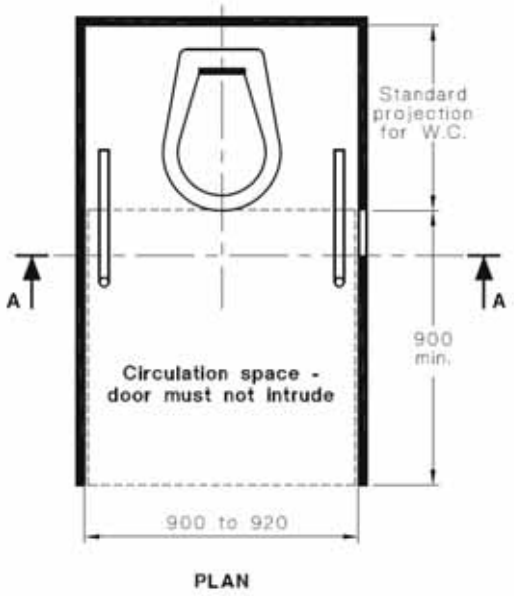


**Figure 2: Ambulant Toilet (Extract AS1428.1-2009 - Figure 53(A))**

**TECHNICAL ADVICE AND REASONS FOR EXPERT OPINION**

**Ambulant Toilet in lieu of Visitable Toilet**

**Legislative Requirements**

In accordance with the current BCA requirements, Class 2 residential buildings are not required to provide accessible/adaptable units.

However to meet Lane Cove Development Control Plan requirements, the following adaptable and visitable housing provisions apply:

- A minimum of 20% adaptable units are to be provided and designed in accordance with AS4299-1995
- A minimum of 80% visitable housing is required which requires a continuous path of accessible travel from the property frontage or carparking area to the living area and to a toilet that is either accessible or visitable and common areas within the building.

**Technical Departure:**

In lieu of a visitable toilet within 80% of the units, it is proposed to provide a minimum of one (1) ambulant toilet within 100% of the units.

**Discussion/ Justification**

This Expert Opinion has been produced to provide technical support for the proposal to provide 'ambulant toilets' within 100% of the residential units in lieu of 'visitable toilets', based on the following justification:

- 100% of the units have been designed as visitable with an 'ambulant toilet' in lieu of the 80% prescribed by Council's DCP
- As per Clause 3.6 of the Part F – Access and Mobility policy produced by Lane Cove DCP *"Groups who benefit from visitable housing include families with strollers or prams for young children, older and frail aged people and persons with disability"*
- The dimensions and layout of the specified 'visitable toilet' with a clear floor space of 900mm x 1250mm does not provide adequate circulation for a wheelchair user who prefers angled or side transfer on and off the pan.
- In addition, the design of the visitable toilet is not required to be fitted with grabrails to allow a person to transfer on and off the pan.
- In line with the DCP requirements, the proposed 'ambulant' toilet (refer figure 2) will cater for families with strollers or prams for young children, older and frail aged people and persons with an ambulant disability.
- As part of this solution, a minimum of one (1x) unisex accessible sanitary facility will be provided within the common areas of each building to cater for a visitor with limited mobility and for any visitor who may have difficulty using the 'ambulant toilets'.
- There is no prescribed requirement (BCA or DCP) to provide any common use sanitary facilities.
- The provision a unisex accessible sanitary facility within each of the buildings provides a higher degree of compliance catering for a wider range of visitors with disability, due to the larger compartment size and increased circulation spaces around each fixture in addition to the provision of grabrails, compliant pan and basin and associated fixtures that are within the required reach ranges.
- In addition this enables a person to independently use the facilities as opposed to being assisted on and off a visitable toilet.
- An equal distribution of left and right handed mirror image facilities will be provided throughout the development.
- The addition of such facilities in the building will enhance the functionality for all visitors, residents and staff.

- The provision of lift access within each residential tower enables immediate access to the unisex accessible facilities with the tower, which is considered efficient and convenient.
- Consideration to a visitor requiring use of toilets during an overnight stay has been reviewed, however it is our professional opinion, that the intent of the term 'visitable' implies short term stay. This is also based on the fact that the term 'visitable housing' does not require a continuous path of travel to a bedroom, nor does it require a visitable shower facility.
- It should also be noted that a total of 54 Adaptable units (20% of the units) will provide a toilet with AS1428.1-2009 circulation spaces in the pre adaption phase, catering for a visitor with disability.
- As the user group of this environment are known users of this space (residents) they have the opportunity to learn about the location of the common accessible facilities and will be able to advise friends and visitors - thus reducing any functional deficits associated with this departure.
- Wayfinding signage will be provided on each level at the lift landings to direct users to the location of the common accessible facilities within the building.
- Given the nature and use of the development, this proposed solution is considered a reasonable solution to catering for the needs of visitors with disability.

**Associated Technical Compliances:**

The following features are recommended to be provided in support of this approach:

- A single unisex accessible sanitary facility designed in accordance with AS1428.1-2009 is to be provided in each of the buildings – low rise and high rise building.
- An equal distribution of Left handed and right handed transfers shall be accommodated within the development (i.e. one LH in low rise building and one RH in high rise building)
- Wayfinding signage to be installed at each bank of toilets and at lift landings to identify the location of the unisex accessible sanitary facilities in accordance with Clause 8 of AS1428.1-2009 (refer figure 9(d) and (e) as examples)

**Recommended Technical Additions:**

The following features are recommended as part of this advice:

- Consider the provision of a baby change table within each of the accessible sanitary facilities to enhance the use of these facilities for parents

## SUMMARY

Therefore it is our professional opinion that suitable access for visitors with disabilities has been provided to the buildings in relation to the nature and use of the development and that the proposed visitable housing meets the range of needs of all occupants.

We support this approach to visitable housing and believe that the departure from the Lane Cove DCP is acceptable given that the proposed solution provides a more functional and dignified outcome that will meet the range of needs by all occupants.

## SUPPORTING EVIDENCE

This Alternative Solution is based on the follow key project drawings/documentation:

- Part F Access and Mobility – Lane Cove Development Control Plan, Amendment 5 Dated 03-04-13

## DECISION

The recommendations in this report have been provided to assist in the creation of a universally accessible environment within the development proposed.

In summary, we are satisfied that the proposed design documentation complies with the spirit and intent of Disability Discrimination Act (DDA), the principals of universal accessibility and the relevant technical requirements of the AS1428 series for access and mobility; AS4299 Adaptable Housing; the Access to Premises Standard (2010) and applicable associated documentation for the purposes of the development application process.

## AUTHORISATION BY DDA & ACCESSIBILITY CONSULTANT

**Prepared By:**

**Angela Chambers** **Date: 28/01/2015**
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**Authorised By:**

**Francis Lenny** **Date: 28/01/2015**
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