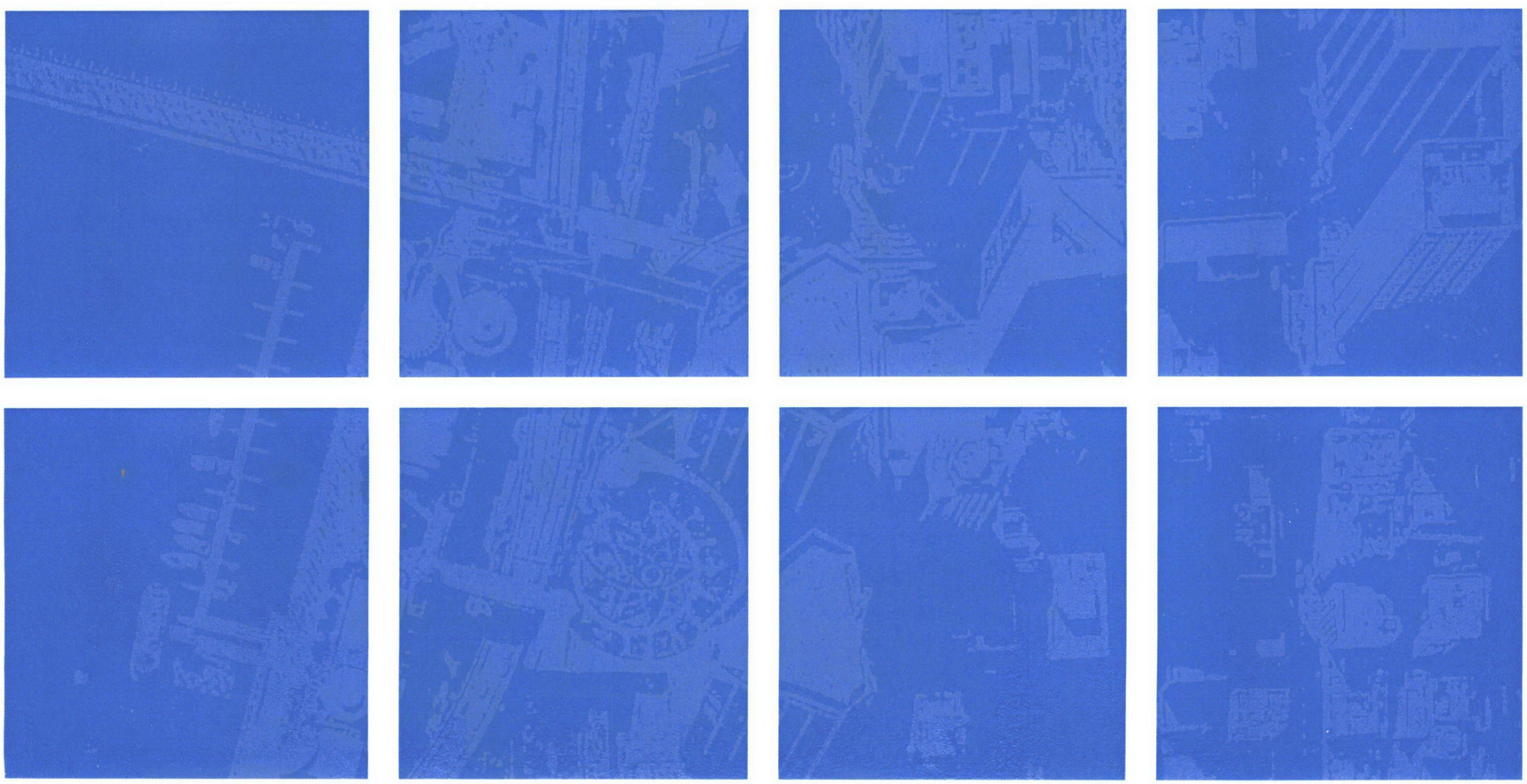
Cross City Tunnel

Modifications to the Tunnel Control Centre
Review of Environmental Factors

OCTOBER 2003





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Parsons Brinckerhoff ABN 84 797 323 433

PPK House
9 Blaxland Road
Rhodes NSW 2138
Locked Bag 248
Rhodes NSW 2138
Australia
Telephone +61 2 9743 0333
Facsimile +61 2 9736 1568
Email sydney@pb.com.au

ABN 84 797 323 433
NCSI Certified Quality System ISO 9001

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Author:	Greg Marshall
Reviewer:	Mark Keogh
Signed:	.....
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1. Introduction

1.1 Background

1.1.1 Original Concept Development and Planning Approval

In 1998, the Roads & Traffic Authority of NSW (RTA) began developing a concept design for a cross city road tunnel located beneath the alignment of Druitt, Park and William Streets. Following extensive assessment and consultation, an environmental impact statement (the Original EIS) was released for community comment from 2 August 2000 to 6 October 2000 (PPK Environment & Infrastructure July 2000).

The RTA considered the representations and prepared a Representations Report (Roads & Traffic Authority of NSW 2001a). A number of modifications to the proposal detailed in the Original EIS were made in response to the representations, as well as additional studies undertaken and further development of the proposal design. These modifications were detailed in a Preferred Activity Report (Roads & Traffic Authority of NSW 2001b) which was placed on exhibition from 19 May 2001 to 18 June 2001.

The RTA sought the approval of the then Minister for Planning for the proposal on 14 May 2001. The RTA subsequently provided the Minister with an Addendum to the Representations Report in August 2001 (Roads & Traffic Authority of NSW 2001c). The Director-General of the then PlanningNSW reviewed the Original EIS, the issues raised in representations and other relevant reports and matters, and prepared a report for the consideration of the Minister. The Minister approved the proposal on 3 October 2001 subject to 240 conditions.

1.1.2 Previous Modifications to the Approved Activity

On 15 September 2000, the RTA called for expressions of interest from private sector organisations to finance, construct and operate the cross city road tunnel known as the Cross City Tunnel. Following the short-listing of consortia and the receipt and consideration of detailed tenders, the Minister for Roads announced on 27 February 2002 that the Cross City Motorway Consortium, comprising Cheung Kong Infrastructure Holdings Ltd (CKI), DB Capital Partners, Bilfinger Berger GOT GmbH, had been selected as the preferred tenderer.

The Cross City Motorway Consortium tender outlined a package of changes to the design of the Cross City Tunnel which the consortium believed would increase the benefits of the proposal and reduce the overall construction-related impacts on the local community. Other changes incorporated in the design package had not been previously proposed and some of the potential environmental impacts would be new or different from those assessed previously. The RTA believed that this package of modifications to the proposal was worthy of investigation and a Supplementary Environmental Impact Statement (PPK Environment & Infrastructure July 2002)

was prepared. The Supplementary EIS was released for community comment from 31 July 2002 to 31 August 2002. The RTA considered the 1,012 submissions received and prepared a Supplementary Representations Report (Roads and Traffic Authority 2002).

The RTA proposed that the then Minister for Planning modify the activity to incorporate the Supplementary EIS proposal together with alterations proposed in the Supplementary Representations Report. The then PlanningNSW considered the RTA's proposal and the then Minister for Planning approved the RTA's proposal on 12 December 2002. In doing so, the Minister revised the proposal, and imposed conditions on the proposed modification. The current conditions of approval are contained in *Appendix A*.

The project was awarded to the Cross City Motorway consortium on 19 December 2002.

1.2 Tunnel Control Centre

Section 7.4.1 of the Original EIS referred to the development of a Tunnel Control Centre at the corner of Bourke and William Streets which was surplus land left over from the development of the Eastern Distributor. The Original EIS noted that development of the building would not form part of the activity for which approval was being sought and that there were a number of options also being considered for the housing of some, or all of the supervisory facilities.

The then Department of Urban Affairs and Planning required as part of the conditions of approval for the Eastern Distributor that the RTA prepare an Urban Design Guideline Master Plan prior to the disposal of any surplus lands created by the construction of the Eastern Distributor. The Master Plan was submitted to South Sydney Council and was expected to assist Council by providing development guidelines for the various sites. The original site of the Tunnel Control Centre was identified as Site 4 within the Master Plan mentioned above.

Subsequent to exhibition of the Original EIS, an alternative location was identified for a purpose-built Tunnel Control Centre at a site referred to as Site 3A in the Master Plan, located immediately south of St Kilda Lane and east of Palmer Street. The site is underlain by the cut and cover section of the Eastern Distributor road tunnels. A supplementary environmental impact assessment for the extension of site compound areas and relocation of the Tunnel Control Building was contained in Appendix 6 of Volume 2 of the Original Representations Report (reproduced as *Appendix B*) and on approval by the then Minister for Planning, became part of the Cross City Tunnel project.

Separately, and unrelated to the Cross City Tunnel project, the RTA submitted to South Sydney Council a development application (DA) for a three-storey commercial building at the corner of Cathedral and Palmer Streets, and referred to as Site 2 in the Master Plan. The DA was determined on 15 October 2001 subject to 30 conditions. Salient details of both the DA and the Council approval are reproduced as *Appendix C*.

Figure 1.1 shows the locations of Sites 2, 3A and 4.

It has recently been determined that the building proposed for the Tunnel Control Centre cannot be constructed on Site 3A and after assessment of options, the RTA has decided to seek a modification of the approved Cross City Tunnel project. The proposed modification is to relocate two of the three stories proposed for Site 3A, which would accommodate the Tunnel Control Centre supervisory facilities, onto the adjacent Site 2. A single storey building would be constructed on Site 3A to primarily accommodate maintenance facilities.

1.3 Planning and Assessment Process

1.3.1 Statutory Framework

State Environmental Planning Policy No. 63 - Major Transport Projects, gazetted on 2 February 2001 and amended on 21 June 2002, allows the proposal to be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979*.

Section 115BA of the Act allows the RTA to request the Minister for Infrastructure and Planning to modify an approval to a proposal if the proposal as modified would be inconsistent with the original approval. The RTA has determined that the proposed modifications would make the proposal inconsistent with the Minister's approval and therefore further Ministerial approval is required.

Prior to seeking the Minister's approval, the RTA must examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the Cross City Tunnel project only to the extent that it is proposed to be modified(Sections 111 and 115BA of the Act). The RTA considers that the modifications are not likely to significantly affect the environment and therefore an environmental impact statement is not required to be prepared.

The project approval requirements of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* would apply if the proposed modifications would have a significant impact on a matter of national environmental significance or other aspects of the environment such as an impact on Commonwealth land. *Appendix D* considers such matters and concludes that the Commonwealth legislation does not apply to the proposed modifications.

1.3.2 Review of Environmental Factors

This Review of Environmental Factors (REF) considers the environmental impacts of the proposed modification as required by Section 111 of the *Environmental Planning and Assessment Act 1979*. It presents details of the proposal, assesses the existing natural and social environments, describes the potential impacts on the environment and presents safeguards to minimise and/or avoid these identified impacts. The REF includes a consideration of State and Commonwealth factors from Clause 228 of the *Environmental Planning and Assessment Regulation 2000* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (refer *Appendices E* and *D* respectively).

The findings of the REF have been considered when determining that:

- The project is not likely to significantly affect the environment to the extent that it is proposed to be modified and therefore an EIS is not required in respect of the proposed modification under Section 112 of the Environmental Planning and Assessment Act 1979; and
- the proposed modification is unlikely to have a significant impact on threatened species as defined by the *Threatened Species Conservation Act 1995*, in accordance with Section 5A of the *Environmental Planning and Assessment Act 1979* and therefore a Species Impact Statement is not required;

The proposed modification was considered against the *Environment Protection Biodiversity Conservation Act 1999* and the Commonwealth Administrative Guidelines and it was concluded that there would be no likely significant impact on matters of national environmental significance or Commonwealth land. Accordingly, referral to the Commonwealth Minister of the Environment pursuant to Section 68 of that Act is not considered necessary.

This REF has relied on detailed environmental assessments which are contained in the appendices. Of particular note are:

- *Appendix F – Preliminary Construction Method and Related Environmental Management*;
- *Appendix G – Urban Design Assessment*; and
- *Appendix K – Construction Noise and Vibration Assessment.*

If approved, detailed design of the Tunnel Control Centre would be undertaken which would take into account relevant matters in assessment documents and the final conditions of approval of the Minister for Infrastructure and Planning. In the course of complying with these and other conditions of the Minister's approval, it is possible that the details of the final design, construction method and related environmental management measures may vary from the description provided in this REF. These changes and any additional impacts resulting would be documented through the following requirements of the project:

- a Construction Method Statement in accordance with Condition 18;
- a Traffic Management Plan in accordance with Condition 46;
- a Construction Noise Impact Statement in accordance with Condition 124; and
- an Urban Design and Landscape Plan in accordance with Condition 166.

1.3.3 Exhibition and Approval

The RTA, as the proponent of the proposal, will place the REF on public exhibition for a period of 14 days in accordance with Clause 241 of the *Environmental Planning and Assessment Regulation 2000*. During that period the REF will be available for inspection at selected RTA offices and the other locations where the Original and Supplementary EIS's were exhibited. The document will also be available on the

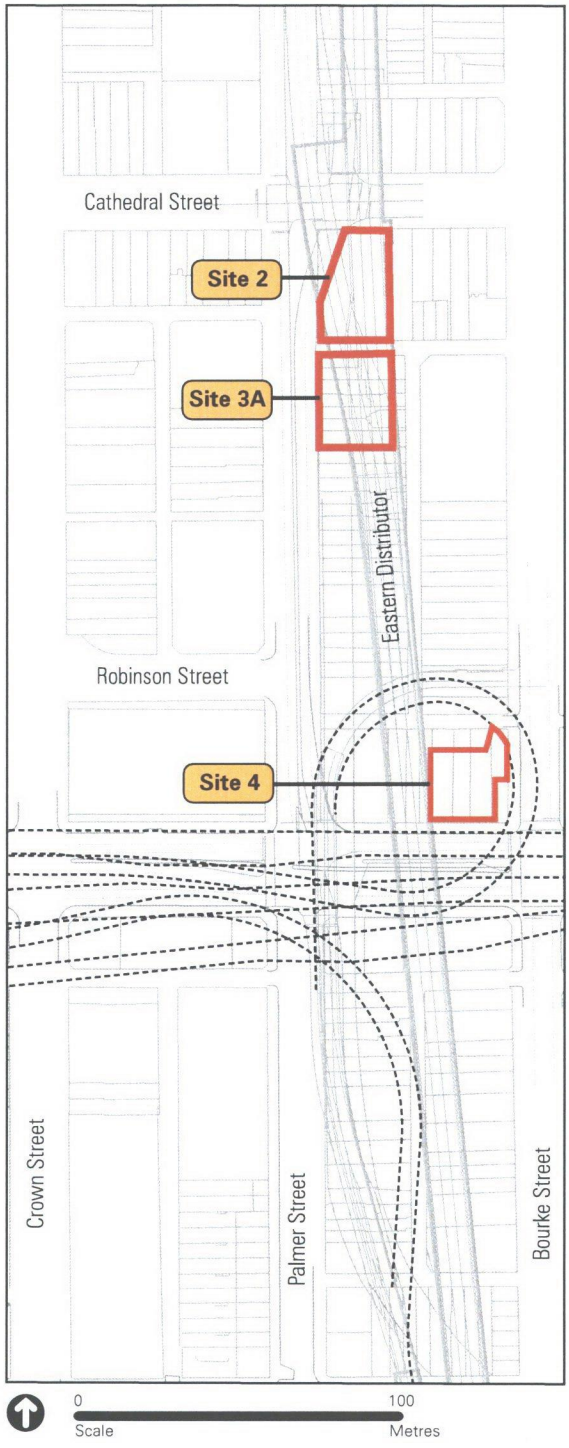

Figure 1.1 **Location of Sites 2, 3A and 4**

RTA internet site. Written representations from public authorities, interested organisations and the general community will be invited.

Details of the exhibition will be widely advertised and will meet the requirements of Clause 239 of the *Environment Planning and Assessment Regulation 2000*. Additionally, a letter will be posted to property owners previously notified by South Sydney Council in relation to the DA submitted by the RTA for Site 2. A copy of the REF will also be provided to City of Sydney Council (because Sites 2 and 3A are now within the City of Sydney local government area) and the Department of Infrastructure, Planning and Natural Resources (DIPNR).

Assessing representations made in response to exhibition of the REF is an integral part of the process. All information included in written representations is collected for the sole purpose of assisting the proposal assessment. The information may be used by the RTA's Project Manager, RTA planning and environmental staff and/or the RTA's project contractor. Copies of the information will be provided to DIPNR and the Environment Protection Authority. .

Information in representations received, including the name and address of the respondent, may be published in subsequent assessment documents unless clear indication is given in the representation that all or any part of that information is not to be published. The supply of this information is voluntary.

Each respondent has free access at all times to the information provided but not to the information provided by other respondents. Any respondent may make a correction to the information they have provided by providing it in writing to the same address where original representations were sent.

Following completion of the exhibition period, the RTA will review all representations to the REF and prepare a Representations Report. The report will incorporate:

- consideration of the REF;
- consideration of all representations and responses to the issues raised;
- any new information on the proposal;
- any proposed further modifications; and
- a summary of mitigation measures and other commitments should the proposed modifications be approved.

After examining the REF and the Representations Report, the RTA will decide whether to proceed with the proposed modifications either in the form described in the REF or to request the Minister for Infrastructure and Planning to approve the modification together with revisions in light of responses received. If the RTA decides to proceed, the Representations Report, the REF and any other relevant information would be forwarded to DIPNR and the approval of the Minister for Infrastructure and Planning for the modifications sought.

1.3.4 Making a Determination

The Director-General of DIPNR will examine the proposed modifications and prepare an Assessment Report for submission to the Minister for Infrastructure and Planning. When considering whether to approve the Modified Activity, the Minister must examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment as a result of the Cross City Tunnel, but only to the extent it is proposed to be modified (Section 115BA(7)). After carrying out this assessment, considering the Director-General's report and any submission made by the Minister for Roads, the Minister will decide whether or not to grant approval to the proposed modifications. If approved, a number of the original conditions of approval would be changed. New conditions may also be added and the Minister may revise the requested modification. An outline of the RTA's proposed changes to the Conditions of Approval relating to the proposed modifications is provided in *Section 2*.

1.3.5 Other Statutory Approvals

The Cross City Tunnel project is subject to an Environment Protection Licence issued by the Environment Protection Authority under the Protection of the Environment Operations Act 1997. This Act came into effect on 1 July 1999. Its objectives include:

- to protect, restore and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development;
- to ensure increased opportunities for public involvement and access to information; and
- to reduce risks to human health and prevent degradation of the environment.

The project is a "scheduled activity", namely construction of a freeway/tollway, under this Act. The Environment Protection Licence regulates various forms of possible pollution (water, air, noise and waste) during the construction stage of the proposed works. The licence deals with waste and spoil disposal issues regulated under the Act. A variation to the issued EPA Licence would be sought to include the modification.

1.4 Terms Used in this REF

This REF contains the terms "Approved Activity" and "Modified Activity". The Approved Activity refers to the Cross City Tunnel proposal originally approved by the then Minister for Planning on 3 October 2001, as modified by the approval granted by the Minister on 12 December 2002 and subsequent assessments made by both the RTA and PlanningNSW. Therefore, the Approved Activity relates to the proposal described by:

- the proposal contained in the Original EIS (PPK Environment & Infrastructure 2000), as amended and modified by the Representations Report (Roads & Traffic Authority 2001a) the Addendum (Roads & Traffic Authority 2001c),

and the Supplementary EIS and the Supplementary Representations Report (PPK Environment & Infrastructure, 2002 and Roads and Traffic Authority, 2002); and

- the conditions of approval granted by the then Minister for Planning on 3 October 2001 as modified on 12 December 2002 (*Appendix A*).

Appendix H contains details of the approved Tunnel Control Centre as described by Appendix 5 of the Original Representations Report.

The Modified Activity refers to the approved Cross City Tunnel project and the proposed modifications which are now being assessed in this REF (see *Chapter 2*).

Appendix I provides plans of the proposed modifications relating to the Tunnel Control Centre.

2. Proposed Modifications to the Activity

2.1 Description of the Approved Tunnel Control Centre

The Tunnel Control Centre for the Cross City Tunnel was proposed to be wholly located on Site 3A. It was described in the Original Representations Report, and is summarised in *Section 2.1.1*. Further details are provided in *Appendix H*.

It is now proposed to relocate some of the functions of the Tunnel Control Centre into a new building to be constructed on Site 2. A similar building to that which is currently proposed was approved by South Sydney Council on 15 October 2001 under Part 4 of the *Environmental Planning and Assessment Act 1979*. Details of the approved building are summarised in *Section 2.1.2* for information only. It is not intended or required to seek modification of the approval originally granted by South Sydney Council under Part 4 of the *Environmental Planning and Assessment Act 1979*. Further details are provided in *Appendix C*.

Figure 1.1 shows the locations of Sites 2 and 3A.

2.1.1 Approved Tunnel Control Centre

Site 3A is located at 88 Palmer Street over a section of the tunnel of the Eastern Distributor which was constructed using the cut and cover method. A three storey development was proposed comprising a lightweight cladding to upper floors with face brickwork to lower levels and external aluminium sun control louvres to windows. The gross floor area proposed was 1345 square metres and the maximum height of the building was 15 metres.

A number of changes were proposed to the surrounding road system as part of the development including:

- the widening of Egan Place by 3.0 metres to 7.5 metres;
- creating a western extension to St Kilda Lane;
- creating a new lane to the south of the proposed building; and
- amendments to the kerb arrangements at the corner of Bourke Street and St Kilda Lane.

The proposed Tunnel Control Centre was to operate twenty-four hours a day as noted in Section 7.4.1 of the Original EIS.

The internal development was to comprise the following components:

Ground Floor

- truck parking area accessed from Egan Place and discharging to Palmer Street;
- car parking spaces for 10 cars, one motorcycle and six bicycles at the northern end of the site;
- reception area (E-tag);
- lift lobby/fire stairs;
- maintenance staff change/ locker areas;
- maintenance workshop;
- rubbish store area;
- electrical switch room;

First Floor and Second Floors

- Commercial office space with usable gross floor areas of 410 square metres and 733 square metres respectively (approximate net floor areas) with the internal layout determined by the operator of the Cross City Tunnel; and

Roof Level

- roof plant platform accessed from fire stair extension.

2.1.2 Previous Development Approval of Site 2

Site 2 located at 131 Cathedral Street is vacant surplus land located on the south-east corner of Palmer and Cathedral Streets. The site is approximately 683 square metres in area with vehicular access provided via an extension to St Kilda Lane. The site is also located over the cut and cover tunnel section of the Eastern Distributor.

A three story commercial building was proposed by the RTA and approved by South Sydney Council having a gross floor area of 1,797 square metres fronting Cathedral and Palmer Streets. Vehicular access was proposed via a laneway from a proposed new lane on the eastern side of the building and via an extension to St Kilda lane. The maximum proposed height of the building was 14 metres (not including plant room). The building was proposed to be rendered and painted on external walls and the windows aluminium framed. Hours of operation for the building were proposed to be 6am to 9pm Monday to Saturday.

The internal development was to comprise the following components:

Ground Floor

- seven car parking spaces accessed from St Kilda Lane;
- four car spaces and seven bicycle spaces accessed from a new one way lane (with the assistance of a vehicle turntable) by a northward extension to Egan Place;
- commercial spaces divided into two tenancies (of approximate net floor area of 160 and 221 square metres) accessed from Palmer Street;
- main stair lobby accessed from Cathedral Street;

First and Second Floors

- commercial floor space of 640 square metres on each floor; and

Roof Level

- roof deck accessed from main entry stair.

Access to the site was proposed to be from the new unnamed laneway and from St Kilda lane. Originally, eleven car parking spaces in total were proposed, although the RTA subsequently agreed to delete one car parking space (at the corner of the new unnamed lane and the St Kilda lane extension) at the request of South Sydney Council. Council also requested that the car parking area fronting St Kilda lane be restricted by using a series of mechanical tilt-a-lift doors constructed of metal (Council Condition 3b).

A lift for the building was not proposed mainly due to structural constraints from the Eastern Distributor tunnel underneath.

2.2 Proposed Modifications to the Tunnel Control Centre

The approved Tunnel Control Centre, to be wholly located on Site 3A, was described in Appendix 5 of the Cross City Tunnel Representations Report. The approved building was to be three stories. The proposed modifications would involve construction of a single storey building on Site 3A. Floors one and two originally proposed for Site 3A would be transferred to a new three storey building on Site 2.

The proposed use of the single storey building on Site 3A would remain the same as originally proposed for the ground floor, that is, a truck parking area and related maintenance facilities. The main uses of the building on Site 2 would be tunnel control and communications rooms, commercial offices and other uses related to the administration of the Cross City Tunnel (including E-tag sales and administration). Therefore the use of the ground floor in the building on Site 3A would remain the same as originally proposed, while the uses of the previously proposed second and third floors would be transferred to the building on Site 2.

Further details of the proposed modifications are provided in *Section 2.2.2*. Plans of the proposed modified buildings are contained in *Appendix I*.

Artist's impressions of the proposed buildings are shown in *Figures 2.1* and *2.2*.

Drawings illustrating the approved buildings (both the Part 4 DA approved building and the approved Tunnel Control Centre) and the proposed Modifications to the Tunnel Control Centre are contained in *Figures 2.3* to *2.4*. More figures comparing the buildings are contained in *Appendix L*.

2.2.1 Reasons for Modification

The Tunnel Control Centre was intended to be built on Site 3A (as identified in the Eastern Distributor Master Plan). This was the central site of three development sites owned by RTA that front Palmer Street and which are located over the cut and cover section and driven tunnel portal of the Eastern Distributor.

The reasons for the proposed modifications relate to detailed structural investigations which indicate that Site 3A, located over the Eastern Distributor cut and cover tunnel, is unable to support the loadings posed by the previously proposed three storey building. After consideration of options, the RTA has decided to relocate two floors of the Tunnel Control Centre which house the supervisory and emergency monitoring facilities into a new building to be constructed on the adjacent Site 2 and a reduction in scale of the building originally proposed for Site 3A.

Alternative solutions were investigated, including structural/ architectural solutions that would allow the Tunnel Control Centre building to span over the Eastern Distributor on Site 3A and have foundations that were independent. Such a solution would however necessitate a number of undesirable changes to the architectural design for the building, including:

- adjusting the plan of the building by moving the eastern wall further east and the southern wall northwards; and
- skewing the eastern building wall to make it parallel with the line of the Eastern Distributor tunnel and hence reducing the width of Egan Place.

These changes would contradict the intent of the Master Plan which specifically proposed a widening of Egan Place to encourage increased vehicle usage. The reduced width of Egan Place would also restrict access to the truck parking area proposed for Site 3A. It was also noted that the Suttons building located on the east side of Egan Place is currently constructed behind the property line and any future redevelopment of the site may further reduce the width of Egan Place.

A geotechnical investigation commissioned by the consortium also raised concern about the state of the rock face on the eastern side of the Eastern Distributor that would support the eastern foundations of the Tunnel Control Centre at Site 3A.



Figure 2.1 **Artist's Impression North View from Palmer Street**



Figure 2.2 **Artist's Impression South View from Palmer Street**

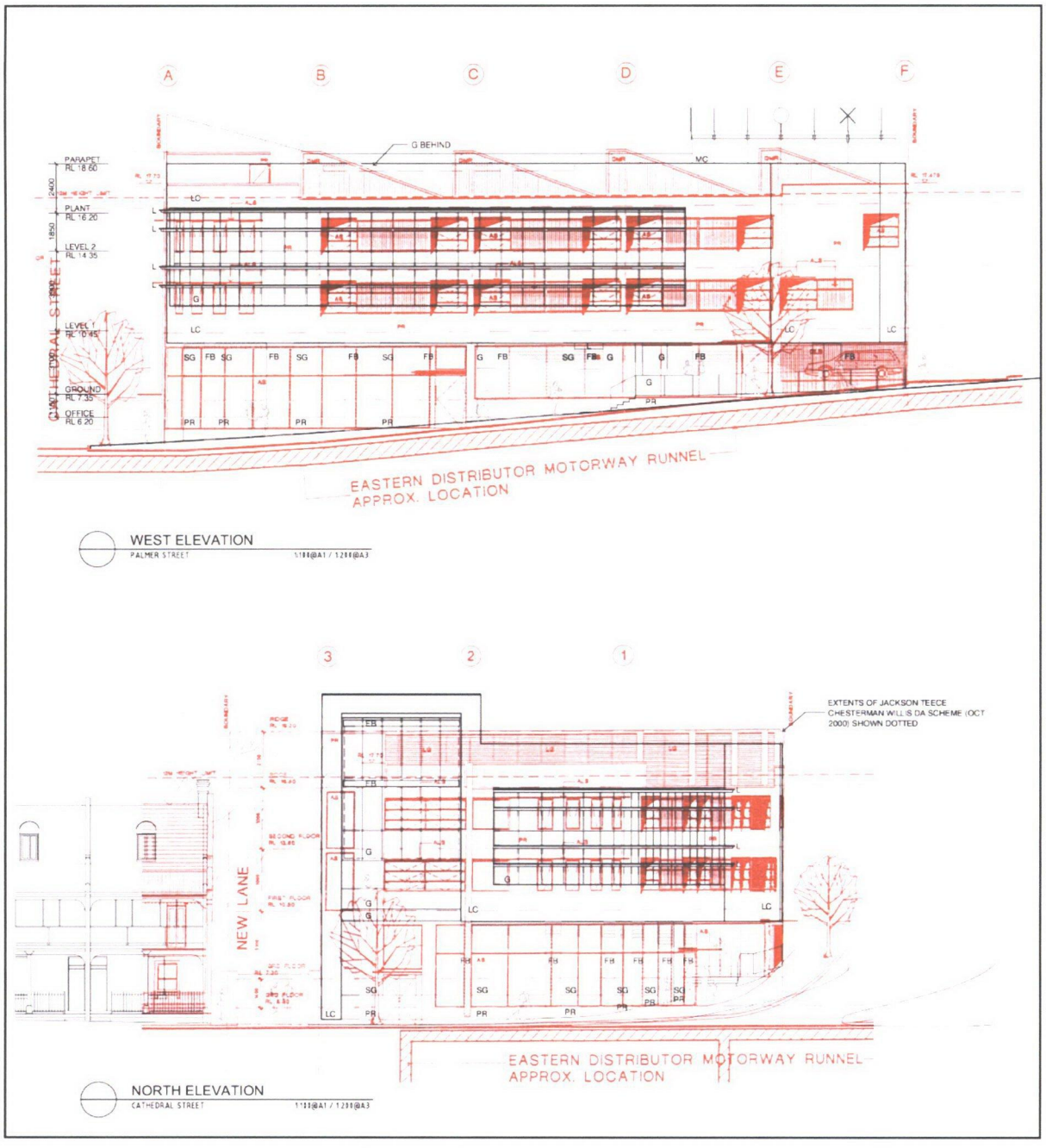

Figure 2.3 **Elevations Showing Approved (Part 4) Building on Site 2 and Proposed Modified Tunnel Control Centre**

Part 4 DA Approved building shown in red. Modified Tunnel Control centre shown in black.

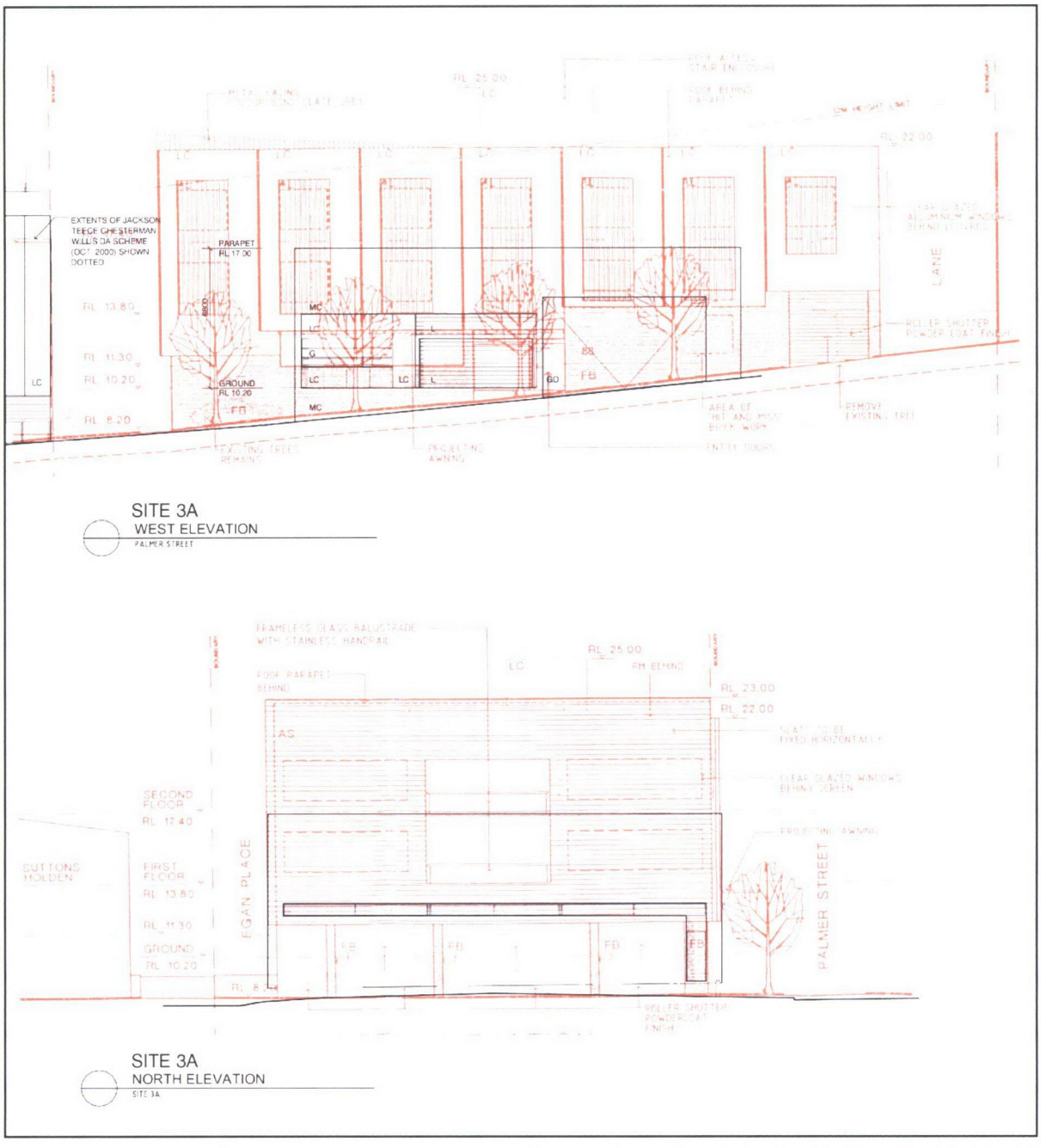

Figure 2.4 **Elevations Showing Approved and Modified Tunnel Control Centres on Site 3A**

Approved Tunnel Control Centre shown in red. Modified Tunnel Control centre shown in black.

Other structural/ architectural solutions also included:

- strengthening the existing tunnel roof planks to accommodate increased load. Whilst theoretically possible, it would require access from the Eastern Distributor and as a result, require closure of the Eastern Distributor tunnels during the construction period; and
- relocation of the Tunnel Control Centre facilities to another site in the Sydney central business district. While other sites were initially investigated for a potential relocation, one of the factors in favour of Site 2 was the advantage of the Tunnel Control Centre supervisory facilities being located in close proximity to the maintenance facilities proposed on Site 3A. As Site 2 has an area of only about 700 square metres compared with 1,100 square metres on Site 3A, only the offices could be accommodated on Site 2 while the truck and vehicle parking originally proposed for Site 3A would have to be separate.

In light of the options investigated and the preliminary results obtained, relocating some of the facilities to Site 2 was selected as the preferred option.

2.2.2 Site 3A

The development of Site 3A would comprise a one storey building in place of the three story building previously proposed with the office areas, reception and other functions being moved to Site 2. The resulting height of the building would be reduced from a maximum height of 15 to eight metres at its northern end.

The use of the single storey comprising the ground floor of this building would remain unchanged and include truck parking, maintenance staff change/ locker areas and a maintenance workshop. Public access to the building on Site 3A would not be allowed under proposed changes.

The area of Site 3A would be reduced from the previously proposed 1,220 square metres to 784 square metres (including 119 square metres of proposed laneway) by moving the southern boundary of the site seven metres northward. This would also result in the truck exit to Palmer Street also being relocated seven metres northward.

Parking for seven cars would be provided, with all parking being accessed from the westward extension of St Kilda lane.

The building exterior would be clad in a colorbond cladding system which varies to the material under the previous approval. The previously proposed use of face brickwork on the lower levels would be deleted.

The proposed gross floor area of the building would be reduced from 1345 square metres to 466 square metres.

The proposed facility would operate 24 hours a day, consistent with the existing approval.

2.2.3 Site 2

A new three storey building is proposed at 131 Cathedral Street (also described as Site 2 in the Eastern Distributor Master Plan). The site has an area of 848 square metres (including 165 square metres for the proposed laneway). The proposed maximum building height would be 15 metres with a parapet height of 13 metres.

The three floors of the building would comprise space for commercial offices and the supervisory and administration facilities for the Tunnel Control Centre. The gross floor area of the three floors would be 1,422 square metres with 383 square metres proposed for commercial activities related to the Cross City Tunnel including an E-Tag sales and administration area on the ground floor accessed from Palmer Street.

The internal layout of the building would comprise a centrally located core consisting of toilets, lift shaft, service risers and fire stairs.

The building would be housed in a lightweight cladding on the upper levels on a face brickwork base. A raked ceiling and roof would be provided over the third storey to provide daylight into a potential boardroom location. Strip windows would be used in preference to individual windows and sun shading via external louvres would be provided.

Vehicle access to the site would be via St Kilda lane with access to and from Palmer and Cathedral Streets from the laneways directly behind the proposed building restricted by bollards. A total of six car parking spaces and a single motorcycle space would be provided to be accessed from the St Kilda lane extension. Pedestrian access to the administration areas on the Ground Floor to the Tunnel Control Centre would be via Palmer Street.

Corporate signage would be surface or parapet mounted on the northern and surface mounted on the western facades of the building on Site 2, as shown on Drawing G-UD-625-REF-506 in *Appendix I*. The signs would include the project name "Cross City Tunnel" and the project logo. Lettering would be up to 600 millimetres in height and the logo approximately two metres in height and width, both in metal cut out finished in the corporate colours of blue and green or clear anodised metal.

The proposed hours of use of the Tunnel Control Centre facilities would be twenty four hours a day, seven days a week. while the administration area would be open from 6.00am to 9.00pm Monday to Saturday.

2.3 Proposed Construction Methods

Section 3.6 of Appendix 6 of the Original Cross City Tunnel Representations Report (*Appendix B*) contains a description of the proposed construction activities associated with the development of Site 3A. The construction methods for this site would not substantially change, although the scale of construction would be reduced because of the smaller building.

The construction method and works associated with development of Site 2 are similar to those on Site 3A and are typical of the construction of a small to medium size commercial building. Details of the major construction activities are:

- site establishment, including removal of hoardings and existing construction sheds; including relocation of the Eastern Cross City Tunnel Display Centre to a site approved by the Environmental Management Representative. The public would be made aware of the new Display Centre location through site notices and the Cross City Tunnel website. The existing water management structure on Site 2 would be relocated further to the north.
- demolition and removal of pavement and soil. This would be achieved using a small excavator fitted with a hydraulic hammer. Fill presently on top of the Eastern Distributor tunnel would be removed by excavator and loaded into small trucks involving a maximum of 100 trucks over a period of three days. Trucks would primarily enter the site via Palmer Street, Cathedral Street or St - Kilda Lane;
- installation of services. This would involve excavation of a trench along Egan Place from the southern end of the site. The surface of Egan Place would be cut using a concrete saw; concrete would be removed by a small excavator. Some trench boxing may be necessary;
- concreting, blockwork and steel framing. This would involve concrete trucks which would enter and leave via Palmer Street, a concrete pump, concrete vibrators and a trowelling machine. Blockwork and steel framing would occur in conjunction with concreting. This would involve a crane situated within a Palmer Street lane closure for approximately three weekends. A forklift, materials lift and cement mixer would also be required;
- external and internal fitout – application of external finishes such as Colorbond cladding to Site 3A and roofing and glazing to the offices would involve a cherry picker. Internal fitout will be conducted entirely within the building and would involve small hand tools; and
- paving St Kilda Lane would involve an asphalt paver and rollers.

Construction works would be mostly carried out during daytime hours of 7.00am - 6.00pm on Monday and 8.00am - 1.00pm on Saturday in accordance with Condition 122 of the Ministerial approval. However, various activities would be required to be conducted outside of normal working hours for reasons such as delivery and placement of oversize materials, public safety reasons and because of utility service providers to minimise inconvenience to users. These activities are outlined in *Appendix F*. A partial lane closure on Palmer Street would also be required at various times to facilitate the out-of-hours construction works.

Construction of the Tunnel Control Centre would last approximately seven months with a further two months required for testing and commissioning prior to opening. The Tunnel Control Centre would be required to be fully operational prior to the opening of the tunnel.

2.4 Proposed Modifications to the Conditions of Approval

Owing to the nature of some of the proposed modifications, not all of the conditions for the Approved Activity remain appropriate. *Table 2.1* provides a list of the proposed modifications and the reasons why a modification is being sought.

Table 2.1: Identification and Reasons for the Proposed Modifications to the Conditions of Approval[1,2]

Condition of Approval of Minister for Planning	Reason for Modification	Proposed Modified Condition
1. The proposal shall be carried out in accordance with: (a) the proposal contained in the Environmental Impact Statement (EIS), as modified by the Representations Report and as amended by the Addendum, Supplementary EIS and Supplementary Representations Report; (b) all identified Sub Plans, safeguards and mitigation measures identified in the EIS and Representations Report as amended by the Addendum Supplementary EIS and Supplementary Representations Report; and (c) the Director-General's Report dated September 2001 as amended by the Director-General's report dated December 2002. Despite the above, in the event of any inconsistency with the proposal as described in the EIS, Representations Report as amended by the Addendum, the Supplementary EIS, Supplementary Representations Report and/or the original conditions of approval granted by the Minister these conditions shall prevail. These conditions do not relieve the Proponent of the obligation to obtain all other approvals and licences from all relevant authorities required under any other Act. Without affecting the generality of the foregoing, the Proponent shall comply with the terms and conditions of such approvals and licences. It shall be the ultimate responsibility of the Proponent to ensure compliance with all conditions of approval granted by the Minister.	To ensure that the approval of the Modified Activity is consistent with assessment documents prepared by the RTA and PlanningNSW.	MODIFIED 1. The proposal shall be carried out in accordance with: (a) the proposal contained in the Environmental Impact Statement (EIS), as modified by the Representations Report and as amended by the Addendum, Supplementary EIS and Supplementary Representations Report **and Review of Environmental Factors for Modifications to the Tunnel Control Centre;** (b) all identified Sub Plans, safeguards and mitigation measures identified in the EIS and Representations Report as amended by the Addendum, Supplementary EIS and Supplementary Representations Report **and Review of Environmental Factors for Modifications to the Tunnel Control Centre**; and (c) the Director-General's Report**s** dated September 2001 **and XXXXXXXX**. Despite the above, in the event of any inconsistency with the proposal as described in the EIS, Representations Report as amended by the Addendum, the Supplementary EIS, Supplementary Representations Report, **the Review of Environmental Factors for Modifications to the Tunnel Control Centre** and/or the original conditions of approval granted by the Minister, the modified conditions shall prevail. These conditions do not relieve the Proponent of the obligation to obtain all other approvals and licences from all relevant authorities required under any other Act. Without affecting the generality of the foregoing, the Proponent shall comply with the terms and conditions of such approvals and licences. It shall be the ultimate responsibility of the Proponent to ensure compliance with all conditions of approval granted by the Minister.
17. Prior to the commencement of construction, a Construction Framework Environmental Management Plan (EMP) shall be prepared, following consultation with the EPA, DoH, DLWC, SHFA, SSCC, CCS and all relevant utility/service providers. The Construction Framework EMP shall be prepared in accordance with the conditions of this approval, all relevant Acts and Regulations and accepted best practice management Sub Plans. The Construction Framework EMP shall require approval by the Director-General prior to the commencement of substantial construction or within such time as otherwise agreed to by the Director-General. The Construction Framework EMP shall be certified by the EMR as being in accordance with the Conditions of Approval and all undertakings made in the EIS and Representations Report as amended by the Addendum and as updated by the Supplementary EIS and Supplementary Representations Report, prior to seeking approval of the Director-General.	To ensure the approval is consistent with the updated environmental assessment.	MODIFIED 17. Prior to the commencement of construction, a Construction Framework Environmental Management Plan (EMP) shall be prepared, following consultation with the EPA, DoH, DLWC, SHFA, SSCC, CCS and all relevant utility/service providers. The Construction Framework EMP shall be prepared in accordance with the conditions of this approval, all relevant Acts and Regulations and accepted best practice management Sub Plans. The Construction Framework EMP shall require approval by the Director-General prior to the commencement of substantial construction or within such time as otherwise agreed to by the Director-General. The Construction Framework EMP shall be certified by the EMR as being in accordance with the Conditions of Approval and all undertakings made in the EIS and Representations Report as amended by the Addendum, the Supplementary EIS and Supplementary Representations Report **and Review of Environmental Factors for Modifications to the Tunnel Control Centre**, prior to seeking approval of the Director-General.

Table 2.1: Identification and Reasons for the Proposed Modifications to the Conditions of Approval[1,2] *(continued)*

Condition of Approval of Minister for Planning	Reason for Modification	Proposed Modified Condition
The Construction Framework EMP shall include: (a) reference and proposed timeframes for all the Sub Plans required under this Approval; (b) the role of the EMR; (c) details of the community consultation process and identification of the role of the ICLR; (d) definition of the role, responsibility, authority, accountability and reporting of personnel relevant to compliance with the Construction Framework EMP; (e) a matrix of Construction Method Statements (CMS) required to construct the project, including an assessment of the predicted level of risk and potential level of public interest posed by each CMS and indicative timeframes for completion; and, (f) propose a response time-frame for all CMS to be approved by the Director-General. The Construction Framework EMP shall be made publicly available. *Note: The Director-General shall provide a response to the Construction Framework EMP within 1 month of receipt of all relevant information from the Proponent assuming receipt of adequate and sufficient information. If a request is made by the Director-General for additional information, the period of time that elapses between the date on which the Proponent receives the request and the date on which the additional information is provided to the Director-General shall not be taken into account in the 1 month period referred to. Any requests for additional information shall be made by the Director-General within 2 weeks of receipt of all relevant information from the Proponent.*		The Construction Framework EMP shall include: (a) reference and proposed timeframes for all the Sub Plans required under this Approval; (b) the role of the EMR; (c) details of the community consultation process and identification of the role of the ICLR; (d) definition of the role, responsibility, authority, accountability and reporting of personnel relevant to compliance with the Construction Framework EMP; (e) a matrix of Construction Method Statements (CMS) required to construct the project, including an assessment of the predicted level of risk and potential level of public interest posed by each CMS and indicative timeframes for completion; and, (f) propose a response time-frame for all CMS to be approved by the Director-General. The Construction Framework EMP shall be made publicly available. *Note: The Director-General shall provide a response to the Construction Framework EMP within 1 month of receipt of all relevant information from the Proponent assuming receipt of adequate and sufficient information. If a request is made by the Director-General for additional information, the period of time that elapses between the date on which the Proponent receives the request and the date on which the additional information is provided to the Director-General shall not be taken into account in the 1 month period referred to. Any requests for additional information shall be made by the Director-General within 2 weeks of receipt of all relevant information from the Proponent.*
18. The Proponent shall prepare in consultation with the relevant government agencies and the CLGs, Construction Method Statements (CMS) for all construction methods and/or major construction work sites to be utilised during construction in accordance with the Framework Construction EMP required by Condition 17. The Director-General shall nominate the CMSs that will require approval by the Director-General. Those CMSs not requiring the approval of the Director-General shall require the certification of the EMR as being in accordance with the Conditions of Approval and all undertakings made in the EIS and Representations Report as amended by the Addendum, and as updated by the Supplementary EIS and Supplementary Representations Report. Any CMS to be approved by the Director-General shall be submitted to the Department following certification by the EMR no less than one (1) month prior to the proposed commencement of the relevant construction activities.	To ensure the approval is consistent with the updated environmental assessment.	MODIFIED 18. The Proponent shall prepare in consultation with the relevant government agencies and the CLGs, Construction Method Statements (CMS) for all construction methods and/or major construction work sites to be utilised during construction in accordance with the Framework Construction EMP required by Condition 17. The Director-General shall nominate the CMSs that will require approval by the Director-General. Those CMSs not requiring the approval of the Director-General shall require the certification of the EMR as being in accordance with the Conditions of Approval and all undertakings made in the EIS and Representations Report as amended by the Addendum, and as updated by the Supplementary EIS and Supplementary Representations Report **and Review of Environmental Factors for Modifications to the Tunnel Control Centre**. Any CMS to be approved by the Director-General shall be submitted to the Department following certification by the EMR no less than one (1) month prior to the proposed commencement of the relevant construction activities.

Table 2.1: Identification and Reasons for the Proposed Modifications to the Conditions of Approval[1,2] *(continued)*

Condition of Approval of Minister for Planning	Reason for Modification	Proposed Modified Condition
Each CMS shall include, but not be limited to: (a) construction activities and processes associated with the relevant construction site(s), including staging and timing of the proposed works; (b) specific hours of operation for all key elements including off-site movements; (c) cover specific environmental management objectives and strategies for the main environmental system elements and include, but not be limited to: noise and vibration; air quality; water quality; erosion and sedimentation; access and traffic; property acquisition and/or adjustments; heritage and archaeology; groundwater; acid sulfate soils, spoil stockpiling and disposal; waste/resource management; weed management; flooding and stormwater control; geotechnical issues; visual screening, landscaping and rehabilitation; hazards and risks; energy use, resource use and recycling; and utilities; and (d) address, but not be limited to: (i) identification of the statutory and other obligations which the Proponent is required to fulfill during project construction, including all approvals and consultations/agreements required from other authorities and stakeholders, and key legislation and policies which control the Proponent's construction of the project; (ii) measures to avoid and/or control the occurrence of environmental impacts; (iii) changes to loss of on-street parking; (iv) measures (where practicable and cost effective) to provide positive environmental offsets to unavoidable environmental impacts; (v) definition of the role, responsibility, authority, accountability and reporting of personnel relevant to compliance with the CMS; (vi) site specific environmental management techniques and processes for all construction processes which are important for the quality of the environment in respect of permanent and/or temporary works; (vii) site specific monitoring, inspection and test plans for all activities and environmental qualities which are important to the environmental management of the project, including performance criteria, tests, and protocols (e.g. frequency and location); (viii) locational details of important elements such as temporary noise barriers; portable offices and amenities; truck, plant and materials storage; access locations; provision of site hoardings etc; (ix) environmental management instructions for all complex environmental control processes which do not follow common practice or where the absence of such instructions could be potentially detrimental to the environment;		Each CMS shall include, but not be limited to: (a) construction activities and processes associated with the relevant construction site(s), including staging and timing of the proposed works; (b) specific hours of operation for all key elements including off-site movements; (c) cover specific environmental management objectives and strategies for the main environmental system elements and include, but not be limited to: noise and vibration; air quality; water quality; erosion and sedimentation; access and traffic; property acquisition and/or adjustments; heritage and archaeology; groundwater; acid sulfate soils, spoil stockpiling and disposal; waste/resource management; weed management; flooding and stormwater control; geotechnical issues; visual screening, landscaping and rehabilitation; hazards and risks; energy use, resource use and recycling; and utilities; and (d) address, but not be limited to: (i) identification of the statutory and other obligations which the Proponent is required to fulfill during project construction, including all approvals and consultations/agreements required from other authorities and stakeholders, and key legislation and policies which control the Proponent's construction of the project; (ii) measures to avoid and/or control the occurrence of environmental impacts; (iii) changes to loss of on-street parking; (iv) measures (where practicable and cost effective) to provide positive environmental offsets to unavoidable environmental impacts; (v) definition of the role, responsibility, authority, accountability and reporting of personnel relevant to compliance with the CMS; (vi) site specific environmental management techniques and processes for all construction processes which are important for the quality of the environment in respect of permanent and/or temporary works; (vii) site specific monitoring, inspection and test plans for all activities and environmental qualities which are important to the environmental management of the project, including performance criteria, tests, and protocols (e.g. frequency and location); (viii) locational details of important elements such as temporary noise barriers; portable offices and amenities; truck, plant and materials storage; access locations; provision of site hoardings etc; (ix) environmental management instructions for all complex environmental control processes which do not follow common practice or where the absence of such instructions could be potentially detrimental to the environment; (x) steps the Proponent intends to take to ensure that all Plans and Sub Plans are being complied with;

Table 2.1: Identification and Reasons for the Proposed Modifications to the Conditions of Approval[1,2] *(continued)*

Condition of Approval of Minister for Planning	Reason for Modification	Proposed Modified Condition
(x) steps the Proponent intends to take to ensure that all Plans and Sub Plans are being complied with; (xi) consultation requirements with relevant government agencies; and (xii) community consultation and notification strategy (including local community, businesses, relevant government agencies, and all relevant Councils), and complaint handling procedures. Specific requirements of the main environmental system elements referred to in (c) shall be as required under the conditions of this approval and/or as required under any licence or approval. All CMS shall be made publicly available.		(xi) consultation requirements with relevant government agencies; and (xii) community consultation and notification strategy (including local community, businesses, relevant government agencies, and all relevant Councils), and complaint handling procedures. Specific requirements of the main environmental system elements referred to in (c) shall be as required under the conditions of this approval and/or as required under any licence or approval. All CMS shall be made publicly available.
22. An Environmental Impact Audit Report shall be submitted to the Director-General, 2 and 7 years from the start of operations or at any time as requested by the Director-General within the first 10 years of operation. The environmental impact audit report shall be undertaken by an independent person(s) or organisation approved by the Director-General and paid for by the Proponent. The Report shall assess the key impact predictions made in the EIS, Representations Report and as updated by the Supplementary EIS, Supplementary Representations Report and any supplementary studies and detail the extent to which actual impacts reflect the predictions during the first 12 months of operation and any other periods as required. The Report shall provide details on actual versus predicted impacts for all key issues identified in the EIS, Representations Report and as updated by the Supplementary Representations Report and Supplementary EIS. The suitability of implemented mitigation measures and safeguards shall also be assessed. The Report shall also assess compliance with the Operational EMP. The Report shall discuss results of consultation with the local community in terms of feedback/complaints on the construction and operation phases of the project and any issues of concern raised. The Proponent shall comply with all reasonable requirements of the Director-General, EPA and other relevant authorities with respect to any reasonable measure arising from, or recommendations in, the report. The Report shall be made publicly available.	To ensure the approval is consistent with the updated environmental assessment.	MODIFIED 22. An Environmental Impact Audit Report shall be submitted to the Director-General, 2 and 7 years from the start of operations or at any time as requested by the Director-General within the first 10 years of operation. The environmental impact audit report shall be undertaken by an independent person(s) or organisation approved by the Director-General and paid for by the Proponent. The Report shall assess the key impact predictions made in the EIS, Representations Report and as updated by the Supplementary EIS, Supplementary Representations Report, **Review of Environmental Factors for Modifications to the Tunnel Control Centre** and any supplementary studies and detail the extent to which actual impacts reflect the predictions during the first 12 months of operation and any other periods as required. The Report shall provide details on actual versus predicted impacts for all key issues identified in the EIS, Representations Report and as updated by the Supplementary Representations Report and Supplementary EIS. The suitability of implemented mitigation measures and safeguards shall also be assessed. The Report shall also assess compliance with the Operational EMP. The Report shall discuss results of consultation with the local community in terms of feedback/complaints on the construction and operation phases of the project and any issues of concern raised. The Proponent shall comply with all reasonable requirements of the Director-General, EPA and other relevant authorities with respect to any reasonable measure arising from, or recommendations in, the report. The Report shall be made publicly available.

Table 2.1: Identification and Reasons for the Proposed Modifications to the Conditions of Approval[1,2] *(continued)*

Condition of Approval of Minister for Planning	Reason for Modification	Proposed Modified Condition
134. The additional Palmer Street site compounds (sites H and J as identified in Figure 2.17b in the Supplementary EIS) shall only be used for light activities (including administration/office purposes etc) with minimal night time activities. Use of sites I and J as a workshop for maintenance is allowed if the maintenance is carried out within the confines of the building and only within the hours of 7.00 am to 6.00 pm (Monday to Friday); 8.00 am to 1.00 pm (Saturday) and at no time on Sundays and Public Holidays.	To recognise the proposal to develop the Tunnel Control Centre following use of the sites for construction.	MODIFIED 134. **The additional Palmer Street site compounds (sites ~~H and J~~ as identified in Figure 2.17b in the Supplementary EIS) shall only be used for light activities (including administration/office purposes etc) with minimal night time activities.** Use of sites I and J as a workshop for maintenance is allowed if the maintenance is carried out within the confines of the building and only within the hours of 7.00 am to 6.00 pm (Monday to Friday); 8.00 am to 1.00 pm (Saturday) and at no time on Sundays and Public Holidays. **Site H (as identified in Figure 2.17b in the Supplementary EIS) shall also be used for light activities with minimal night time activities prior to the commencement of the construction of the Tunnel Control Centre.**

Notes: 1. Refer to *Appendix A* for complete Conditions of Approval by the Minister for Planning.

2. The following acronyms and abbreviations are used in these Conditions:

Assessment Document	The EIS, Representations Report, Supplementary EIS, the Supplementary Representations Report and the Director General's Report dated December 2002.
Addendum	The Addendum to the Cross-City Tunnel Representations Report dated August 2001
AQCCC	Air Quality Community Consultative Committee
ASS	Acid Sulfate Soils
CBMS	Community Based Monitoring Station
CCS	Council of the City of Sydney
CCT	Cross City Tunnel
CMS	Construction Method Statements
CLG	Community Liaison Group
Department, the	Department of Planning
Director-General,	the Director-General of the Department of Planning or delegate
Director-General's Report	the report of the Director-General of the Department of Urban Affairs and Planning dated September 2001
DLWC	Department of Land and Water Conservation, NSW
DoH	Department of Health, NSW
DoT	Department of Transport, NSW
DUAP	Department of Urban Affairs and Planning, NSW
EIS	The Cross City Tunnel Environmental Impact Statement prepared for the RTA by PPK Environment and Infrastructure Pty Ltd, dated July 2000.
EMP	Environmental Management Plan
EMR	Environmental Management Representative
EP& A Act	Environmental Planning and Assessment Act 1979
EPA	NSW Environment Protection Authority
ESD	Ecologically Sustainable Development
ICLR	Independent Community Liaison Representative
LATM	Local Area Traffic Management
LALC	Local Aboriginal Land Council
LAeq 9hour	Equivalent continuous (constant) sound level over 9 hour period from 10pm to 7am
LAeq 15 hour	Equivalent continuous (constant) sound level over 15 hour period from 7am to 10pm
Minister, the	Minister for Planning
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NPWS	National Parks and Wildlife Service, NSW
PM10	Particulate matter with an aerodynamic diameter of less than or equal to 10 microns
PM 2.5	Particulate matter with an aerodynamic diameter of less than or equal to 2.5 microns
Proponent	Roads and Traffic Authority
PTC	Cross City Tunnel Public Transport Committee
Relevant Councils	Any one or more of the following Councils as applicable: Woollahra, South Sydney City Council, Council of the City of Sydney.
Representations Report	The Cross City Tunnel Representation Report' prepared by RTA Operations for the RTA and dated 23 April 2001
RIC	Rail Infrastructure Corporation
SCEGGS	Sydney Church of England Girls Grammar School
SHFA	Sydney Harbour Foreshore Authority
SRA	State Rail Authority
SSCC	South Sydney City Council
STA	State Transit Authority
SWC	Sydney Water Corporation
Supplementary EIS	The Cross City Tunnel Supplementary Environmental Impact Statement prepared for the RTA by PPK Environment & Infrastructure, dated July 2002.
Supplementary Representations Report	The Cross City Tunnel Representations Report for the Supplementary EIS prepared by RTA Operations for the RTA dated October 2002.
UDAS	Department of Urban Affairs and Planning's Urban Design Advisory Service
VOCs	Volatile Organic Compounds

3. Environmental Impact Assessment

3.1 Existing Environment

Sites 2 and 3A are both vacant residual lands resulting from the construction of the Eastern Distributor and under the Approved Activity, form part of a construction worksite referred to as "the additional site" in the Original Representations Report and as Site Compound H in the Supplementary EIS. The environmental impacts resulting from the use of the sites as a construction compound were assessed in Appendix 6 of the Original Representations Report (refer *Appendix B*). Uses of the site include car parking, offices, meeting rooms and administration area, subcontractors offices and amenities and a workshop area.

Section 13.2 of the Original EIS and Section 6.5.1 of the Supplementary EIS generally outline the key characteristics of the surrounding area. Development in the area is mixed with a significant number of vacant sites. There is little consistency of scale, building type or land use in the area between Sir John Young Crescent and William Street. Twelve storey office buildings, restored Victorian terraces and recently renovated three-storey commercial buildings are juxtaposed. The amenity of the area is dominated by the noise and disturbance of through traffic, predominantly on William Street and by the scale and impact of the Eastern Suburbs Railway viaduct. These conditions have improved since the opening of the Eastern Distributor, which has resulted in the removal of significant volumes of traffic from Riley, Crown and Palmer Streets. Following the opening of the Cross City Tunnel there is also expected to be a reduction in general traffic levels on streets such as Palmer Street, Riley Street and Sir John Young Crescent.

3.2 Detailed Assessment

The potential impacts from the proposed modifications would be typical of the construction of a small to medium sized commercial building including impacts on visual and social amenity, access and traffic, air quality and noise and vibration. These and other potential impacts are discussed below.

The duration of construction for the Tunnel Control Centre was estimated to be five months previously. Under the proposed modifications, construction activities would result in a slightly longer duration of approximately seven months.

3.2.1 Land Use Planning and Zoning

Both sites are owned by the RTA and therefore there are no resumption or compensation related issues.

State Environmental Planning Policy No.63 - Major Transport Projects applies to the Cross City Tunnel project and therefore Part 5 of the Environmental Planning and Assessment Act 1979 applies to the assessment. There are also a series of local zonings and controls which indicate local planning intentions in relation to land use and built form. These matters are relevant for assessment under Part 4 of the Act and therefore compliance with the controls is not required. Nevertheless, the controls are outlined below as consideration of these matters indicates that the design of the modified Tunnel Control Centre appropriately responds to the urban context of the sites.

Arising from Council boundary changes that occurred on 8 May 2003, the sites are under the jurisdiction of the City of Sydney (previously under South Sydney Council). However, the policies and plans adopted by South Sydney Council before the boundary change still apply to the land. While not an approval authority for the proposed modifications, City of Sydney have been consulted on the proposed modifications and are also able to submit representations on the proposal.

Site 2 is zoned Arterial Road Reservation 9(a) under the provisions of the South Sydney Local Environmental Plan 1998. Objective 1(b) of this clause states that the purpose of the zoning is "to provide flexibility in the development of sites identified for future arterial roads by allowing development which is permissible in an adjacent zone and consistent with objectives for that zone". The zone adjacent to Site 2 is Mixed Use 10. The proposal is compatible with the Mixed Use 10 zone objectives in the South Sydney Local Environmental Plan 1998 and relevant Development Control Plans (DCP).

The development controls relevant to Site 2 include:

- the site is located in the Woolloomooloo Conservation Area under LEP 1998 which contains heritage objectives to be addressed;
- the permissible floor space ratio contained under Part E, Clause 2.2 of DCP 1997 is 2:1;
- the permissible height under Part E Clause, 2.2 of the DCP 1997 is 12 metres;
- the permissible set back is contained under Part E, Clause 2.4 of the DCP 1997 which states that the set back must be consistent with the prevailing setback pattern within surrounding streets; and
- under the provisions of Table 3 of DCP 11, car parking must be provided at 1/125 square metres of gross floor area.

Comparisons of the proposed modification with the above development controls are discussed further in Section 3.2.3 and 3.2.8.

3.2.2 Visual Amenity

The existing visual amenity of the area has been reduced as a result of the approved activity and particularly, Site Compound H which includes site sheds, parking, workshops and storage and site hoardings on Sites 2 and 3A. Existing visual impacts include the impact on the streetscape and landscaping of these facilities as well as adverse views from elevated positions into the construction works areas.

The short term visual impact would not be substantially altered as a result of the proposed modifications, although the duration of impacts would be longer by a period of approximately two months during construction. Conversely, the inclusion of Site 2 within the overall Cross City Tunnel development would expedite the completion of urban renewal in this area and reduce the longer term visual amenity effects from a site which would otherwise remain vacant.

3.2.3 Access and Traffic

Appendix 6 of the Original Representations Report indicated that localised temporary construction traffic impacts would occur along Palmer Street, St Kilda Lane and Egan Place as a result of construction works associated with the Cross City Tunnel and Site Compound H. The modified activity would result in similar impacts with access to the construction site proposed via Palmer Street, St Kilda Lane and Egan Place.

Spoil during site excavation works would be removed over approximately three days during the construction of the Tunnel Control Centre. Approximately 100 trucks (four trucks per hour) would remove spoil and waste off-site during this period.

Spoil trucks would enter the site from Palmer Street and would exit the site onto either Palmer Street or Cathedral Street. These trucks would then proceed left onto William Street, left into Bourke Street, left into Cathedral Street, right into Palmer Street and proceed up to the Shakespeare Place U turn facility and then enter the Eastern Distributor.

A Traffic Management Plan as defined by Condition 46 of the approval of the Minister for Infrastructure and Planning would be produced for the site and would outline the impacts on existing traffic including pedestrians, vehicles, cyclists and disabled persons. The Traffic Management Plan would be approved by the Traffic and Transport Liaison Group prior to the RTA granting a Road Occupancy Licence.

The majority of construction work for the Tunnel Control Centre would be undertaken within the site boundaries requiring minimal day to day impact on passing traffic. Access to residential properties on Egan Place would remain open at all times. Residents may, however, be required to move their vehicles prior to each day work commencing to enable access to the trench site for service installation. Specific consultation with residents would be carried out prior to works being conducted in Egan Place to ensure residents are aware of the service installation works and any requirements to move vehicles to enable access to the trench site. General access to the construction site would be via Palmer Street, St Kilda Lane and Egan Place. These entry-exit points would be given a gate number and be clearly identified to suppliers to prevent problems with incorrect deliveries. In general, access would be restricted to left-in and left-out and the access points would be provided with an approved traffic controller to guide vehicles.

It is noted that the sites for the buildings of the modified Tunnel Control Centre are currently located within a construction site for the Cross City Tunnel. The volume of construction vehicles from this construction site has previously been estimated to be an average of 100 vehicle movements per day (refer *Appendix B*). Traffic movements arising from the construction of the modified Tunnel Control Centre would fall within the previously estimated vehicle movements per day. Therefore no additional traffic impacts are expected.

Once completed, the proposed modifications would result in:

- removal of parking off Egan Place at Site 3A and all car parking being accessed from the St Kilda Lane extension;
- the total number of available car parking spaces for the Tunnel Control Centre would be increased from ten to thirteen for the modified Centre (both buildings), plus a single motorcycle space;
- the southern boundary of Site 3A being relocated north by seven metres affecting the location of the exit driveway for trucks leaving the site onto Palmer Street and the location of the southern laneway; and
- car access from Cathedral Street via Egan Place being removed.

The reduction in size of Site 3A and subsequent relocation of the truck exit driveway would move the truck parking entrance at Egan Place closer to the turn required from St Kilda Lane, although the proposed movement of maintenance trucks into Site 3A would not be affected.

Figure 3.1 shows truck turning circles into and out of the proposed building on Site 3A. *Figure 3.2* shows facilities for pedestrians.

As there would be an increase of three car parking spaces provided for the modified Tunnel Control Centre, there would be a slight increase in operational traffic of approximately 24 vehicle movements per day. These movements would be insignificant compared to existing movements on Bourke and Palmer Streets.

3.2.4 Air Quality

Construction of the new building on Site 2 may give rise to additional dust impacts and additional emissions from on-site plant given the closer location of the works to some receivers. However, these impacts would be temporary and manageable.

3.2.5 Noise and Vibration

Appendix 6 of the Original Representations Report (refer *Appendix B*) outlined the potential noise impacts resulting from the approved development on Site 3A, however no vibration assessment was conducted. *Table 3.1* summarises the results of noise level predictions for the Approved Activity.

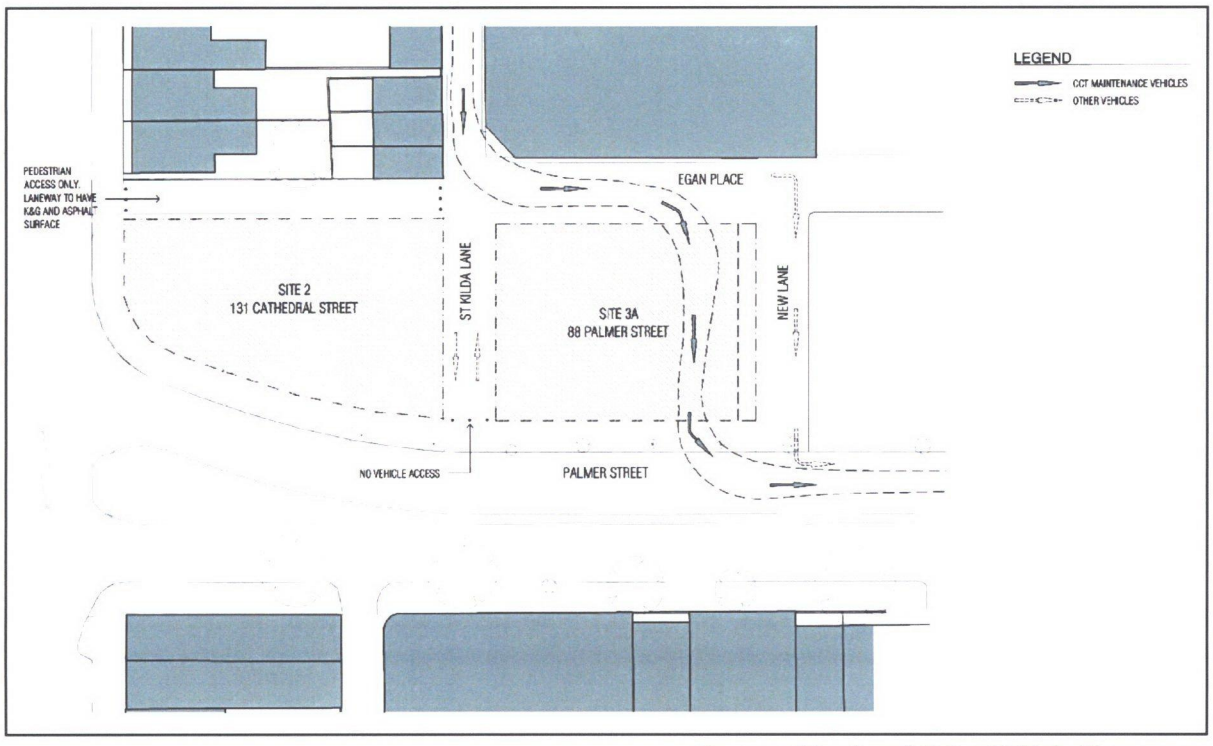

Figure 3.1 **Truck and Other Vehicle Movements**

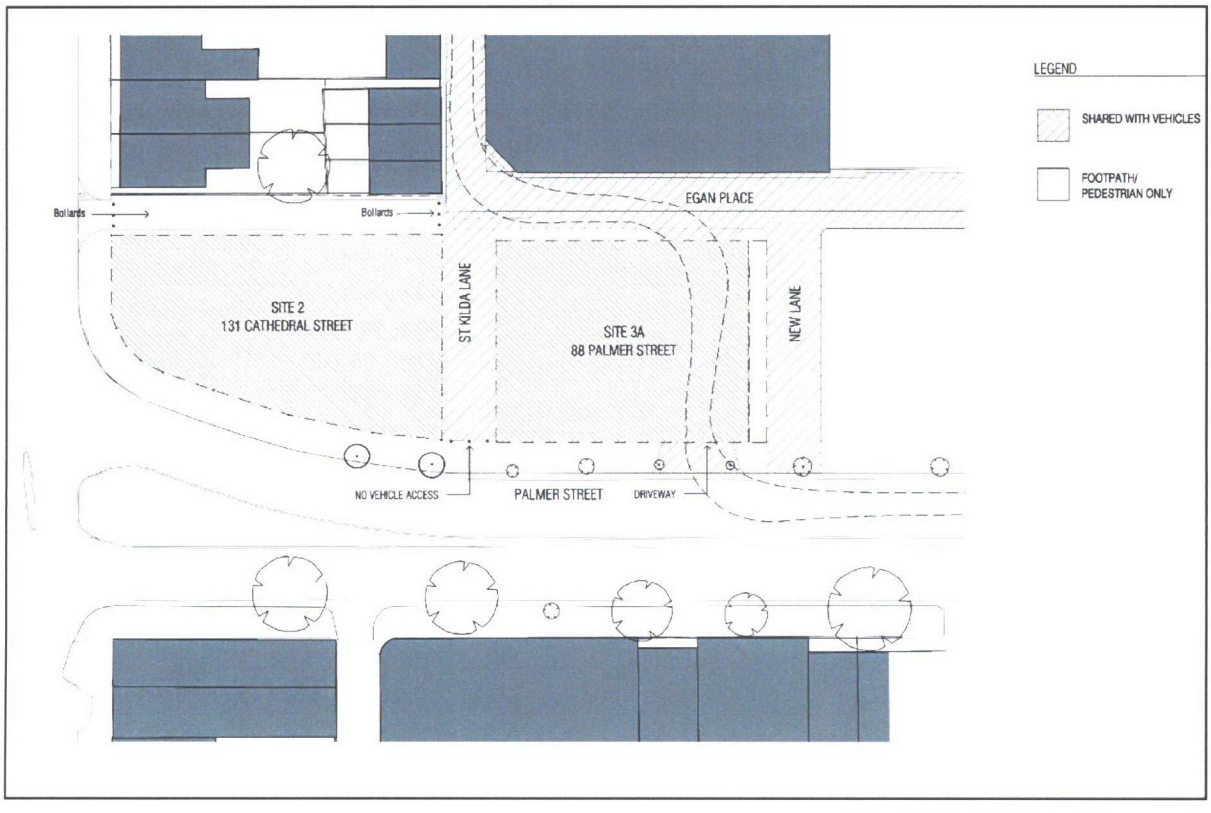

Figure 3.2 **Pedestrian Movements**

Table 3.1: Estimated Construction Noise Levels from Construction of the Approved Tunnel Control Centre on Site 3A

Receiver Location	$L_{A10(15\ minute)}$ Construction Noise Goal[1]		Calculated $L_{A10(15\ minute)}$ Construction Noise Level[2]
	<4 weeks	<26weeks	
Demolition and Excavation Stage			
2-storey Residential Block (Cathedral to St Kilda, north-east of site)	70	na	62 – 82
2- and 3-storey Residential Blocks (Palmer Street opposite site)	73	na	60 – 80
2-storey Suttons Holden Commercial (Bourke Street to Egan Place, east of site)	78	na	65 – 85
5-storey Residential Block (Egan Place, south-east of site)	75	na	62 – 82
Erection of Primary Structure and Façade			
2-storey Residential Block (Cathedral to St Kilda, north-east of site)	na	60	57 – 79
2- and 3-storey Residential Blocks (Palmer Street opposite site)	na	63	55 – 78
2-storey Suttons Holden Commercial (Bourke Street to Egan Place, east of site)	na	68	60 – 78
5-storey Residential Block (Egan Place, south-east of site)	na	65	57 – 79
Internal Fit-Out			
2-storey Residential Block (Cathedral to St Kilda, north-east of site)	na	60	42 – 62
2- and 3-storey Residential Blocks (Palmer Street opposite site)	na	63	40 – 60
2-storey Suttons Holden Commercial (Bourke Street to Egan Place, east of site)	na	68	45 – 65
5-storey Residential Block (Egan Place, south-east of site)	na	65	42 – 62

Notes: 1. Goals based on daytime ambient LA90 noise levels

2. Range depends upon the number of plant concurrently operating on site, location around the site and hence proximity to particular receiver, etc.

Appendix K contains a detailed construction noise and vibration assessment of the proposed modifications. While the construction activities and location of receivers is somewhat different in the latter analysis, the results can be broadly compared to indicate the potential change in impact arising from the proposed modifications. The predicted typical noise results from the modifications are outlined in *Table 3.2*.

Table 3.2: Predicted Typical Construction Noise Levels from the Construction of the Proposed Modified Tunnel Control Centre (with Mitigation)

Scenario/Receiver Location	Daytime Noise Level Objective (based on Condition 123)	Calculated L_{A10} (15 minute) Typical Construction Noise Level (dBA)
Excavation [1] (3 days)		
Cathedral Street	65	75-82
West side of Palmer Street	67	65-75
St Kilda Lane	65	75-82
169 Bourke Street	65	67-75
Concreting, Blockwork and Steelwork (5 days only)		
Cathedral Street	65	75-82
West side of Palmer Street	67	60-67
St Kilda Lane	65	75-82
169 Bourke Street	65	70-78
External Finishes (6 weeks)		
Cathedral Street	65	70-77
West side of Palmer Street	67	55-62
St Kilda Lane	65	70-77
169 Bourke Street	65	65-72
Paving St Kilda Lane (1 week)		
Cathedral Street	65	63-68
West side of Palmer Street	67	55-62
St Kilda Lane	65	78-83
169 Bourke Street	65	67-72

Note 1: Higher levels than shown up to the identified maximum in *Appendix K* may occur for brief periods only when a hydraulic hammer works close to the receiver location. This will be only in the region of a few hours in a month.

The construction staging outlined in *Appendix K* is broadly similar to the Approved Activity, although the paving of St Kilda Lane is a proposed new activity. There are also differences in the selection of receivers although the predictions at the St Kilda Lane residences in *Table 3.2* would be similar to those of the Suttons Building in *Table 3.1*.

Notwithstanding the differences between the two analyses, the predictions are generally similar. The predicted noise impacts are consistent with the existing approval and typical of construction activities in an urban area.

Groundborne vibration levels were not included as part of the previous assessment of the Approved Activity but the highest vibration levels would be generated by excavators fitted with hydraulic hammers which, at times would work within five metres from the closest buildings. Some marginal exceedances of the criteria are

expected. However, it is considered that these occasions would be rare and excavation using the shovel would be attempted wherever possible.

Sources of operational noise included in the environmental assessment of Appendix 6 of the Original Representations Report included:

- proposed truck movements from the maintenance/ workshop area on Site 3A;
- operation of the roller doors servicing the maintenance truck entry and exit ramps; and
- roof-top ventilation plant for Site 3A.

No changes are proposed to the truck movements to /from the maintenance/ workshop area.

It is proposed to replace roller shutter doors proposed as part of the approved Tunnel Control Centre (as included in Appendix 6) with panel lift doors to help reduce potential noise impacts.

It is proposed to replace the roof-top ventilation plant proposed for Site 3A with roof exhaust fans. These fans are not mechanically operated and would thus not create a potential noise issue. Any rooftop plant proposed for Site 2 would need to be treated to ensure that noise levels comply with the Environment Protection Authority's *Industrial Noise Policy* at the nearest residential premises. Such treatment is likely to involve attenuators fitted to the fans where required. No additional operational noise impacts are therefore anticipated.

3.2.6 Biodiversity

Three existing street trees on Palmer Street adjoining Site 3A would be removed as a result of the relocation of the proposed truck driveway. These trees would be replaced with two new trees on Palmer Street in front of Site 2.

As the two sites are clear of vegetation and the area is highly urbanised, there would be no impacts on biodiversity and a Species Impact Statement is therefore not required.

3.2.7 Water Quality

The existing water management structure on the Palmer Street site will be relocated further to the north. The site drains to the north (Cathedral Street) and site runoff will be directed through sediment devices placed at the northern end of the site prior to draining off-site.

The proposed construction activity would not result in any substantial difference to the erosion and sedimentation impacts of the approved activity. Existing environmental management measures would be sufficient to control the likely impacts. Therefore, no changes to water quality are expected as a result of the proposed modifications.

3.2.8 Urban Design and Heritage

Assessment of Modifications

The proposed design of the two buildings generally adheres to the Master Plan prepared by the RTA which itself, was designed in accordance with local planning guidelines including:

- setting;
- building and heritage;
- public space and pedestrian networks; and
- design for sustainable, healthy environments.

The Master Plan identifies the reinstatement of the eastern edge of Palmer Street as a significant urban design element. The proposed building would make an important contribution to the streetscape along Palmer and Cathedral Streets. *Appendix G* contains details of the urban design issues associated with the building and the design response to the issues identified in the Master Plan. A summary of proposed changes is provided below.

The building proposed on Site 2 does not differ substantially in terms of overall bulk and scale from that previously approved by South Sydney Council. The Council approval report for Site 2 is contained in *Appendix C*. The building is contemporary and reflects the traditional design of a number of industrial buildings in the area. The building on Site 2 has been designed to reflect its corner position without impacting on the adjoining terraces. The height of the building remains in most parts below the 12 metre height limit stipulated in the South Sydney Council DCP. The section above 12 metres has been designed to reinforce the corner of Palmer and Cathedral Streets.

The 4.5 metre laneway (Egan Place extension) between the proposed building and existing terraces creates a sufficient space to step up the building in scale. The site is located in an area with a Floor Space Ratio (FSR) of 2:1. The FSR has been reduced to 2.48:1 (a decrease of 0.12:1 from the previous proposal). Departure from the FSR is considered appropriate given other existing buildings and the corner nature of the site provides valid reason for development that is a least as large as the adjoining buildings.

The building on Site 3A has been reduced in height from three storeys to one storey and is in keeping with the eight metre height limit for the site specified in the DCP. This building is simple in design due to the proposed uses however, windows have been provided on the north, west and east to activate the facades and maintain a degree of natural surveillance. The site is located in an area with a Floor Space Ratio (FSR) of 2:1. The FSR of Site 3A has been reduced to 1.62:1 (decrease of 0.05:1 from the previous proposal).

Sun shadow diagrams in *Appendix J* indicate that the proposed buildings would provide minimal overshadowing and would not vary substantially from the previous proposals.

Stakeholder Consultation

Meetings with staff of the City of Sydney Council on the 16 September and 1 October were undertaken and raised the following issues concerning the proposed changes:

- Site 2 exists within a heritage conservation area; and
- the proposed northward movement of the laneway at the southern end of Site 3A potentially misaligns it with the footprint of the building to the east.

Site 2 is located within the Woolloomooloo Conservation Area under South Sydney Local Environmental Plan 1998 (LEP). Heritage issues in relation to the construction of building on Site 2 were previously addressed in a Statement of Environmental Effects prepared by Jackson Teece Chesterman Willis (refer *Appendix C*).

Given that the general bulk, scale and architectural treatment of the proposed Site 2 building is unchanged, it is considered that the conclusion of the previous Statement of Heritage Impact is applicable to the modified Tunnel Control Centre in respect of Site 2. The heritage impact assessment has been updated and is included as *Table 3.1*.

Table 3.1: Heritage Impacts of Tunnel Control Centre on Site 2

Proposed Change to Conservation Area	Issues	Resultant Enhancement of Conservation Area
Demolition of a building structure	Not applicable. Site vacant	Intrusive impact of vacant site on streetscape eliminated..
Change of use	Not applicable	Not applicable.
New development in Conservation Area	*How is impact of new development to be minimised?*	
	Setback from existing terraces established with new lane. Servicing from rear reflects existing pattern in area	Gap in existing streetscape repaired by new development, corner site creates landmark feature.
	Why is new development required?	
	Previous building was demolished for construction of the Eastern Distributor project creating a vacant site that has a negative impact within the setting of the conservation area.	New building will minimise the negative impact the currently vacant site has within the setting of the conservation area.
	How does the curtilage allowed around the heritage item contribute to the retention of its heritage significance?	
	Not applicable. Proposal relates to development within a conservation area. Nearest heritage item (Item No. 93, 94)	New building has no impact on the curtilage of the nearest heritage item.

Table 3.1: Heritage Impacts of Tunnel Control Centre on Site 2 *(continued)*

Proposed Change to Conservation Area	Issues	Resultant Enhancement of Conservation Area
	How does the new development affect views to and from the heritage item? What has been done to minimise negative effects?	
	Nearest item (Item No. 93, 94) identified by South Sydney Council is not affected with respect to views from the proposed building.	New building has no impact on the views to and from the nearest heritage item.
	Is the development sited on any known or potentially significant archaeological deposits? If so, have alternative sites been considered? Why were they rejected?	
	The cut-and-cover excavation carried out for the Eastern Distributor tunnel under the site would have removed any prior deposits with archaeological interest.	New building has no impact on known existing deposits with archaeological interest.
	Is the new development sympathetic to the heritage item? In what way (e.g. form, siting, proportion, design)?	
	The building would be obliquely visible from the nearest heritage items (Item No. 93, 94), however, within the setting of the Conservation Area. The proposed building would be articulated to create visual interest and reflect the street environment of Cathedral and Palmer Streets.	The proposal's architectural qualities seek to reinforce the existing attributes present in the context. This will achieve a more cohesive nature to the setting.
	Will the additions visually dominate the heritage item? How has this been minimised?	
	The building would be only obliquely visible from the nearest heritage items (Item No. 93,94), therefore, the possibility of visual dominance does not occur.	The existing visual properties associated with Item 93 and 94 are not changed by the proposed building.
	Will the public and the users of the item still be able to view and appreciate its significance?	
	Public and users of Item 93 and 94 would not be affected by the proposed development and therefore the level of appreciation remains unchanged.	The existing view patterns are maintained.
Subdivision	Not applicable	Not applicable
Repainting	Not applicable	Not applicable
Re-roofing/recladding	Not applicable	Not applicable
New services proposed for installation in heritage fabric	Not applicable	Not applicable
Fire upgrade to heritage item	Not applicable	Not applicable

Table 3.1: Heritage Impacts of Tunnel Control Centre on Site 2 *(continued)*

Proposed Change to Conservation Area	Issues	Resultant Enhancement of Conservation Area
New landscape works	Not applicable	Not applicable
Tree removal or replacement	Not applicable	Not applicable
New signage	*How has the impact of the new signage on the heritage significance of the item been assessed?*	
	Limited signage would be placed on the proposed building.	The design of signage would consider the visual character of the conservation setting and would not be commercial in nature.

The adjustment to the southern boundary of Site 3A maximises the development area and potential of Site 3B. While the proposed movement may misalign Site 3A with the current footprint of the building to the east, the area to the south of this building is currently a carpark and could be developed at some future point itself. It is therefore not considered that this should be a constraint on Site 3A.

Response to Previous Community Issues

The previous DA application for Site 2 was notified to a population of some 370 local residents of which there were 2 submissions received. One was from the State Rail Authority regarding notification of potential noise and vibration concerns from the Eastern Suburbs Railway tunnel. Given the commercial nature of the building, this submission was not considered further. The other submission was in the form of an objection and highlighted the following points of relevance to the modifications:

- the proposal did not identify the potential for archaeological deposits;
- both the height and floorspace ratio are exceeded. Setbacks, splays and streetscape improvements are also needed;
- the saw-tooth roof is not sympathetic to St Kilda lane or surrounding area; and
- the hours of operation should be reviewed.

The potential for archaeological deposits to be located at Site 2 is negligible due to the cut and cover construction operations undertaken for the Eastern Distributor which previously removed any archaeological potential. The proposed building for Site 2 removes the saw-tooth roof design originally proposed. The proposed operation of Site 2 on a twenty-four hour basis would enable use of the tunnel control facilities during these times, seven days a week. These hours of operation are consistent with the current approval for the Tunnel Control Centre. Height, floorspace ratio and other urban design issues are addressed above.

3.2.9 Geology, Soils and Landforms

Site 2 is relatively flat but rises from Cathedral Street along Palmer Street with an approximate change in level totalling three metres. With respect to potential contamination, the past use of the site is residential and therefore the risk is considered to be very low.

3.2.10 Operational Hazards and Risks

There are no hazardous materials proposed to be stored on Site 2. Therefore the potential risk during operation is considered minimal.

3.2.11 Social Issues

The primary social issues arising from the proposed modifications relate to reduced amenity during the construction period due to intermittent disruptions to vehicular and pedestrian traffic and access, public safety concerns and changes to air quality and construction noise. The site would be secured by means of a site hoarding or other appropriate forms restricting entry and security lighting would be provided. The remaining issues are generally short term and would be intermittent throughout the construction period.

Pedestrian and vehicular access to the laneway network at the rear of Site 2 would be improved as a result of the proposed modifications, particularly by providing wider through streets and restricting traffic access from others.

3.2.12 Waste Management and Minimisation

The proposed modification is expected to result in similar amounts of waste generation. As for the approved activity, recycling waste will be maximised.

3.2.13 Demand on Resources

The proposed modifications would require the consumption of energy (that is, electricity, fuel and water), construction materials and human resources. The consumption of resources would increase marginally as a result of the construction of the additional building, however this is expected to be negligible in the context of the overall resources required for the project.

3.2.14 Cumulative Effects

The additional cumulative effects during construction would be minimal with the addition of a new building on Site 2 considering the reduced scale of the building on Site 3A.

3.3 Environmental Management Measures

Procedures to identify and manage the potential environmental impacts of the proposal are subject to the conditions of approval of the Minister for Infrastructure and Planning. They include conditions relating to the development and implementation of environmental management systems to ensure thorough documenting of all stages of the project and receipt and compliance with the necessary approvals, as well as requirements to conduct further assessments of potential impacts on the basis of more detailed information being generated throughout the course of the project. Conditions relating to consultation with the relevant Government authorities, the community liaison groups, potentially affected property owners, ongoing environmental monitoring and management during

construction and operation of the project are also contained within the existing approval.

Specific mitigation measures proposed for construction of the modified Tunnel Control Centre are outlined in *Appendix F*.

4. Conclusion

The RTA propose to relocate two floors of the Cross City Tunnel Control Centre from Site 3A at 88 Palmer Street to a new building to be constructed on an adjacent site (Site 2) at 131 Cathedral Street. Various changes to the internal layout of the two buildings are proposed as well as changes to the parking and access regimes surrounding the buildings.

The development of a Tunnel Control Centre at 88 Palmer Street was previously considered in an environmental assessment contained in the Original Cross City Tunnel Representations Report (Appendix 6) and approved by the Minister on 12 December 2002 subject to conditions. Subsequently, but unrelated to this approval, the RTA gained development consent from South Sydney Council for a building to be constructed at 131 Cathedral Street as part of its obligations to redevelop surplus lands left over from the construction of the Eastern Distributor. Development consent for this building was provided on 15 October 2001 subject to conditions.

This REF documents the changes proposed and undertakes an environmental assessment of the proposed modifications. The reasons for the proposed modifications relate to detailed structural investigations which indicate that Site 3A, located over the Eastern Distributor cut and cover tunnel, is unable to support the loadings posed by the previously proposed three storey building. After consideration of options, the RTA has decided to relocate two floors of the Tunnel Control Centre which house the supervisory and emergency monitoring facilities into a new building to be constructed on the adjacent Site 2 and a reduction in scale of the building originally proposed for Site 3A.

Construction impacts of the modified activity would be similar to those anticipated for the approved activity These impacts would not be substantial, being typical of the construction of a small to medium size commercial building. Primarily, these relate to noise and vibration impacts and social amenity issues. While some of the impacts resulting from the proposed modifications would be new and different, they are largely consistent with those of the Approved Activity. The implementation of the existing Conditions of Approval and additionally proposed mitigation measures would assist to ensure minimal adverse environmental impacts would result.

The REF will be publicly exhibited for a period of fourteen days during which time representations will be received and the RTA will subsequently determine whether or not to proceed with the modifications. If the RTA decide to proceed, a modification to the Minister's approval for the Cross City Tunnel project would be sought.

References

Jackson Teece Chesterman Willis 2000, *Surface Works and Redevelopment of Residual Lands and Air Rights Masterplan*, Sydney.

PPK Environment & Infrastructure, 2000, *The Cross City Tunnel Environmental Impact Statement*, PPK Environment & Infrastructure, Sydney.

PPK Environment & Infrastructure, 2002, *The Cross City Tunnel Supplementary Environmental Impact Statement*, PPK Environment & Infrastructure, Sydney.

Roads & Traffic Authority of NSW, 2001(a), *The Cross City Tunnel Representations Report*, Roads & Traffic Authority, Sydney.

Roads & Traffic Authority of NSW, 2001(b), *The Cross City Tunnel Preferred Activity Report*, Roads & Traffic Authority, Sydney.

Roads & Traffic Authority of NSW, 2001(c), *Addendum to the Cross City Tunnel Representations Report*, Roads & Traffic Authority, Sydney.

Roads & Traffic Authority of NSW, 2002, *The Cross City Tunnel Supplementary Representations Report*, Roads and Traffic Authority, Sydney.

Appendix A

Conditions of Approval

SCHEDULE 1

Approval granted by the Minister Planning on 3 October 2001 to the Roads and Traffic Authority for the Cross-City Tunnel.

SCHEDULE 2

The following acronyms and abbreviations are used in this section:

Assessment Document	The EIS, Representations Report, Supplementary EIS, the Supplementary Representations Report and the Director General's Report dated December 2002.
Addendum	The Addendum to the Cross-City Tunnel Representations Report dated August 2001
AQCCC	Air Quality Community Consultative Committee
ASS	Acid Sulfate Soils
CBMS	Community Based Monitoring Station
CCS	Council of the City of Sydney
CCT	Cross City Tunnel
CMS	Construction Method Statements
CLG	Community Liaison Group
Department, the	Department of Planning
Director-General, the	Director-General of the Department of Planning or delegate
Director-General's Report	the report of the Director-General of the Department of Urban Affairs and Planning dated September 2001
DLWC	Department of Land and Water Conservation, NSW
DoH	Department of Health, NSW
DoT	Department of Transport, NSW
DUAP	Department of Urban Affairs and Planning, NSW
EIS	*The Cross City Tunnel Environmental Impact Statement* prepared for the RTA by PPK Environment and Infrastructure Pty Ltd, dated July 2000.
EMP	Environmental Management Plan
EMR	Environmental Management Representative
EP& A Act	Environmental Planning and Assessment Act 1979
EPA	NSW Environment Protection Authority
ESD	Ecologically Sustainable Development
ICLR	Independent Community Liaison Representative
LATM	Local Area Traffic Management
LALC	Local Aboriginal Land Council
L_{Aeq} 9hour	Equivalent continuous (constant) sound level over 9 hour period from 10pm to 7am
L_{Aeq} 15 hour	Equivalent continuous (constant) sound level over 15 hour period from 7am to 10pm
Minister, the	Minister for Planning

NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NPWS	National Parks and Wildlife Service, NSW
PM10	Particulate matter with an aerodynamic diameter of less than or equal to 10 microns
PM 2.5	Particulate matter with an aerodynamic diameter of less than or equal to 2.5 microns
Proponent	Roads and Traffic Authority
PTC	Cross City Tunnel Public Transport Committee
Relevant Councils	Any one or more of the following Councils as applicable: Woollahra, South Sydney City Council, Council of the City of Sydney.
Representations Report	*The Cross City Tunnel Representation Report'* prepared by RTA Operations for the RTA and dated 23 April 2001
RIC	Rail Infrastructure Corporation
SCEGGS	Sydney Church of England Girls Grammar School
SHFA	Sydney Harbour Foreshore Authority
SRA	State Rail Authority
SSCC	South Sydney City Council
STA	State Transit Authority
SWC	Sydney Water Corporation
Supplementary EIS	The Cross City Tunnel Supplementary Environmental Impact Statement prepared for the RTA by PPK Environment & Infrastructure, dated July 2002.
Supplementary Representations Report	The Cross City Tunnel Representations Report for the Supplementary EIS prepared by RTA Operations for the RTA dated October 2002.
UDAS	Department of Urban Affairs and Planning's Urban Design Advisory Service
VOCs	Volatile Organic Compounds

General

1. The proposal shall be carried out in accordance with:

   (a) the proposal contained in the Environmental Impact Statement (EIS), as modified by the Representations Report and as amended by the Addendum, Supplementary EIS and Supplementary Representations Report;
   (b) all identified Sub Plans, safeguards and mitigation measures identified in the EIS and Representations Report as amended by the Addendum Supplementary EIS and Supplementary Representations Report; and
   (c) the Director-General's Report dated September 2001 as amended by the Director-General's report dated December 2002.

   Despite the above, in the event of any inconsistency with the proposal as described in the EIS, Representations Report as amended by the Addendum, the Supplementary EIS, Supplementary Representations Report and/or the original conditions of approval granted by the Minister these conditions shall prevail.

These conditions do not relieve the Proponent of the obligation to obtain all other approvals and licences from all relevant authorities required under any other Act. Without affecting the generality of the foregoing, the Proponent shall comply with the terms and conditions of such approvals and licences.

It shall be the ultimate responsibility of the Proponent to ensure compliance with all conditions of approval granted by the Minister.

Compliance

General

2. The Proponent shall comply with, or ensure compliance with, all requirements of the Director-General in respect of the implementation of any measures arising from the conditions of this approval. The Proponent shall bring to the attention of the Director-General any matter that may require further investigation and the issuing of instructions from the Director-General. The Proponent shall ensure that these instructions are implemented to the satisfaction of the Director-General within such time that the Director-General may specify.

Pre-Construction Compliance Report

3. At least one month prior to commencement substantial construction (or within such period as otherwise agreed by the Director-General), the Proponent shall submit to the Director-General a compliance report detailing compliance with all relevant conditions that apply prior to commencement of substantial construction and shall address:

   (a) the dates of submissions of the various studies and/or requirements of various relevant conditions, and their approval and terms of approval; and
   (b) action taken and/or proposed to implement the recommendations made in terms of approvals and/or studies.

Pre-Operation Compliance Report

4. At least one month prior to commencement of operation of the tunnel (or discrete sections of the proposal as agreed by the Director-General), the Proponent shall submit to the Director-General a compliance report detailing compliance with all relevant conditions that apply prior to commencement of operation and shall include:

   (a) results of environmental monitoring required under this Approval including interpretation and discussion by a suitably qualified person;
   (b) a record of all complaints and the action taken to mitigate all such complaints;
   (c) recommendations in regard to compliance issues; and
   (d) action taken and/or proposed to implement the recommendations made in terms of approvals and/or studies.

The period of one month referred to in this condition above may be altered as agreed by the Director-General.

> *Note:*
> *The Director-General shall provide a response to Conditions 3 and 4 within 1 month of receipt of all relevant information from the Proponent assuming receipt of adequate and sufficient information. If a request is made by the Director-General for additional information, the period of time that elapses between the date on which the Proponent receives the request and the date on which the additional information is provided to the Director-General shall not be taken into account in the 1 month period referred to. Any requests for additional information shall be made by the Director-General within 2 weeks of receipt of all relevant information from the Proponent.*

Project Commencement

5. The Proponent shall notify the Director-General and all relevant authorities in writing of the project commencement both in terms of construction and tunnel operation at least 2 weeks prior to the relevant commencement date.

Dispute Resolution

6. The Proponent shall endeavour, as far as possible, to resolve any dispute between relevant public authorities arising out of the implementation of the conditions of this approval. Should this not be possible, the matter shall be referred firstly to the chief executives and directors of the agencies involved. If the matter cannot be resolved then it shall be referred to the Minister for resolution. The Minister's determination of the disagreement shall be final and binding on all parties.

Contact Telephone Number

7. Prior to the commencement of construction, the Proponent shall institute, publicise and list with a telephone company a 24 hour toll-free complaints contact telephone number, which would enable any member of the general public to reach a person who can arrange appropriate response action to the complaint within two hours.

Complaints Register

8. The Proponent shall record details of all complaints received during construction and ensure that at least a verbal response on what action is to be undertaken is provided to the complainant within 2 hours (unless the complainant agrees otherwise) and a detailed written response within seven (7) calendar days. Information on all complaints received and response times shall be made available to the EMR at the end of day and to the Director-General every three months or any other time specified during construction. This information shall be made available to all relevant government agencies on request. The Proponent shall nominate an appropriate person(s) to receive, log, track and respond to complaints within the specified timeframe. The name and contact details of this person(s) shall be provided to the relevant Council(s) and the Director-General upon appointment or upon any changes to that appointment, but at least one week prior to the commencement of substantial construction.

Advertisement of Activities

9. Prior to the commencement of construction, and then at three-monthly intervals, the Proponent shall advertise in relevant local newspapers, the nature of the works proposed for the forthcoming three months, the areas in which these works are proposed to occur, the hours of operation, a contact telephone number and internet site.

   The Proponent shall ensure that the local community and businesses are kept informed (by appropriate means such as: local newsletters, leaflets, newspaper advertisements, and community notice boards, etc.) of the progress of the project, including any traffic disruptions and controls, construction of temporary detours and work required outside the nominated working hours, including noisy works, prior to such works being undertaken.

10. The Proponent shall establish a project internet site prior to the commencement of construction and maintain the internet site until 12 months after commencement of operation of the project. This internet site shall contain monthly updates of work progress and consultation activities, including but not limited to:

    (a) a description of relevant approval authorities and their areas of responsibility;
    (b) a list of environmental management reports that are publicly available and the executive summaries of those reports;
    (c) minutes of community liaison group meetings;
    (d) bi-monthly newsletters;
    (e) contact names and phone numbers of the project communications staff; and
    (f) 24 hour toll-free complaints contact telephone number.

    Updates of work progress and construction activities shall be provided more frequently where significant changes in the noise impacts are expected.

Community Consultation

Community Liaison Groups

11. The Proponent shall:

    (a) establish appropriate representative Community Liaison Groups, having considered the *Guidelines for the Establishment of the Community Liaison Groups* (see Attachment 1);
    (b) ensure that the first meeting is held prior to submission of the Construction Environmental Management Plan required under Condition 17;
    (c) nominate a chair to be approved by the Director – General;
    (d) allow the Groups to make comments and recommendations about the implementation of the development and environmental management plans, monitor compliance with conditions of this approval and other matters relevant to the operation of the development during the term of the consent;
    (e) ensure that the Groups have access to the necessary plans and information for such purposes;
    (f) consider the recommendations and comments of the Groups and provide a response to the Groups and Director-General;
    (g) ensure that the Community Liaison Groups and the Air Quality Community Consultative Committee required by the Conditions of Approval shall be appropriately co-ordinated in terms of nominees, issues covered by each committee and updates from the Air Quality

Community Consultative Committee to the Community Liaison Groups;

The Proponent shall bear all costs associated with the establishment and ongoing function of the Groups.

Community Involvement Plan

12. The Proponent shall prepare a Community Involvement Plan for the construction period, which would be in place prior to commencement of construction. The Community Involvement Plan shall set out the community consultation procedures for the project, which shall comply with the obligations under the approval from the Minister, other approvals, licences and permits. The Community Involvement Plan shall also include:

    (a) identification of the local community likely to be affected by the project, including identification of residences, businesses and other sensitive land uses;
    (b) procedures for the establishment and functioning of the Community Liaison Groups in accordance with Condition 11;
    (c) procedures for informing users of the affected road network of planned traffic arrangements including temporary traffic switches;
    (d) procedures for informing the local community of planned investigation and construction operations;
    (e) provisions for dealing with complaints (particularly night time) and response requirements as specified in Condition 8.
    (f) provision for the Proponent's attendance and participation in all groups and public meetings forming part of the Community Involvement Plan; and
    (g) the provision of training for all employees and sub-contractors on the requirements of the Community Involvement Plan.

Independent Community Liaison Representative

13. The Director- General shall approve the appointment of the person nominated to serve as the Independent Community Liaison Representative (ICLR), for the duration of the construction period, to:

    (a) attend local community liaison group meetings;
    (b) oversee the community consultation obligations;
    (c) be available for direct contact from the community within reasonable hours; and,
    (d) to the greatest extent practicable resolve all community complaints.

    The ICLR shall:

    (e) be experienced in mediating planning disputes; and
    (f) contact the EMR immediately if, in the opinion of the ICLR, an unacceptable noise or other impact is being generated.

The Proponent shall bear the cost of employment of the ICLR.

Display Centres

14. At least two (2) display centres shall be established, staffed and maintained at or near the William Street and the Harbour Street construction sites, at least up until commencement of operation of

the project. The two (2) display centres shall be established prior to the commencement of substantial construction with at least one display centre being established prior to the commencement of construction. The ICLR shall be based at one of the display centres. The display centres shall be open between 10:00 am and 6:00 pm on business days. Up-to-date photographs, diagrams, samples and other suitable material shall be provided at each display centre, covering at least:

(a) noise and retaining wall locations, details and finishes;
(b) landscape concept, cross section treatments, perspective views and details;
(c) buildings;
(d) bridges;
(e) tunnels;
(f) overall architectural and landscape design theme;
(g) ventilation technology and ventilation stack design; and
(h) temporary works affecting businesses, residences, pedestrians and public transport users.

A dedicated PC internet access point to the internet site shall be provided in each display centre. A dedicated phone line shall be provided from one display centre to the centre where the ICLR is based.

Environmental Management

Environmental Management Representative

15. Prior to the commencement of construction, the Director- General shall approve the appointment of the person nominated to serve as the Environmental Management Representative (EMR). In considering the appointment, the Director- General shall take into account:

    (a) the qualifications and experience of the EMR including demonstration of general compliance with the principles of AS/NZS ISO 14012:1996 *Guidelines for Environmental Auditing : Qualification criteria for environmental auditors*;
    (b) the role and responsibility of the EMR; and,
    (c) the authority and independence of the EMR including details of the Proponent's internal reporting structure. This shall include the authority to stop work immediately if, in the view of the EMR, an unacceptable impact is likely to occur or to require other reasonable steps to be taken to avoid or minimise any adverse impacts.

The EMR shall have responsibility for:

    (d) Consideration and advice on matters specified in the conditions of approval;
    (e) Compliance with these conditions; and
    (f) Facilitation of an induction and training program for all persons involved with the construction works.

The EMR shall immediately advise the Proponent and the Director-General of any major issues resulting from the construction of the project that have not been dealt with expediently or adequately by the Proponent.

The EMR shall be available during construction activities at the site and be present on-site during any critical construction activities as defined in the relevant Environmental Management Plan (EMP) or Construction Method Statements (CMSs).

Environmental Management System

16. The Proponent shall ensure the appointment of construction and/or operation head contractors that have an Environmental Management System prepared in accordance with the AS/NZS ISO 14000 series or BS7750-1994 certified by an accredited certifier and/or have a proven environmental management performance record.

Construction Framework Environmental Management Plan

17. Prior to the commencement of construction, a Construction Framework Environmental Management Plan (EMP) shall be prepared, following consultation with the EPA, DoH, DLWC, SHFA, SSCC, CCS and all relevant utility/service providers. The Construction Framework EMP shall be prepared in accordance with the conditions of this approval, all relevant Acts and Regulations and accepted best practice management Sub Plans.

    The Construction Framework EMP shall require approval by the Director-General prior to the commencement of substantial construction or within such time as otherwise agreed to by the Director-General. The Construction Framework EMP shall be certified by the EMR as being in accordance with the Conditions of Approval and all undertakings made in the EIS and Representations Report as amended by the Addendum and as updated by the Supplementary EIS and Supplementary Representations Report, prior to seeking approval of the Director-General.

    Note:
    The Director-General shall provide a response to the Construction Framework EMP within 1 month of receipt of all relevant information from the Proponent assuming receipt of adequate and sufficient information. If a request is made by the Director-General for additional information, the period of time that elapses between the date on which the Proponent receives the request and the date on which the additional information is provided to the Director-General shall not be taken into account in the 1 month period referred to. Any requests for additional information shall be made by the Director-General within 2 weeks of receipt of all relevant information from the Proponent.

    The Construction Framework EMP shall include:

    (a) reference and proposed timeframes for all the Sub Plans required under this Approval;
    (b) the role of the EMR;
    (c) details of the community consultation process and identification of the role of the ICLR;
    (d) definition of the role, responsibility, authority, accountability and reporting of personnel relevant to compliance with the Construction Framework EMP;
    (e) a matrix of Construction Method Statements (CMS) required to construct the project, including an assessment of the predicted level of risk and potential level of public interest posed by each CMS and indicative timeframes for completion; and,
    (f) propose a response time-frame for all CMS to be approved by the Director-General.

    The Construction Framework EMP shall be made publicly available.

Construction Method Statements

18. The Proponent shall prepare in consultation with the relevant government agencies and the CLGs, Construction Method Statements (CMS) for all construction methods and/or major construction

work sites to be utilised during construction in accordance with the Framework Construction EMP required by Condition 17. The Director-General shall nominate the CMSs that will require approval by the Director-General. Those CMSs not requiring the approval of the Director-General shall require the certification of the EMR as being in accordance with the Conditions of Approval and all undertakings made in the EIS and Representations Report as amended by the Addendum, and as updated by the Supplementary EIS and Supplementary Representations Report. Any CMS to be approved by the Director-General shall be submitted to the Department following certification by the EMR no less than one (1) month prior to the proposed commencement of the relevant construction activities.

Each CMS shall include, but not be limited to:

(a) construction activities and processes associated with the relevant construction site(s), including staging and timing of the proposed works;
(b) specific hours of operation for all key elements including off-site movements;
(c) cover specific environmental management objectives and strategies for the main environmental system elements and include, but not be limited to: noise and vibration; air quality; water quality; erosion and sedimentation; access and traffic; property acquisition and/or adjustments; heritage and archaeology; groundwater; acid sulfate soils, spoil stockpiling and disposal; waste/resource management; weed management; flooding and stormwater control; geotechnical issues; visual screening, landscaping and rehabilitation; hazards and risks; energy use, resource use and recycling; and utilities; and
(d) address, but not be limited to:
    (i) identification of the statutory and other obligations which the Proponent is required to fulfil during project construction, including all approvals and consultations/agreements required from other authorities and stakeholders, and key legislation and policies which control the Proponent's construction of the project;
    (ii) measures to avoid and/or control the occurrence of environmental impacts;
    (iii) changes to loss of on-street parking;
    (iv) measures (where practicable and cost effective) to provide positive environmental offsets to unavoidable environmental impacts;
    (v) definition of the role, responsibility, authority, accountability and reporting of personnel relevant to compliance with the CMS;
    (vi) site specific environmental management techniques and processes for all construction processes which are important for the quality of the environment in respect of permanent and/or temporary works;
    (vii) site specific monitoring, inspection and test plans for all activities and environmental qualities which are important to the environmental management of the project, including performance criteria, tests, and protocols (eg. frequency and location);
    (viii) locational details of important elements such as temporary noise barriers; portable offices and amenities; truck, plant and materials storage; access locations; provision of site hoardings etc;
    (ix) environmental management instructions for all complex environmental control processes which do not follow common practice or where the absence of such instructions could be potentially detrimental to the environment;
    (x) steps the Proponent intends to take to ensure that all Plans and Sub Plans are being complied with;
    (xi) consultation requirements with relevant government agencies; and
    (xii) community consultation and notification strategy (including local community, businesses, relevant government agencies, and all relevant Councils), and complaint handling procedures.

Specific requirements of the main environmental system elements referred to in (c) shall be as required under the conditions of this approval and/or as required under any licence or approval. All CMS shall be made publicly available.

Environmental Monitoring – Construction

19. The Proponent shall submit to the Director-General a report(s) in respect of the environmental performance of the construction works and compliance with the Construction Framework EMP, all relevant CMS and any other relevant conditions of this approval. The reports shall be prepared six months after the start of substantial construction and thereafter at six monthly intervals or at other such periods as requested by the Director-General to ensure adequate environmental performance over the duration of the construction works. The report(s) shall include, but not be limited to, information on:

    a) applications for consents, licences and approvals, and responses from relevant authorities;
    b) implementation and effectiveness of environmental controls and conditions relating to the work undertaken;
    c) identification of construction impact predictions made in the EIS and any supplementary studies and details of the extent to which actual impacts reflected the predictions;
    d) details and analysis of results of environmental monitoring;
    e) number and details of any complaints, including summary of main areas of complaint, action taken, response given and intended strategies to reduce complaints of a similar nature; and
    f) any other matter relating to the compliance by the Proponent with the conditions of this approval or as requested by the Director-General.

    The report(s) shall be provided to the EPA, DLWC relevant Councils and any other relevant government agency nominated by the Director-General. The report(s) shall also be made publicly available.

20. The Proponent shall ensure that it has an internal audit system and that internal audits are undertaken and certified by the EMR every three (3) months to ensure compliance with the EMP, the conditions of approval and all other relevant licences and approvals. Each audit must be completed within 6 weeks of the end of the 3 month period and be made available to the Director-General upon request.

Operational Environmental Management Plan

21. An Operational Environmental Management Plan (OEMP) shall be prepared prior to the commencement of operation. The Plan shall be prepared in consultation with the EPA, DLWC, DoH, SHFA, SSCC, CCS and any other relevant government agency nominated by the Director-General. The Plan shall be prepared in accordance with the conditions of this approval, all relevant Acts and Regulations and accepted best practice management Sub Plans.

    The OEMP shall require approval by the Director-General prior to commissioning or within such time as otherwise agreed to by the Director-General. The EMP shall be certified as being in accordance with the conditions of approval by the EMR prior to seeking approval of the Director-General.

    Note:
    The Director-General shall provide a response to the Operational EMP within 1 month of receipt of all relevant information from the Proponent, assuming receipt of adequate and sufficient information. If a request is made by the Director-General for additional information the period of time that elapses between the date on which the Proponent receives the request and the date on which the additional information is provided to the Director-General shall not be taken into account in the 1 month period referred to. Any requests for additional information shall be made by the Director-General within 2 weeks of receipt of all relevant information from the Proponent.

The OEMP shall address at least the following issues:

a) identification of the statutory and other obligations which the Proponent is required to fulfil, including all licences/approvals and consultations/agreements required from authorities and other stakeholders, and key legislation and policies which control the Proponent's operation of the project;
b) sampling strategies and protocols to ensure the quality of the monitoring program, including the specific requirements of DLWC and EPA;
c) monitoring, inspection and test plans for all activities and environmental qualities which are important to the environmental performance of the project during its operation, including a description of potential site impacts, performance criteria, specific tests and monitoring requirements, protocols (eg. frequency and location) and procedures to follow;
d) steps the Proponent intends to take to ensure compliance with all plans and procedures;
e) consultation requirements, including relevant government agencies, the local community and Council, and complaints handling procedures; and
f) strategies for the main environmental system elements including, but not limited to: noise; water quality; erosion and sedimentation; access and traffic; groundwater; settlement; waste/resource management/removal/disposal; hydrology and flooding; visual screening, landscaping and rehabilitation; hazards and risks; and energy use, resource use and recycling.

Specific requirements for some of the main environmental system elements referred to in (f) shall be as detailed under the conditions of this approval and/or as required under any licence or approval.

The OEMP shall be made publicly available.

All sampling strategies and protocols undertaken as part of the Operational EMP shall include a quality assurance/quality control plan and shall be approved by the relevant regulatory agencies to ensure the effectiveness and quality of the monitoring program. Only accredited laboratories can be used for laboratory analysis.

Environmental Impact Audit Report

22. An Environmental Impact Audit Report shall be submitted to the Director-General, 2 and 7 years from the start of operations or at any time as requested by the Director-General within the first 10 years of operation. The environmental impact audit report shall be undertaken by an independent person(s) or organisation approved by the Director-General and paid for by the Proponent. The Report shall assess the key impact predictions made in the EIS, Representations Report and as updated by the Supplementary EIS, Supplementary Representations Report and any supplementary studies and detail the extent to which actual impacts reflect the predictions during the first 12 months of operation and any other periods as required. The Report shall provide details on actual versus predicted impacts for all key issues identified in the EIS, Representations Report and as updated by the Supplementary Representations Report and Supplementary EIS. The suitability of implemented mitigation measures and safeguards shall also be assessed. The Report shall also assess compliance with the Operational EMP.

The Report shall discuss results of consultation with the local community in terms of feedback/complaints on the construction and operation phases of the project and any issues of concern raised. The Proponent shall comply with all reasonable requirements of the Director-General, EPA and other relevant authorities with respect to any reasonable measure arising from, or recommendations in, the report.

The Report shall be made publicly available.

Harbour Street Exit

23. The Proponent shall make provision for the installation of electronic toll facilities that will enable charges of higher tolls for vehicles exiting to Harbour Street.

24. The Proponent shall provide a report to the Director-General on traffic using the Harbour Street exit, including a specific assessment of the proportion of traffic with destinations to the east of and including George Street. The traffic assessment shall be undertaken after 12 months of operation, and thereafter, 3 years then 10 years after opening, and shall be provided to the Director-General within 3 months of the end of the required periods. Should the assessment indicate a significant infiltration of traffic from the Harbour Street exit, east of George Street, the Proponent shall prepare a report in consultation with PTC on potential mitigation measures including further traffic management measures and/or a congestion toll. No toll shall be charged to buses providing public transport services (not including those used for commercial hire or ventures) at any time. Any bonus revenue generated by the Harbour Street exit shall be put towards public transport, pedestrian, cyclist, air quality and other amenity improvements as agreed by the PTC. For the purposes of this Condition, if the PTC has ceased, any reference to the PTC shall mean the Director-General.

Public Transport Enhancement Measures

Contingency Funds

25. The Proponent shall set aside the sum of $5 million to be used for implementing any additional operation stage measures resulting from investigations required as part of these conditions of approval and/or further offset measures including air quality improvement measures (i.e. commercial cooking emission controls, assisting Sydney Buses in converting to less pollution emitting fuel sources), public transport improvement, pedestrian and cyclist improvements and/or for any other measure as required by the Director-General.

Pre-construction Stage

26. The Proponent shall ensure that any construction and/or operation contract arrangement shall not preclude any future public transport developments outside the Tunnel.

27. Prior to commencement of any substantial construction works the Proponent shall establish a Cross-City Tunnel Public Transport Committee (PTC) to be chaired by the DoT. The key role of the PTC shall be to:

    (a) co-ordinate the concerns and interests of relevant local and state transport agencies relating to the proposal;
    (b) ensure adverse impacts of the construction and operation of the CCT on public transport are minimised;

(c) identify opportunities and develop plans and strategies for maximising short and long term public transport opportunities during construction, including but not limited to: education programs for the public and affected businesses; public transport improvements beyond those already identified as part of these conditions of approval including but not limited to: bus only routes, bus signals, bus priority lanes, enhanced bus and rail services; public transport incentives such as free bus and train travel days particularly during peak disturbance periods; giving due consideration to pedestrians and cyclists and other users of the city; and,

(d) ensure that any plans and strategies are implemented to ensure that potential benefits to public transport are captured and maintained throughout the construction and operational life of the project.

The Proponent shall following consultation with the DoT, submit a detailed set of requirements for constituting and funding the operations of the PTC for approval by the Director-General, within 6 months of this approval.

The PTC shall invite representatives from at least the RTA, NSW Police Service, STA and DoT. The PTC shall also consult with the relevant Council(s) on a regular basis and shall consider any issues, advice and submissions from the relevant Council(s). The PTC shall provide the relevant Council(s) with written advice within a reasonable time-frame on how any issues raised have been addressed.

The Proponent shall provide appropriate funding assistance to ensure appropriate facilities for and resourcing of the PTC.

The PTC shall continue for at least 3 years after opening of the tunnel unless otherwise agreed by the Director-General.

The Proponent shall prepare a bi-annual report to the Director-General on the progress and outcomes of the PTC process, including results of communications with relevant local Council(s) and the application of these conditions of approval (where relevant) and shall make the report publicly available. The PTC shall take into account any comments/requirements raised by the Director-General.

28. The Proponent shall, in consultation with the PTC, develop measurable performance indicators for bus efficiencies (including consideration of bus timetables), occurring as a result of the project taking into account the existing performance and predictions made in the EIS, Representations Report and as updated by the Supplementary EIS and Supplementary Representations Report.

29. The Proponent shall consult all affected schools in relation to all practicable measures to be taken to avoid undue disruption from altered school bus services during construction.

30. The Proponent shall consult with CCS with regard to the final design of kerb realignments for Park Street, between College and Elizabeth Streets.

Construction Stage

31. Prior to the commencement of substantial construction, a Construction Stage Public Transport Management Plan(s) shall be prepared as part of the Framework Traffic Management Plan in consultation with the SRA, RIC, CCS, SSCC, STA, Bus and Coach Association, Sydney Light Rail, NSW Taxi Council and monorail operator and to the satisfaction of the PTC. The Plan shall address the potential impact of construction activities on public transport. The objective of the Plan

shall be to achieve, to the greatest degree practicable, at least pre-construction level use of buses and high occupancy vehicles.

Note:
The PTC shall be requested to provide a response to this Condition within 1 month of receipt of all relevant information from the Proponent assuming receipt of adequate and sufficient information. If a request is made by the PTC for additional information, the period of time that elapses between the date on which the Proponent receives the request and the date on which the additional information is provided to the PTC shall not be taken into account in the 1 month period referred to.

32. The Proponent shall, to the satisfaction of the PTC, resolve the need to re-route any bus services and in particular the 311 bus service to Cathedral and Crown Streets for the duration of the closure of Bourke Street.

33. Prior to substantial construction commencement, the Proponent shall develop a Rail Safety Plan to the satisfaction of RIC and SRA. The plan shall address maintenance of safe train operations during construction of the CCT including:

    (a) the safety and well being of passengers, staff, tenants and others in stations including a specific noise and vibration impact statement for Town Hall Station;
    (b) methods and means of monitoring construction impacts on rail infrastructure facilities and stations and their operations including the electrical systems for the city underground rail system, including demonstration of how the power supply to the city underground rail lines would not be adversely affected, and,
    (c) emergency responses including the immediate cessation of construction to address incidents that could affect train operational safety, and passenger and staff safety.

Operation Stage

34. The Proponent shall ensure to the satisfaction of the PTC that the proposal does not prevent or impose significantly greater cost implications for future provision of a light rail system within Sydney CBD.

35. All STA buses and any other buses providing scheduled public transport services shall be exempt from all CCT tolls.

36. The Proponent shall in consultation with the PTC review the bus performance indicators developed in Condition 28 (including bus timetables) at 6 months after opening, then after 1 and 3 years of operation. The Proponent shall initiate, at its own expense and where practicable, any actions as reasonably required by the PTC to achieve the bus performance indicators to the greatest extent practicable.

37. The Proponent shall manage the Sydney Co-ordinated Adaptive Traffic System (SCATS) to optimise public transport traffic flow efficiency through the CBD at all times, including implementation of real-time dynamic bus priority on key CBD approach corridors including William Street, Oxford Street, Parramatta Road and City Road and consideration of any other roads nominated by the PTC. In managing SCATS, the Proponent shall take into account any reasonable issue raised by the PTC and report back to the PTC on such issues.

38. The following bus priority measures, or as otherwise agreed with PTC, shall be developed in consultation with the relevant community groups nominated by the PTC. The bus priority measures are:

    (a) Creation of new bus lanes on:

        (i) Western Distributor (westbound) between the Druitt Street ramp and the Anzac Bridge (where feasible);
        (ii) Chalmers Street and Elizabeth Street between Redfern and Foveaux Streets;
        (iii) Bridge Street (eastbound), between George and Loftus Streets; and,
        (iv) Liverpool Street (eastbound) between Elizabeth and College Streets.

    (b) Investigate potential for new bus lanes or transit lanes on:

        (i) Pitt Street between Alfred and Hunter Streets;
        (ii) Park Street, between Elizabeth and George Streets.
        (iii) Ocean Street;
        (iv) New South Head Road between Kings Cross Tunnel and Ocean Street;
        (v) Victoria Road (outbound) to match inbound transit lane (from Cressy Road Gladesville); and,
        (vi) Anzac Bridge (outbound).

    (c) Marking of the Castlereagh Street bus lane in red;

    (d) examine the feasibility of making Druitt Street eastbound a bus only lane between Kent Street and George Street or between Clarence Street and George Street;

    (e) Progress the planning, consultation and implementation of measures to prohibit general traffic from using the section of York Street between Market Street and Druitt Street which would continue to operate as a key bus interchange facility;

    (f) If appropriate, identify improvements to the transfer capability of Park Street, including footpath improvements with bus stops and increased capacity for "through" buses to negotiate the traffic;

    (g) Develop a real time congestion monitoring system and associated protocol to facilitate the pre-emptive diversion of buses off key corridors prior to being trapped on congested CBD corridors;

    (h) If agreed by the PTC, include a bus only right hand turn traffic signal at the corner of George and Druitt Streets;

    (i) Develop and fund measures (such as relocation of street furniture, etc) to improve the interface between pedestrians and bus commuters in the zones adjacent to bus stops in William Street, in consultation with the PTC;

    (j) Ensure that changes to existing pedestrian access will be undertaken in consultation with and to the satisfaction of CCS. In particular, the Proponent shall consult with CCS in regard to changes in Druitt Street, Market Street and Sussex Street; and,

    (k) Consult with CCS and DoT with regards to any changes to the signalised scramble crossing at George, Park and Druitt Streets.

39. Subject to outcome of current trials and legislative amendments, the Proponent shall implement digital cameras or such other measures as appropriate, to assist in enforcing appropriate use of bus lanes throughout the CBD and key approach roads.

40. Prior to the operator collecting any toll, the Proponent shall have in place, and to the greatest extent practicable (including agreement on all funding requirements and an implementation program), all the necessary bus priority measures referred to in Condition 38 formulated to the satisfaction of the PTC. The implementation of such measures including any associated construction works shall be completed within 3 months of commencement of toll collection. Any extension of time beyond the 3 month period shall be specifically approved by the Director-General following consultation with the PTC.

41. The Proponent shall, in consultation with the PTC, investigate the feasibility of an electronic based passenger information system to provide arrival information for passengers at key City feeder bus stops impacted by the proposal, including major stops along William Street, Oxford Street and New South Head Road or other streets as agreed by the PTC.

42. The Proponent shall consult with the PTC regarding the dual left turn from Clarence Street to Market Street and the proposed southbound right hand turn bay for buses at George and Druitt Streets with respect to potential impacts on parking, traffic lanes, bus lanes and bus zones and intersection arrangements and shall comply with any reasonable requirement of the PTC.

43. Prior to commencing operation of the CCT, the Proponent shall prepare an Operations Rail Safety Plan to the satisfaction of RIC and SRA. The plan shall address:

    (a) matters resulting from the operation of the project and incidents in the Tunnel that could affect safe train operations and the safety and well being of passengers and staff in stations and their environs;
    (b) matters resulting from the operation of rail infrastructure facilities and stations and incidents that could affect safe Tunnel operations;
    (c) procedures for the notification of incidents and emergencies; and
    (d) responses to emergencies identified in a risk analysis.

44. The Proponent shall, In consultation with RIC and SRA, conduct regular (at least 6 monthly) testing and review of the Operation Rail Safety Plan's effectiveness, including co-ordination with emergency services, RIC, SRA and the operator of the project. The Proponent shall provide and maintain a communications link between the CCT Control Centre and a train control centre nominated by the SRA.

Construction Stage Traffic Impacts

Pre construction Stage

45. The Proponent shall prepare a Framework Traffic Management Plan for overall traffic arrangements during the full construction period. The Plan shall include, with respect to the project as a whole:

    (a) cumulative impacts of multiple construction sites;
    (b) measures to manage traffic flows through and surrounding the project, including regulatory and direction signposting, line marking and variable message signs;
    (c) management of the Sydney Co-ordinated Adaptive Traffic System (SCATS) to optimise traffic flow efficiency particularly for public transport at all times, particularly during peak periods; and

(d) identify any regulatory measures to improve the efficiency of traffic conditions.

The Plan shall take into account both local and regional traffic impacts and shall at all stages give priority to public transport and pedestrian movements. The Plan shall be approved by the PTC prior to substantial construction commencement.

Note:
The PTC shall be requested to provide a response to this Condition within 1 month of receipt of all relevant information from the Proponent assuming receipt of adequate and sufficient information. If a request is made by the PTC for additional information, the period of time that elapses between the date on which the Proponent receives the request and the date on which the additional information is provided to the PTC shall not be taken into account in the 1 month period referred to.

46. The Proponent shall prepare individual Traffic Management Plans (TMPs) for each construction site in accordance with the Framework Construction Traffic Management Plan required by Condition 45, and in consultation with relevant local councils and other agencies, prior to commencement of substantial construction affecting that area. The individual TMPs shall be incorporated into the relevant Construction Method Statements required under Condition 18. The individual TMPs shall include, but not be limited to:

(a) impacts on all existing traffic (including pedestrians, vehicles, cyclists and disabled persons), including the staging of construction works to minimise road closures and delay or detours to traffic;
(b) access to construction sites and site compounds, including minimising the disruption from construction vehicles entering and leaving construction sites and site compounds;
(c) any changes to existing number and width of traffic lanes;
(d) maximum and average truck volumes and expected hourly distribution;
(e) truck ingress and egress routes;
(f) entry/exit locations;
(g) nature of loads and materials;
(h) temporary traffic arrangements, including the identification and promotion of alternative routes;
(i) no heavy vehicle queuing on public roads unless otherwise agreed by the relevant Council(s);
(j) provision of barriers between working and trafficked areas;
(k) the impact on pedestrian and bicycle facilities, including measures to ensure safe pedestrian and cycle routes and access at all times, and the provision of alternative facilities and locations for pedestrians and cyclists;
(l) the provision of safe and convenient access to all bus stops;
(m) signposting;
(n) stormwater drainage;
(o) methods for implementing the TMP;
(p) access to side streets;
(q) access to adjoining properties, which would be maintained at all times wherever practicable;
(r) road or lane closures;
(s) the use of cranes on public roads;
(t) deliveries to construction sites and site compounds;
(u) a response plan which sets out the proposed response to any traffic, construction or other incident; and,
(v) appropriate review and amendment mechanisms.

The TMP shall be certified by an experienced traffic/transport planner who shall be engaged

throughout the construction stage to advise on implementation issues and amendments and as a key liaison contact for the relevant local Councils.

47. The Proponent shall as part of its construction stage monitoring required under Condition 19, monitor traffic changes during construction on regional and local streets in Paddington, Ultimo, Pyrmont, Glebe, Darlinghurst, East Sydney and Woolloomooloo. Should monitoring indicate traffic intrusion above predicted levels on these streets as a result of the construction of the proposal the Proponent shall also prepare and implement LATM for these areas following consultation with the relevant Council(s).

Construction Management

48. The Proponent shall monitor the performance of all project traffic arrangements during construction, including any impact of bus operations and prepare quarterly reports to the PTC. The report shall be made available to the Director-General upon request.

49. The Proponent shall review the TMPs as required by, and in consultation with, the PTC. The Proponent shall implement any additional public transport management measures as reasonably required by the PTC.

50. The Proponent shall ensure that the proposed traffic arrangements during construction are in accordance with Table 8.1 Section 12.1.5 of the Representations Report as modified by the Supplementary EIS, as modified by the Supplementary Representations Report unless otherwise agreed by the PTC. In the event of any inconsistencies the most recent assessment document as modified by the conditions of Approval shall prevail.

51. The Proponent shall take all reasonable steps to ensure that all heavy vehicles travel to and from all construction sites via State roads and/or the routes specified in the EIS, Representations Report and as updated by the Supplementary EIS and Supplementary Representations Report. In the event of any inconsistency the most recent assessment document as modified by the Conditions of Approval shall prevail.

52. The Proponent shall ensure that access and egress to the additional site compound on Palmer Street is left in/left out or signal controlled unless otherwise agreed by the Traffic Committee of the relevant local Council in whose area the site compound is located.

53. The Proponent shall ensure that all businesses affected by altered traffic arrangements are consulted at least 10 days prior to any affectation and shall endeavour where reasonable and feasible to maintain critical access at all times.

54. For the duration of the project construction, parking shall only be provided for senior site personnel, visitors and delivery vehicles. No construction personnel shall be allowed to park at any construction sites.

55. For the duration of the project, the construction sites, site compounds and surrounding areas shall be maintained in a generally clean and tidy condition.

Regional Traffic

56. The Proponent shall ensure adequate monitoring of the local and regional road network is conducted prior to the opening of the tunnel to provide an appropriate base line for measuring any

future impacts resulting from the construction and/or operation of the tunnel. Key impact prediction shall include traffic volumes on approach and departure routes, key central Sydney streets and local streets. The Proponent shall consult with and take into account comments from the PTC and relevant Council(s) regarding the methodology and timing of the study.

57. As part of the TMP identified in Condition 46, the Proponent shall work with the relevant local councils to ensure that traffic impacts within the regional road network affected by the proposal are consistent with the predictions made in the EIS, Representations Report, Supplementary EIS and Supplementary Representations Report and managed in consultation with the relevant local council(s). In the event of any inconsistency the most recent Assessment Document as modified by the Conditions of Approval shall prevail.

58. The Proponent shall undertake a comprehensive assessment of all roads identified in Table 5.7 of the Director-General's Report, and shall, in consultation with the PTC, develop measures to reduce roadway capacity where practicable.

Local Traffic

Local Area Traffic Management

59. Within 6 months of this approval the Proponent shall in consultation with the PTC, NSW Police, Emergency Services, relevant local Council(s) and community representatives, commence the preparation of the Local Area Traffic Management (LATM) measures for Paddington as defined in Appendix 7 of the Representations Report and shall include as a minimum unless otherwise agreed by the relevant local Council(s) the following:

    (a) traffic calming on Brown Street/Nield Avenue between Macdonald and Lawson Streets; and,
    (b) traffic calming on Glenmore Road between New South Head Road and Cascade Street.

    The preparation of the LATM shall include a comprehensive consultation process, including the relevant government agencies as well as affected community, business and bicycle groups. The key objective of the LATM shall be to restrict through traffic and ensure that alternative routes for traffic wishing to avoid the toll are relatively unattractive.

    The measures listed above shall be installed at full cost to the Proponent as soon as practicable after finalising the LATM consultation process.

60. Prior to the operator collecting any toll, the Proponent shall have in place to the greatest extent practicable and have agreed on all funding requirements and an implementation program for the necessary LATM measures referred to in Condition 59. Despite the above, the implementation of such measures including any associated construction works shall be fully completed within 6 months of commencement of toll collection. Any extension of time for the full implementation of the LATM measures shall be specifically approved by the Director-General following consultation with the relevant local councils.

61. The Proponent shall, as part of its impact verification required under Condition 22, monitor traffic changes on regional and local roads/streets in Paddington, Ultimo, Pyrmont, Glebe (particularly Cowper Street and Bay Street), Darlinghurst, Bellevue Hill, Double Bay, Edgecliff, Rushcutters Bay, Woollahra (Ocean Street), East Sydney, Wolloomooloo, Haymarket (Chinatown) and CBD (St Marys Road, Macquarie Street and Hunter Street). Monitoring shall be undertaken for a representative periods at 1 and 3 years after opening. Should monitoring indicate traffic intrusion on these roads/streets reasonably beyond that predicted in the Supplementary Representations Report as a result of the operation of the proposal, the Proponent shall also prepare and implement traffic management measures to mitigate the impacts of intrusive traffic in the affected areas following consultation and agreement with the relevant Council(s) and consultation with the local communities In the event of any inconsistency the most recent Assessment Document as modified by the Conditions of Approval shall prevail.

62. The Proponent shall review the design and signal phasing of the Harbour Street and Bathurst Street intersection in consultation with the SHFA, CCS and to the satisfaction of the Director-General to ensure that pedestrian green times and intersection performance are appropriately balanced.

63. The Proponent shall ensure that the access/egress between the Domain car park and Sir John Young Crescent is maintained at all times.

Pedestrian and Cyclist Access

64. The Proponent shall maintain safe pedestrian access to the fullest extent possible during construction. In circumstances where pedestrian access is not possible due to construction activities, the Proponent shall ensure that a satisfactory alternate route is provided and sign posted.

65. The Proponent shall in consultation with the PTC develop measurable performance indicators for pedestrian walk times occurring as a result of the proposal. The performance indicators shall be reviewed 1 and 2 years after opening the tunnel. The Proponent shall, at its own expense, implement any measures as reasonably required by the PTC to achieve the indicators to the greatest extent practicable.

66. The Proponent shall ensure that all cycle lanes are 1.5 m wide and marked in accordance with Austroads *Guide to Traffic Engineering Practice*, Part 14 - Bicycles, 1999 including where appropriate, advanced stop lines.

67. Subject to the ongoing development of the CCS Bike Plan for the CBD, the Proponent shall, in consultation with Bicycle NSW, CCS and SSCC and to the satisfaction of the Director-General, develop and provide funding for the construction of a connection from the William/Park/Druitt Street cycle route to the Pyrmont Bridge and King Street Cycleway.

68. Subject to the ongoing development of the CCS Bike Plan for the CBD, the Proponent shall, in consultation with Bicycle NSW, SSCC and CCS, investigate a cyclist connection between Oxford Street and Darling Drive. In designing this connection, the Proponent shall investigate the provision of a two way cycle route in Liverpool Street between Harbour and Elizabeth Streets; a pedestrian and cyclist crossing at the intersection with Harbour Street; and investigate the establishment of a cycle route along the western footpath of Harbour Street or at the southern side of Pier Street. The Proponent shall submit a Report, prepared by a qualified bicycle planner, on the feasibility of this connection and shall comply with all reasonable requirements of the Director-General.

69. The Proponent shall, in consultation with Bicycle NSW, CCS and SSCC and to the satisfaction of the Director-General, develop a Plan and implement the construction of cycle lanes in William Street, Park Street, Kings Cross Road and Craigend Street. The cycle lane on Kings Cross Road shall include an east bound lane that extends to the Roslyn Street/Hickey Lane footbridge. The cycle lane on Craigend Street shall include a west bound link as shown in Figure 2.12 of the Supplementary EIS. The plan and construction shall be in accordance with the Addendum. Appropriate line marking shall be provided at bus stops, bus bays and intersections.

Business Impacts

70. Prior to construction commencement with the potential to impact on businesses, the Proponent shall prepare a Business Management Strategy in consultation with all businesses affected during the construction stage. The objective of the Strategy shall be to minimise impacts on local businesses through appropriate signage, maintaining vehicular and pedestrian access during business hours, minimising noise and dust impacts and retaining visibility of the business appropriate to its reliance on such. A draft Strategy shall be made available to all businesses, and to the relevant local Council(s) for comment for a period of no less than 21 days. The final Strategy shall indicate how any issues raised on the draft have been considered in the final Strategy. The Strategy shall be made publicly available.

Road Safety Audit

71. The Proponent shall undertake a Road Safety Audit during detailed design of the project and prior to commencement of substantial construction, including but not limited to:

    (a) reassessment of the length of the slip lane at the Bourke Street entry to the Eastern Distributor, in relation to the design speed of the entry to ensure acceleration/deceleration distances comply with the Austroads *Guide to Traffic Engineering Practice* – Part 5, 1998 and/or the *RTA Road Design Guide* (1993);
    (b) review of the design of bicycle facilities for compliance with the Austroads design criteria;
    (c) review of the safety implications of the horizontal curves on western approach to the tunnel, and the provision of appropriate sign posting; and
    (d) weaving/merging/diverging manoeuvres at eastern end between tunnel exit and Neild Avenue.

Darling Harbour Access

72. The Proponent shall provide access to Darling Harbour in accordance with the Addendum.

73. The final design details of the Darling Harbour access identified in the Addendum shall be developed in consultation with the SHFA and shall require approval by the Director-General within 6 months of substantial construction beginning. All pedestrian bridges shall be of high quality in terms of form, finish and materials and shall be designed by an architect with appropriate experience in urban pedestrian bridge design.

74. The Proponent shall ensure that the grade separated pedestrian access between Bathurst Street and the Darling Walk building (Harbour Street crossing), as shown on Figure 5.2 of the Director-General's Report is completed in either a temporary or permanent form and opened to pedestrians prior to construction works affecting this area. Prior to finalising of the permanent access arrangement, the Proponent shall consult with the SHFA to review the design adequacy of the eastern end of the proposed elevated footway, including consideration of extending the footway

over Day Street or other reasonable and feasible options as identified by SHFA. Final design shall require approval by the Director-General within 12 months of this approval.

75. Subject to resolution of the lessee arrangements for the Darling Walk building, the Proponent shall ensure that the permanent grade separated access between the Darling Walk building and the Kiosk, as shown on Figure 5.2 of the Director-General's Report is completed and opened to pedestrians as early in the construction period as practicable and, as a minimum, concurrently with the permanent, Harbour Street pedestrian bridge.

76. The Proponent shall also consult with the SHFA in relation to minimising disruption to:

    (a) traffic, pedestrian and cycle access to Darling Harbour during the construction period;
    (b) the operations of the SHFA and its tenants; and,
    (c) comply with the mitigation measures and strategies identified in Section 2.3 of the Addendum unless inconsistent with the other conditions of this approval.

77. The Proponent shall in consultation with CCS and SHFA provide a new footpath from Druitt Street to Bathurst Street including the western frontage of the Park Royal Hotel. The footpath shall be 3.6 metres wide wherever possible.

78. The Proponent shall also ensure the following specific measures are undertaken unless otherwise agreed by the SHFA:

    (a) provide safe pedestrian access along Druitt Street to the Darling Park footbridge to Darling Harbour for the duration of construction;
    (b) provide safe pedestrian access along Bathurst Street to the footbridge to Darling Walk for the duration of construction; and,
    (c) provide clear signposting of affected pedestrian access between the CBD and Darling Harbour for the duration of construction.

Tolling

79. A tolling system shall be implemented which:

    (a) is compatible with the existing standard for electronic tolling adopted throughout Sydney and Australia; and,
    (b) makes adequate provision for casual users.

Air Quality - Operation Stage

Note:
On the basis of ongoing assessment and evaluation of a number of tunnel proposals (including the M5 and Lane Cove Tunnel) a number of major improvements and clarifications have been made to air quality conditions. Subsequently an edited version became too difficult to decipher and a new complete and comprehensive revised set has been developed. Overall the conditions are more stringent than those originally developed. Reference to $PM_{2.5}$ in Condition 91 has been deleted on the basis of advice from the EPA. See Section 6.2 of the Director Generals Report.

Physical Requirements

80. Deleted. (See New Condition 247)

81. Deleted. (See New Condition 248)

82. Deleted. (See New Condition 249)

83. Deleted. (See New Condition 251)

84. Deleted. (See New Condition 252)

Air Quality Community Consultative Committee

85. Deleted. (See New Condition 256)

Portal Emissions

86. Deleted. (See New Condition 250)

87. Deleted. (See New Condition 250)

Monitoring of Ambient Air Quality

88. Deleted. (See New Condition 262)

Air Quality - In-Tunnel Limits

89. Deleted . (See New Conditions 258-259)

Monitoring of In-Tunnel Air Quality

90. Deleted. (See New Condition 257)

Verification of Air Quality Assessment

91. Deleted. (See New Condition 266)

Air Quality Goals – Ambient Air

92. Deleted. (See New Condition 267)

Air quality – Ventilation Stack Limits

93. Deleted. (See New Condition 271)

Exceedance of Limits and/or Goals

94. Deleted. (See New Conditions 262 and 267)

95. Deleted. (See New Condition 268)

Air Quality Monitoring Requirements – Ventilation Stack Emissions

96. Deleted. (See New Condition 270)

Operation Stage Monitoring Stations - Community Based Monitoring Station

97. Deleted. (See New Condition 263)

Operation Stage Monitoring Stations - Residents in High Rise Apartments (Elevated Receptors)

98. Deleted. (See New Condition 264)

Operation Stage Monitoring Stations - IMAX Building

99. Deleted. (See New Condition 264)

Operation Stage Monitoring Stations - Residents Living at Ground Level (Ground Level Receptors)

100. Deleted. (See New Condition 265)

Installation of Pollution Control Systems

101. Deleted. (See New Condition 251)

Public Access to Monitoring Results

102. Deleted. (See New Condition 269)

Local and Sub-Regional Air Quality Improvements

103. Deleted. (See New Condition 274)

104. Deleted. (See New Condition 275)

Air Quality Auditing and Quality Assurance

105. Deleted. (See New Conditions 276 to 279)

106. Deleted. (See New Conditions 277 to 279)

Property Matters

Pre-construction

107. Prior to the commencement of construction, the Proponent shall consult all affected landowners regarding any practicable and cost-effective measures to minimise impacts which may be beneficially implemented prior to the commencement of construction or within such time as agreed with the relevant landowner.

108. Subject to the receipt of permission of the landowner and occupier, building condition surveys shall be completed on the following buildings/structures at least 1 month prior to commencement of excavation construction works and major vibration inducing construction activities in the vicinity of such buildings/structures (including basements):

(a) all buildings/ structures within a plan distance equal to twice the invert depth from the edge of the tunnel and/or excavation works unless otherwise determined following geotechnical and vibration analysis as certified by a qualified geotechnical engineer as not likely to be adversely affected;
(b) all heritage buildings as identified in the Heritage and Archaeology Management Sub Plan required by Condition 175 and other sensitive structures within 100 metres from the edge of the tunnel and/or excavation works unless otherwise determined following geotechnical and vibration analysis as certified by a qualified geotechnical engineer as not likely to be adversely affected;
(c) buildings/structures on shallow or unknown footings to 150 metres from the edge of tunnelling works near the Sir John Young Crescent exit or the western portals unless otherwise determined following geotechnical and vibration analysis as certified by a qualified geotechnical engineer as not likely to be adversely affected; and,
(d) the sandstone walls around the perimeter of Hyde Park and along Sir John Young Crescent.

109. Geotechnical and vibration analysis shall be undertaken to assess where there is a potential for damage to each of the following buildings:

Town Hall Station, Town Hall House, York Street car park, Genting Centre, Australian Museum, The Citibank Tower/Park Plaza, Eastern Distributor tollway, Terrace Towers (80 William Street), Westfield Towers (100 William Street), Olivetti (140 William Street), Columbus Line (150 -162 William Street), Crown Garden Apartments (Riley Street), Darling Harbour Park Royal Hotel, Darling Park/Nestle Building, Oakford Development, Millennium Towers, and St Andrews Development (51 Druitt Street) Altair (3 Kings Cross Road), Elan (1 Kings Cross Road), Millennium Hotel (2 Kings Cross Road), Maestri Towers, MBF Building, Lobana, 70 William Street, and 52-58 William Street.

Where the analysis indicates impacts may occur, building surveys shall be undertaken subject to receipt of permission of the landowner and occupier.

> Note:
> This condition does not exempt the listed buildings from the requirements in Condition 108.

110. The Proponent shall advise all property owners of buildings to be surveyed, as defined in Condition 108, what the survey will entail and of the process for making a claim regarding property damage prior the commencement of building condition surveys. A copy of the survey shall be given to each affected owner. A register of all properties surveyed shall be maintained by the Proponent and provided to the Director-General upon request.

111. The Proponent shall ensure that the acquisition of any land shall be in a responsive and sensitive manner and in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*. The Proponent shall consult affected landowners prior to and during the property acquisition process. Where compensation is payable the Proponent shall pay for independent valuation and legal advice if so requested.

Construction

112. Prior to substantial construction commencement, the Proponent shall establish an Independent Property Impact Assessment Panel to be approved by the Director-General. Either the affected property owner or the Proponent may refer any unresolved disputes arising from potential and/or actual property impacts to the Panel for resolution. All costs incurred in establishing and implementing the Panel shall be borne by the Proponent.

113. Prior to the placement of appropriate permanent rock anchors, the Proponent shall notify the owners of all affected properties outside the existing boundary identified in relevant LEPs requiring developments to be referred to the RTA (as of the date of the EIS exhibition), of the need for placement of permanent rock anchors. The Proponent shall provide sufficient detail to each owner to enable the precise location of such anchors relative to existing buildings to be determined. The Proponent shall ensure if necessary, adjustments to construction methods, at no cost to the property owner, to ensure that the placement of any rock anchors or other such construction stage measure does not impose any restrictions on potential development of the affected property unless otherwise agreed by the landowner or where acquisition of easement(s) is undertaken in accordance with the *Land Acquisition (Just Terms) Compensation Act 1991*.

114. Prior to the placement of appropriate temporary soil anchors the Proponent shall notify all affected property owners of the need for placement of temporary soil anchors and shall provide sufficient detail to determine the precise location of such anchors relative to existing buildings. The Proponent shall instigate, if necessary, adjustments to construction methods at no cost to the property owner, to ensure that the placement of any temporary soil anchors or other such construction stage measure does not impose any restrictions on development (existing or proposed) unless otherwise agreed to by the landowner.

115. Once tunnel construction is complete all temporary soil anchors shall be disconnected and made obsolete and no restrictions shall be placed on the use of the land.

116. The Proponent shall notify the owner of any property that is to be adjusted, acquired or from which an easement is to be obtained. This notice shall contain sufficient details to identify the land of interest being adjusted/acquired and is to include dimensions, location with respect to boundaries and any other information necessary to enable the identification of the land in relation to the development. This notification shall be given in adequate advanced time prior to access for construction purposes.

117. Any temporary access road(s) shall be removed and any affected areas reinstated to the reasonable satisfaction of the relevant council and/or landowner when no longer required.

118. Any damage to buildings, structures, lawns, trees, sheds, gardens etc.) shall be fully rectified by the Proponent at no cost to the owner(s). Construction activities undertaken within private property shall be sympathetic to the specific needs of individual property owners particularly in terms of requirements for temporary facilities such as fencing, access to footpaths/ driveways/garages etc.

119. The Proponent shall ensure that the demolition of any structures is carried out only by specialist employees and/or contractors who hold any necessary licences to carry out such works.

Operation

120. The Proponent shall consult with all local councils in whose areas the works are to be carried out regarding amendments to statutory planning controls to ensure an appropriate notification process is placed on future buildings and development modifications (as defined under Section 96(2) of the EP&A Act) in the zone of influence of the tunnel consistent with the provisions of State Environmental Planning Policy (SEPP) No 63 - Major Transport Projects. The Proponent and the relevant Councils shall agree on criteria for establishing those properties that have a claim for a development right prior to the gazettal of SEPP 63. These criteria may include: lodgement or approval of a development application, preparation of development plans or prospectus' or other evidence of development plans which were evident prior to the gazettal of SEPP 63. Those properties that meet this criteria shall be considered for acquisition of easements in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991.*

Noise and Vibration

Construction Noise and Vibration Management Sub Plan

121. A detailed Construction Noise and Vibration Management Sub Plan shall be prepared as part of the Construction Framework EMP in consultation with the relevant government agencies, Council(s) and the CLGs. The Sub Plan shall provide details of noise and vibration control measures to be undertaken during the construction and operation stages, sufficient to address the technical requirements for any EPA approvals/licences. The Sub Plan shall include, but not be limited to:

(a) tests for ascertaining acoustic parameters;
(b) identification of sensitive receivers particularly residents and sensitive equipment.
(c) identification of all noise and vibration generating tasks, duration and predicted airborne noise and vibration levels;
(d) impacts from site compounds/construction depots;
(e) location, type and timing of erection of temporary and permanent noise barriers and/or other noise and vibration mitigation measures;
(f) specific physical and managerial measures for controlling noise and vibration demonstrating how activities would be managed so that relevant EPA guidelines and the conditions of approval are complied with;
(g) a pro-active and reactive strategy for dealing with complaints including compliance with Condition 8, particularly with regard to verbal and written responses;
(h) the need for respite periods;
(i) noise and vibration monitoring, reporting and response procedures;
(j) internal audits of compliance of all plant and equipment
(k) construction timetabling, in particular works outside standard hours, to minimise noise impacts;
(l) procedures for notifying residents of construction activities likely to affect their noise and vibration amenity;
(m) contingency plans to be implemented in the event of non-compliances and/or noise complaints; and
(n) the urban design issues relating to noise and vibration control measures.

With respect to d) above, the Proponent shall consider the use of a range of structural and non-structural measures during construction including barriers, acoustic treatment of residences, scheduling of construction activities to minimise impacts and temporary relocation of affected residents.

Note: The reference to operational noise relates only to those measures to be erected in accordance with condition 132.

Construction Hours

122. All construction activities, including transportation of spoil, shall be restricted to the hours of 7:00 am to 6:00 pm (Monday to Friday); 8:00 am to 1:00 pm (Saturday) and at no time on Sundays and public holidays.

Works outside these hours that may be permitted include:

(a) any works which do not cause noise emissions to be audible at any nearby residential property;
(b) the delivery of materials which is required outside these hours as requested by Police or other authorities for safety reasons;
(c) emergency work to avoid the loss of lives, property and/or to prevent environmental harm;
(d) tunnel excavation and other sub-surface activities providing the criteria in Conditions 123 and 125 can be met;
(e) transport of spoil between the hours of 6:00pm and 10:00pm Monday to Friday, 1:00pm and 6:00pm Saturday the construction area located on the northern side of William Street and bounded by William Street/Palmer Street/Bourke Street provided the noise criteria of background level plus 5dB(A) ($L_{A10,\ 15min}$) at any residence or other sensitive receiver can be met.. Trucks must exit the site directly into the Eastern Distributor and must not exceed more than 10 truck movements to and from the site per hour. Trucks entering the site must use the William Street out ramp from the Eastern Distributor, cross William Street turn into Bourke Street to enter the site. All trucks to be loaded underground during this period;
(f) any other work as agreed by the EPA through the Construction Noise and Vibration Management Sub Plan Process provided local residents are informed of the timing and duration at least 48 hours prior to commencement of the work; and
(g) hoisting to the surface and stockpiling of spoil provided this at the Bourke Street site (compound I) provided this work is carried out within an acoustically treated building and the noise criteria of background level plus 5dB(A) ($L_{A10,\ 15min}$) at any residence or other sensitive receiver can be met.

Construction Noise Criteria

123. The Proponent shall ensure that noise from construction activities is limited to the L_{10} level measured over a period of not less than 15 minutes not exceeding the background level by more than 5dB(A) at any residence or other sensitive receiver unless specified in the Construction Noise Impact Statement prepared in accordance with Condition 124.

For the purposes of the noise criteria for this condition, 5dB(A) must be added to the measured level if the noise from the activity is substantially tonal or impulsive in nature in accordance with Chapter 4 of the *NSW Industrial Noise Policy*.

Construction Noise Impact Statements

124. Specific Construction Noise Impact Statements shall be prepared in consultation with relevant government agencies, relevant Councils, CLGs for specific stages of construction consistent with the Construction Noise and Vibration Management Sub Plan and the relevant CMS and shall specifically address each of the major construction sites. The statements shall include:

(a) a description of the proposed processes and activities;
(b) assessment of potential noise from the proposed construction methods including noise from construction vehicles and noise impacts from required traffic diversions;
(c) examination of alternative methods that would potentially reduce noise if the potential noise exceeds the relevant criteria;
(d) description and commitment to work practices which limit noise;
(e) description of specific noise mitigation treatments and time restrictions including respite periods, duration, and frequency (where possible programming of night works over consecutive nights in the same locality shall be avoided);
(f) justification for any activities outside the normal hours specified in Condition 122;

(g) extent of noise monitoring;
(h) internal noise audit systems including recording of daily hours of construction, progressive impact assessments as the work proceeds, conducting informal checks by the EMR, providing active and continuous communication links to relevant Councils, residents etc; ,
(i) community consultation and notification;
(j) all reasonable and feasible measures including adopting the least noisy available construction methods, systems and equipment;
(k) assessment and examination of potential reasonable and feasible offsite mitigation measures for traffic noise; and,
(l) additional noise mitigation measures as successfully negotiated with affected residents and other sensitive receptors.

Regenerated Noise Criteria

125. Regenerated noise from construction works shall not exceed the following criteria as measured at the nearest residential building (sleeping area(s):

(a) 40 dBA ($L_{eq-15\ minutes}$)between the hours of 6:00 pm and 10:00 pm; and
(b) 35 dBA ($L_{eq-15\ minutes}$) between the hours of 10:00 pm and 7:00 am.

Construction Noise Management

126. The Proponent shall where reasonable and feasible apply best practice innovative noise mitigation measures including:

(a) maximising the offset distance between noisy plant items and nearby noise sensitive receivers;
(b) avoiding the co-incidence of noisy plant working simultaneously close together and adjacent to sensitive receivers;
(c) minimising consecutive night time works in the same locality;
(d) orienting equipment away from sensitive areas;
(e) carrying out loading and unloading away from noise sensitive areas; and,
(f) selecting site access points and roads as far as possible away from sensitive receivers.

127. Construction noise levels shall be monitored to verify compliance with the Construction Noise and Vibration Management Sub Plan. Should monitoring indicate exceedances of the Construction Noise and Vibration Management Sub Plan, the Proponent shall consult with the EPA and implement best available additional mitigation measures to the satisfaction of the EPA.

128. The Proponent shall ensure that rock breaking, rock hammering, sheet piling and any other activities at or near ground level which result in impulsive or tonal noise generation are only scheduled between the following hours unless otherwise permitted under the EPA environment protection licence:

(a) 8 am to 12 pm, Monday to Saturday; and
(b) 2 pm to 5 pm Monday to Friday.

Where these activities are undertaken for a continuous three hour periods and are audible to noise sensitive receptors, a minimum respite period of at least one hour shall be scheduled before activities re-commence.

129. The Proponent shall consult with SCEGGS and other affected schools and ensure that noise generating construction works in the vicinity of affected school buildings are not time tabled during examination periods, unless other arrangements acceptable to the affected schools are made at no cost to the affected schools.

130. The Proponent shall consult with the Australian Museum and develop appropriate noise and vibration criteria in consultation with the EPA and to the satisfaction of the Director-General, to ensure that noise, vibration and regenerated noise works in the vicinity of the Australian Museum do not result in any adverse impacts on its collection or sensitive scientific equipment.

131. The Proponent shall ensure that no public address systems are used at any construction sites outside the standard working hours detailed in Condition 122. Any public address system shall be designed and installed with their pointing axis directed away from residential buildings and sensitive receptors unless otherwise specified in the Construction Noise Impact Statement referred to in Condition 124.

132. In order to minimise noise impacts during construction, the Proponent shall consult with relevant Council(s) and where reasonable and feasible, erect operational noise mitigation measures prior to the commencement of construction.

133. Prior to the commencement of use of the southern Palmer Street Site compound (site 4 as identified in Figure 7.3.23 in the Representations Report) for construction, the Proponent shall in consultation with the Department of Housing and South Sydney City Council erect a permanent masonry wall for noise mitigation on the southern boundary of 169 Bourke Street, at least up to the height of the gutter line of the terrace housing unless otherwise agreed by the Department of Housing.

134. The additional Palmer Street site compounds (sites H and J as identified in Figure 2.17b in the Supplementary EIS) shall only be used for light activities (including administration/office purposes etc) with minimal night time activities. Use of sites I and J as a workshop for maintenance is allowed if the maintenance is carried out within the confines of the building and only within the hours of 7.00 am to 6.00 pm (Monday to Friday); 8.00 am to 1.00 pm (Saturday) and at no time on Sundays and Public Holidays.

135. The Proponent shall use only dampened rock hammers and/or "city" rock hammers to minimise the impacts associated with rock-breaking works.

136. The Proponent shall not undertake any excavation using rock hammers below ground during the night time (10pm to 7am).

137. The Proponent shall investigate and apply all reasonable and feasible noise source controls to reduce noise from all plant and equipment including bulldozers, cranes, graders, excavators and trucks. Examples of appropriate noise source controls could include efficient silencers, low noise mufflers and alternatives to reversing alarms.

138. The Proponent shall ensure that all entry and departure of heavy vehicles to and from the site are restricted to the standard daytime construction hours unless otherwise allowed under the provisions of Condition 122.

139. The Proponent shall ensure that the noisiest activities associated with night time works are scheduled wherever possible to be completed before midnight.

Blasting

140. Should blasting be required, the Proponent shall prepare a Blast Management Strategy in consultation with the EPA and incorporate this Strategy into the Construction Noise and Vibration Management Sub Plan. The Strategy shall be prepared with an aim to demonstrate that all blasting and associated activities will be undertaken in a manner that will not generate unacceptable noise and vibration impacts or pose a significant risk impact to residences and sensitive receptors. The Strategy shall also address the principles outlined in the Department's publications *Hazardous Industry Planning Advisory Paper No.6 - Guidelines for Hazard Analysis* and *Multi-Level Risk Assessment* for the handling and storage of hazardous materials. Issues to be considered in the Strategy shall include, but not necessarily be limited to:

(a) details of blasting to be performed, including location, method and justification of the need to blast;
(b) identification of any potentially affected noise and vibration sensitive sites including heritage buildings and utilities;
(c) establishment of appropriate criteria for blast overpressure and ground vibration levels at each category of noise sensitive site;
(d) details of the storage and handling arrangements for explosive materials and the proposed transport of those materials to the construction site;
(e) identification of hazardous situations that may arise from the storage and handling of explosives, the blasting process and recovery of the blast site after detonation of the explosives;
(f) determination of potential noise and vibration and risk impacts from blasting and appropriate best management practices;
(g) community consultation procedure including consultation with the Australian Museum, Rail Infrastructure Corporation

141. The vibration level due to blasting activities, including both above ground and underground work, shall meet the requirements of the EPA as specified in its Licence.

The guideline entitled "*Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration*" prepared by the Australian and New Zealand Environment and Conservation Council (ANZECC) shall be applicable.

142. Blasting shall only be undertaken between the hours of 10:00 am and 3:00 pm (Monday to Friday) and 10:00 am to 1:00 pm on Saturdays and at no time on Sundays or Public Holidays, unless otherwise agreed by the EPA through the Construction Noise and Vibration Management Sub Plan Process.

143. Blasts shall be limited to one single detonation in any one day, unless otherwise agreed by the EPA through the Construction Noise and Vibration Management Sub Plan Process.

144. For any section of the tunnel construction where blasting is proposed, a series of initial trials at reduced scale must be conducted prior to production blasting to determine site-specific blast response characteristics and to define allowable blast sizes to meet ANZECC guidelines.

145. Air blast control doors shall be erected at tunnel portals to reduce air blast emissions from blasting in the tunnels, until tunnel construction has advanced to a stage where emission levels without the doors comply with ANZECC limits.

Vibration Criteria

146. The Proponent shall ensure that vibration resulting from construction of the project is limited to:

(a) German Standard DIN 4150 and BS 7385: Part 2 – 1993 for structural damage vibration; and,
(b) British Standard BS 6472 and AS2670 for human exposure to vibration.

Where there is an inconsistency between these standards, the more stringent criteria shall apply.

147. Unless otherwise agreed by the Director-General, following consultation with the EPA, vibration levels shall not exceed 3 mm/s at the building foundation of heritage buildings and sensitive structures.

148. Prior to commencement of construction activities likely to result in high vibration levels, the Proponent shall identify potential highly sensitive facilities, including scientific equipment, measuring equipment, printing press and the like where the criteria in Condition 147 may not be adequate. Should such cases arise the Proponent shall consult with the potentially affected owners and develop appropriate mitigation measures to ensure impacts are acceptable.

Vibration Management

149. The Proponent shall ensure that wherever practical, piling activities are completed using bored piles. If driven piles are required they shall only be installed as agreed through the environment protection licensing process with the EPA.

Operational Noise Management Sub Plan

150. A detailed Operational Noise Management Sub Plan shall be prepared as part of the Operational EMP, to the satisfaction of the Director-General. The Sub Plan shall provide details of noise and vibration control measures to be undertaken during the operation stages, sufficient to address the technical requirements of the EPA, and generally in accordance with the NSW's *Environmental Criteria for Road Traffic Noise,* RTA's Environmental Noise Management Manual and the NSW *Industrial Noise Policy*. The Sub Plan shall include, but not be limited to:

(a) tests for ascertaining acoustic parameters;
(b) predicted noise levels;
(c) location, type and timing of erection of permanent noise barriers and/or other noise mitigation measures demonstrating best practice including silencers and building treatments for associated plant rooms and enclosures for exposed plant;
(d) specific physical and managerial measures for controlling noise;
(e) noise monitoring, reporting and response procedures including the monitoring on surrounding roads which experience significantly increased traffic volumes as a result of the CCT; and
(f) the urban design issues relating to noise control measures.

Note:
Environmental Criteria for Road Traffic Noise and RTA's Environmental Noise Management Manual shall be used to assess road traffic noise. NSW Industrial Noise Policy shall be used to assess noise from the ventilation system.

Operational Noise Management

151. The Proponent shall ensure that noise emanating from the tunnel ventilation system does not exceed the noise limits specified in Table 1 below.

Table 1

Location	Period	Intrusive Noise Criteria $L_{Aeq\ (15\ minute)}$ (dB(A))	Amenity Noise Criteria $L_{Aeq\ (Period)}$ (dB(A))
Millennium Tower (façade of most affected sensitive receiver)	Day Evening Night	62 59 54	59 57 53
Park Royal Hotel (façade of most sensitive affected receiver)	Day Evening Night	62 59 54	61 61 59

Daytime shall be defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays. Evening is defined as the period from 6pm to 10 pm. Nighttime is defined as the period 10pm to 7am Monday to Saturday and 10pm to 8 am Sundays and Public Holidays.

152. Monitoring of operational noise shall be undertaken in accordance with the Operational Noise Management Sub Plan. The Proponent shall, in consultation with the EPA, assess the adequacy of the traffic noise and ventilation noise mitigation measures after three months of opening the tunnel and one year of opening the tunnel with regard to the criteria specified in the Operational Noise Management Sub Plan. Should assessment indicate a clear trend in traffic noise levels on surrounding roads which exceed Operational Noise Management Sub Plan defined noise design goals as approved by the EPA, the Proponent shall implement further reasonable and feasible mitigation measures in consultation with affected landowners and/or occupiers.

Settlement

Settlement Analysis

153. A detailed geotechnical model of representative geological conditions shall be prepared prior to construction commencement to identify and include significant geological structures. This model shall also include full details of existing and currently proposed excavations near the western portal. The model shall also identify basements and other sub-surface structures which may be impacted by the project. The Proponent shall use this model to assess the predicted settlement and horizontal strain profiles caused by tunnelling, with particular regard to be given to the western portal and Sir John Young Crescent.

154. Should the geotechnical model in Condition 153 indicate that exceedances of the criteria in Table 2 are likely, the Proponent shall implement mitigation measures such as appropriate support and stabilisation structures in consultation with the relevant land and/or infrastructure owners prior to the commencement of construction to ensure where possible that underground services, infrastructure and adjacent buildings will not experience settlements exceeding the criteria in Table 2.

Table 2 Settlement Criteria for Specific Structures

Beneath Structure/Facility	Maximum Settlement	Maximum Angular Distortion
Buildings - Low or non sensitive buildings (i.e. ≤ 2 levels and carparks). - High or sensitive buildings (i.e. ≥ 3 levels and heritage buildings).	30 mm 20 mm	1 in 350 1 in 500
Roads and Parking areas	40 mm	1 in 250
Parks	50 mm	1 in 250
Identified Utilities	to be determined by the relevant authorities	to be determined by the relevant authorities

The above criteria shall not remove any responsibility from the Proponent for the protection of existing structures or for rectifying any damages resulting from the project.

155. Settlement criteria for individual sensitive utility structures including SWC services (i.e. brick sewers), gas, electricity and telecommunication services, shall be determined in consultation with the relevant authorities prior to the commencement of construction.

Management

156. The Proponent shall install and monitor inclinometers and settlement monuments along the tunnel route throughout the construction period and for a period of not less than 6 months after settlement has stabilised with particular reference to risk areas identified in the building condition surveys required by Condition 108 and/or the geotechnical analysis required by Condition 153. If monitoring during construction indicates exceedance of the criteria then all work affecting settlement shall cease immediately and shall not resume until fully rectified or a revised method of work has been established that will ensure protection of affected structures.

Operation

157. The Proponent shall monitor settlement for any period as may be specified through the Independent Property Impact Assessment Panel referred to in Condition 112. The results of this monitoring shall be made available to the Director-General upon request.

Groundwater

Dewatering Analysis

158. A detailed settlement study specific to construction stage dewatering within the alluvium and fill

areas and all areas identified in condition 109 and the heritage items listed in Section 6.1.1 of Table 8.1 in the Representations Report shall be conducted to the satisfaction of the Director-General to determine the potential extent of settlement and whether structures need to be protected through reinjection, grouting etc.

Groundwater Management Sub Plan

159. A detailed Groundwater Management Sub Plan shall be prepared to meet the requirements of DLWC and the EPA and incorporated into the Construction Framework and Operation EMPs. The Sub Plan shall cover the complete proposal and shall provide details of groundwater control measures to be undertaken during both the construction and operation stages respectively and include but not be limited to:

(a) impacts on nearby structures from potential settlement;
(b) groundwater inflow control, handling, treatment and disposal of contaminated groundwater;
(c) pre-construction and construction monitoring in accordance with the NSW EPA *Contaminated Sites: Sampling Design Guidelines* (NSW Environment Protection Authority 1995) to identify elevated concentrations of contaminants;
(d) auditing; and,
(e) procedures for mitigation through reinjection, grouting etc identified in the dewatering analysis required by Condition 158, including:

(i) detailed community consultation procedures;
(ii) identification of sensitive structures requiring reinjection;
(iii) identification of borehole spacing, borehole design, injection pipework, monitoring pipework and general system design and redevelopment; and,
(iv) a detailed monitoring plan identifying piezometers locations and standards, construction details, monitoring frequency and analysis requirements; and
(v) maximum allowable groundwater inflow.

Pre-Construction

160. Pre-construction groundwater quality monitoring shall be undertaken from the 50 mm piezometer network referred to in Condition 161.

Construction Stage Dewatering

161. The groundwater monitoring system shall comprise a mix of standpipe piezometers installed by direct push techniques and 50mm piezometers installed by conventional drilling. Slim piezometers shall also be used to monitor groundwater levels at identified vulnerable structures and a selection of the 50mm piezometers shall be fitted with transducers and data loggers for continuous groundwater level monitoring to the satisfaction of DLWC. Fortnightly monitoring shall take place for the duration of construction.

162. Licensable groundwater works shall only be undertaken by drilling contractors who hold a current Drillers Licence issued by DLWC with appropriate endorsement for the nature of the work required.

163. A conventional spear point system shall be used to the satisfaction of DLWC for areas of the excavation where risks to structures are high and where it is desirable to install the system before excavation begins or desirable to locate the system outside the excavation for other

reasons.

Operation Stage

164. The Proponent shall take practicable measures to limit operational groundwater inflows to 1 litre/second/kilometre unless otherwise agreed by the Director-General, following detailed geotechnical investigations, groundwater modelling and settlement analyses.

> Note:
> The limit specified in Condition 164 is intended to be a goal aimed at limiting settlement related damage.

165. The Proponent shall ensure that groundwater quality is monitored monthly for a period of at least one year after commissioning of the project or any other such period as required by the Director-General. Seepage, spillages, contaminated water, tunnel washing, fire fighting or other water in the tunnel which contains pollutant levels above the background concentrations of natural discharge points shall be directed into separate sumps with pump out facilities. This water shall not be discharged to the stormwater system.

Urban Design and Landscaping

Urban Design and Landscape Plans

166. A detailed Urban Design and Landscape Plan for the entire proposal shall be prepared in consultation with relevant Councils, SHFA, Sydney Buses, Australian Museum, NSW Heritage Office, Royal Botanic Gardens, the Domain Trust and other relevant authorities and to the satisfaction of the Director-General prior to construction of project elements subject to urban design considerations. The Plan shall be prepared by a suitably qualified urban designer. The Plan shall present an integrated urban design proposal, applying all design principles established in EIS Technical Paper No. 6.

The Plan shall include plans prepared according to appropriate precincts and addressing the entire surface work component of the project. The precincts shall include:

(a) Kings Cross Tunnel (Ward Avenue) to Rushcutters Bay (Neild Avenue) including the eastern "land bridge";
(b) Kings Cross tunnel precinct, including the Kings Cross "lid";
(c) William Street/East Sydney including the Eastern Distributor/Cross City Tunnel loop;
(d) The Domain;
(e) Park Street/Hyde Park;
(f) Park Street/CBD;
(g) Darling Harbour;
(h) Sir John Young Cresent; and
(i) any other precinct requiring urban design consideration.

The Plan shall include, but not be limited to:

(a) built elements including tunnel portals, bridges and other structures, retaining walls, noise walls, toll infrastructure, control buildings, substations, variable message signs (VMS), air quality monitoring stations;

(b) motorway and road furniture including safety barriers, kerbs, paving, signage, lighting, medians, emergency phones and breakdown facilities;
(c) pedestrian and cycle elements including footpaths and paving, pedestrian crossings, street furniture and fixtures (i.e. tree guards, seating, lighting, fencing and signage);
(d) design guideline for the Eastern "land bridge" for safety and crime prevention with reference to the NSW Police Service "Crime and Safety Management Strategy" and preparation of a "Safer by Design" evaluation based on the guidelines prepared by the NSW Police Service and the Department of Planning;
(e) landscape elements including proposed treatments, finishes and materials of exposed surfaces (including colour specifications and samples);
(f) proposals for community art to be integrated into the project;
(g) timing and staging of works, methodology, monitoring and maintenance;
(h) impacts on bus stop operations and passenger access;
(i) identification of the species and location of trees to be planted, which would encourage planting of native species that would have existed in the CBD prior to European settlement or matching of existing species;
(j) consideration of potential relocation of the Museum entrance to William Street and maximising benefits from possible road narrowing;
(k) after considering traffic safety implications, include a substantial program of tree planting along the widened footpaths of William Street and landscaping of the following areas:
    (i) adjacent to tunnel portals;
    (ii) Park Street between College and Elizabeth Streets;
    (iii) Harbour Street between the tunnel entry portal and Wheat Road;
    (iv) corner of Sussex and Druitt Streets;
    (v) area between Harbour, Day and Bathurst Streets;
    (vi) Palmer Street between Stanley Street and Robinson Street;
    (vii) Sir John Young Crescent near the tunnel exit portal;
    (viii) disturbed areas of the Domain; and
    (ix) in front of the Park Royal Hotel, following consultation with the Hotel; and

(l.) consideration of the potential for parking on William and Park Streets and the possible associated removal of the median and adjustments to footpath widths.

The Plan(s) shall consist of a report with accompanying annotated plans, sections and perspective sketches, photo montages and other illustrative material at a scale and level of detail which is adequate to convey the proposal.

167. The final external design, materials and finish of the ventilation stack shall undertaken in consultation with the AQCCC, the CCS and SHFA and approved by the Director-General.

168. The urban design and landscaping strategy for William Street required as part of the Urban Design and Landscape Plan shall be specifically prepared in such a manner as to:

(a) if adopted by SSCC, give consideration to incorporating the relevant outcomes of the William Street Revitalisation Strategy ;
(b) undertake further consultation with resident, community and business groups regarding the final design of the Kings Cross "lid".

Specific Urban Design Aspects

169. All construction hoardings, noise walls and fences shall be painted in a consistent colour scheme with bold and informative graphics. The SHFA shall be consulted in relation to the visual impact of hoardings, noise walls and fences on land within and immediately adjacent to the Authority's land.

170. Where practicable, directional signs for the Cross City Tunnel shall be accommodated on existing signage.

171. No advertising shall be permitted within the lease area for the CCT during construction or when in operation.

172. The Proponent shall ensure that all Plane Trees along William Street are retained. Should any be removed they shall be replaced with specimens of equal height where-ever possible or at least 200 litre size or other alternatives as agreed by the relevant local council in whose area the trees are located.

173. The Proponent shall prepare a report for approval by the Director-General for the installation of electronic tolling facilities within or at least flush with the batter above the portal areas or other means to avoid the erection of gantries separate from the tunnel.

174. Prior to implementation, the Proponent shall consult further with the CCS with respect to urban design and amenity issues relating to variable message signs VMS 8, VMS 9 and VMS 10. In the case of any disputes, the matter shall be referred to the Director-General for resolution, following consultation with the PTC.

Indigenous and Non-Indigenous Heritage

Heritage and Archaeology Management Sub Plan

175. As part of the Construction Framework and Operational EMPs, the Proponent shall prepare and Implement a Heritage and Archaeology Management Sub Plan in consultation with the Royal Botanic Gardens and Domain Trust, NSW Heritage Office and relevant Councils to manage heritage items and archaeological resources located within the impact zone of the project. The Sub Plan shall include:

(a) identification of all heritage properties including all those listed in Table 8.1 of the Representations Report as updated by Appendix R of the Supplementary EIS and the Supplementary Representations Report plus any additional heritage properties as required by the relevant local council in whose area the properties are located and the Heritage Office at the time of construction commencement;
(b) an assessment of the significance of effects on heritage and archaeological items including demolition, relocation, removal, damage and physical intrusion into conservation areas;
(c) a Research Design strategy that would evaluate the research potential of archaeological resources and set out in detail the methodology to be used in archaeological excavation;
(d) Conservation Management Strategies for all heritage items impacted by the proposal;
(e) an Excavation Protocol including provision for detailed archaeological investigations where initial investigations or research identify items of archaeological significance; and
(f) a Contingency Protocol to be implemented in the event of discovery of relics including provision for significance assessment, consideration of management options and, where destruction or

removal is proposed documentation and recording for archival purposes in accordance with *How to Prepare Archival Records of Heritage Items* and *Guidelines for Photographic Recording of Heritage Sites, Buildings and Structures* (DUAP/NSW Heritage Council).

(g) details of works required to widen the existing entrance of the railway maintenance yard at Sir John Young Crescent and other works impacting the Domain and proposed construction management methods.

Management

176. The Proponent shall ensure that the requirements of the Heritage and Archaeology Management Sub Plan are co-ordinated with the CMSs required by Condition 18.

177. The sandstone wall on the boundary of the Domain shall be retained for the full length of Sir John Young Crescent between Crown and Palmer Streets except as permitted in the Heritage Council Section 60 Approval dated 30 October 2002.

178. The gateway and the gate piers in the Domain at the corner of Palmer Street and Sir John Young Crescent shall be retained unless otherwise agreed through the process of preparing the Heritage and Archaeology Management Sub Plan.

179. The Proponent shall ensure that all employees and subcontractors are appropriately trained on the obligations for heritage conservation under the NSW Heritage Act.

Unexpected Items

180. If during the course of construction the Proponent becomes aware of any heritage items or archaeological material, all work likely to affect the site(s) shall cease immediately and the relevant authorities, including NPWS, NSW Heritage Council and/or the relevant Local Aboriginal Land Council(s) shall be consulted to determine an appropriate course of action prior to the re-commencement of work at that site. Appropriate supporting documentation would need to accompany any application for required permit/consent(s).

Water Management

Construction Water Management Sub Plan

181. As part of the Construction Framework EMP, a detailed Construction Water Management Sub Plan shall be prepared in consultation with the EPA, DLWC, and relevant councils. The Sub Plan shall be prepared in accordance with the Department of Housing's guideline *Managing Urban Stormwater - Soils and Construction* to manage the cumulative impacts of the development on the quality and quantity of surface and groundwater, including stormwater in storage, sedimentation dams and flooding impacts. The Sub Plan shall contain, but not be limited to:

(a) preparation of a catchment analysis in consultation with the relevant Councils and Sydney Water to determine the capacity of existing drainage systems and capacity, changes resulting from the construction of the proposal and implications of pumping load and detention requirements;

(b) details of short and long term measures to be employed to minimise soil erosion and the discharge of sediment to land and/or waters including the exact locations and capacities of sedimentation basins;

(c) identification of all potential sources of water pollution and a detailed description of the remedial action to be taken or management systems to be implemented to minimise emissions of these pollutants from all sources within the subject site;
(d) measures to handle and dispose of stormwater; effluent and contaminated water;
(e) measures for the use of water reclaimed or recycled on-site;
(f) detailed description of water quality monitoring to be undertaken including base line monitoring, identification of locations where monitoring would be carried out and procedures for analysing the degree of contamination of potentially contaminated water;
(g) contingency plans to be implemented in the event of fuel spills or turbid water discharge from the site; and,
(h) program for reporting on the effectiveness of the sediment and erosion control system against performance goals.

182. The Construction Water Management Sub Plan shall incorporate detailed erosion and sedimentation controls which shall be prepared to the satisfaction of DLWC and in consultation with the EPA and sufficient to address the technical requirements for obtaining the relevant EPA licence.

Pre-Construction

183. The Proponent shall ensure that the construction and operational tunnel water management systems are designed and implemented to include the management measures and meet the performance objectives specified in Section 7.1.1, 7.1.2 and 7.3.1 of Table M.1 of Appendix M of the Supplementary EIS, as updated by the Supplementary Representations Report, unless otherwise agreed through the preparation of the Construction Water Management Sub-Plan or Operational Water Management Sub-Plan.

184. Prior to finalisation of detailed drainage design, the Proponent shall undertake the additional hydrological studies recommended in Technical Paper No. 11 and incorporate all required management measures into the final drainage design. As a minimum the tunnel drainage design must provide capacity to deal with at least a 100 year ARI storm for tunnel carriageway and ramp approaches. The Proponent shall also consider in consultation with DLWC the implications of a PMF event in accordance with the *NSW Flood Control Manual*.

185. The Proponent shall undertake pre-construction water quality monitoring included in the Construction Water Management Sub-Plan for a period of at least three months duration prior to substantial construction commencement.

186. The Proponent shall prepare plans for site specific drainage and water quality management measures for the additional site compound on Palmer Street and design changes to the Western Portal detailed in the Representations Report and design changes to the Eastern Portal detailed in the Supplementary EIS, as modified by the Supplementary Representations Report in consultation with the DLWC and incorporate these plans into the relevant Construction Method Statement required by Condition 18.

Construction

187. The Proponent shall ensure that all appropriate soil and erosion and sediment control works are completed and in place prior to the commencement of any works that may have the potential to generate soil erosion or sediment. Erosion and sediment protection measures shall also be in place before the commencement of any stockpiling activities.

188. All surface water flows from construction sites shall be detained through appropriate measures to ensure that there is no exacerbation of existing flooding to the satisfaction of DLWC. Agreement shall be reached with the relevant Councils on appropriate and specific measures to be implemented at various locations.

189. All water collected during construction, including water drained from tunnel excavations (portal entry, groundwater influx) and from dewatering of major cuts, which is likely to be contaminated shall be tested, treated, handled and disposed of to the satisfaction of the EPA.

190. No disposal of water shall be allowed to the sewer or the storm-water system without prior agreement from Sydney Water and the relevant Council(s) as applicable.

Acid Sulfate Soils

191. The Proponent shall ensure that tests are carried out in advance of excavation to test for the presence of acid sulfate soils in all areas to be disturbed by the proposal. Such tests shall be undertaken in accordance with a strategy prepared to the satisfaction of DLWC and in consultation with the EPA.

192. A detailed Acid Sulfate Soil Management Sub Plan shall be prepared in consultation with EPA and to the satisfaction of the DLWC and incorporated into the Construction Framework EMP. The Sub Plan shall include reference to the water quality monitoring program contained in the Construction Water Management Sub Plan. The ASS Sub Plan shall be prepared in accordance with the Acid Sulfate Soils Manual (ASSMC, 1998). As part of the ASS Sub Plan, a Contingency Plan to deal with the unexpected discovery of actual or potential acid sulfate soils shall be prepared.

Operational Storm Water Management

193. As part of the Operation EMP a detailed Operational Stormwater Management Sub Plan shall be prepared in consultation with EPA, DLWC, SWC, SHFA and the relevant Councils to the satisfaction of the Director-General. The Sub Plan shall provide details on catchment analysis (including localised flooding as recognised by the relevant local Councils), existing drainage systems and capacity, drainage changes resulting from the proposal and implications for the system including total pumping load to drainage systems, detention requirements, possible reuse of wastewater, and the associated environmental impacts.

194. All operational stormwater and wastewater systems of the proposal shall be designed, constructed, operated and maintained to meet the requirements of the relevant authorities including EPA, SWC and relevant Councils.

195. Provision shall be made for retention and treatment of fire water in accordance with the Government's Best Practice Guidelines for Contaminated Water Retention and Treatment Systems.

Spoil and Waste Management

Spoil Disposal

196. As part of the Construction Framework EMP, the Proponent shall prepare a Spoil Management Sub Plan in consultation with the EPA, SHFA and relevant Council(s). This Sub Plan shall identify how spoil would be handled, stockpiled, reused and disposed. The Sub Plan shall be prepared before the commencement of construction at relevant sites and address issues of dust mitigation, drainage, disturbance and contaminated material (including procedures for dealing with the unanticipated discovery of contaminated material during the course of construction), noise and local amenity. The Proponent shall ensure that this Sub Plan is fully integrated with the Transport Management Plans.

As part of the Sub Plan the Proponent shall investigate options for the barging of spoil in consultation with relevant industry and relevant waterway authorities.

197. Prior to excavation, the Proponent shall undertake a detailed geotechnical/soil analysis assessment to ascertain the potential of excavated material to be used for construction or other such higher value purpose. The Proponent shall encourage and maximise the beneficial use of all excavated material where reasonable and feasible.

198. Prior to commencement of construction at various relevant sites where spoil is to be generated the Proponent shall ensure that the EPA and any other relevant authority is provided with the details of the locations where spoil will be disposed. The Proponent shall also assess the environmental impacts of the disposal in accordance with the EP&A Act and obtain any necessary approvals.

199. The Proponent shall ensure that all clean and/or treated spoil shall be reused or recycled where possible. In particular the EMR shall certify that:

(a) use of spoil generated from construction activities is maximised in preference to any import of fill; and
(b) where reasonable and feasible all clean excavated natural material is either reused on the project or otherwise made available for reuse elsewhere in preference to disposal to landfill.

Contamination

200. The Proponent shall prepare a Contamination Investigation Report to the satisfaction of the EPA as part of the Spoil Management Sub Plan to determine the nature, extent and degree of contamination. The Report shall detail the results of site investigations and the assessment of potential risks posed by contaminants to health and the environment and indicate whether remediation is required.

201. Should the Contamination Investigation Report required by Condition 200 indicate that remediation is necessary to reduce or remove risks posed by contaminants in particular locations, then the Proponent shall remediate the land in accordance with a Remedial Action Plan which shall be incorporated into the relevant CMS(s) required by Condition 18. The Plan(s) shall be prepared in consultation with relevant Council(s) and to the satisfaction of the EPA.

202. In the event of discovery of previously unidentified area(s) of potentially contaminated material, the Proponent shall cease work in the vicinity of the discovery and not commence work until the extent of contamination has been assessed and if necessary a Remedial Action Plan has been prepared and implemented in accordance with Condition 201.

203. Disposal of any contaminated material shall only be to a landfill approved by the EPA.

204. Dilution of contaminated spoil with clean spoil shall not be undertaken, unless otherwise approved by an EPA accredited contaminated site auditor.

205. The Proponent shall ensure that the cost of treatment of any contaminated spoil on-site for reuse is investigated, and if cost effective, implemented to the satisfaction of an EPA accredited contaminated site auditor, prior to commencement of spoil disposal.

Waste Management and Recycling

206. As part of the Construction Framework and Operational EMPs and as relevant, a detailed Waste Management and Reuse Sub Plan shall be prepared in consultation with the EPA. The Sub Plan shall address the management of wastes during the construction and operation stages respectively. It shall be prepared prior to construction, and shall identify requirements for:

(a) waste avoidance;
(b) reduction;
(c) reuse; and
(d) recycling,

and provide details of requirements for:

(e) handling;
(f) stockpiling;
(g) disposal of wastes: specifically contaminated soil or water, concrete, demolition material, cleared vegetation, oils, grease, lubricants, sanitary wastes, timber, glass, metal, etc.; and
(h) identifying any site for final disposal of any material and any remedial works required at the disposal site before accepting the material.

This Sub Plan shall include but not be limited to:

(i) methods of management of all waste generated as part of the project;
(ii) an outline of comprehensive plans of action for key waste streams;
(iii) implementation of the waste hierarchy by seeking to avoid waste generation as a priority, the reuse, recycling or reprocessing of waste and, as a last resort, disposal of waste;
(iv) the need for environmental safeguards and the adoption of environmentally sensitive work practices to minimise waste and advance the values of ecologically sustainable development;
(v) arrangements for waste which cannot be re-used, recycled or reprocessed to be disposed of at a licensed waste disposal facility;
(vi) procedures for separating excavation and demolition waste and for identifying destinations for the material;
(vii) procedures for classifying waste in accordance with the EPA's Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes;
(viii) installation of segregated bins for recyclable materials and provision for material to be reused or recycled wherever possible;
(ix) except where a sewer is available, the discharge of sewerage from site amenities to holding tanks for removal by tankers;

(x) the provision of rubbish skips at all construction sites and site compounds and their regular removal or emptying;
(xi) ensuring that local roads affected by construction remain intact to reduce the need for new paving materials;
(xii) erecting signs within construction sites and site compounds encouraging employees to reduce, re-use, or recycle wherever possible;
(xiii) the disposal of chemical, fuel and lubricant containers and solid and liquid wastes in accordance with the requirements of the EPA;
(xiv) appropriate induction and training of all employees and sub-contractors in the waste hierarchy and the requirements of this Waste Management and Reuse Sub Plan;
(xv) undertaking regular audits of waste management; and
(xvi) keeping of a waste management register of all significant waste collected from construction sites and site compounds for disposal, including amounts, date and time and details and locations of disposal.

As part of the Sub Plan, an Action Plan shall be prepared to promote the use of recycled materials, including construction and landscape materials. The Plan shall detail how the proposal gives consideration and support to the Government's *Waste Reduction and Purchasing Policy*. The Plan shall also include details on measures to implement energy conservation best practice.

207. The demand for water for construction purposes shall be kept to a minimum. The project shall incorporate water use reduction initiatives including reuse of water and recycling to the maximum extent practicably possible.

Hazards and Risks

Dangerous Goods

208. The Proponent shall not store or handle a quantity of goods defined as dangerous under the Australian Dangerous Goods Code, at any location associated with the CCT, whether during the construction or the operation of the CCT. This Condition does not include explosive materials for blasting and diesel fuel, to which Conditions 140 and 210 apply. This condition does not apply to sodium hydroxide and poly aluminium chloride (PAC) or any other chemical as agreed to by the Director-General as necessary for the water treatment process subject to meeting the requirements specified in Condition 289.

Pre-Construction

209. An Emergency Response Sub Plan shall be prepared as part of the Construction Framework EMP. The Sub Plan shall include, but not be limited to:

(a) the provision of adequate emergency procedures and equipment for the response to and management of any environmental pollution events;
(b) a program for training of all staff;
(c) a protocol for notifying the appropriate authorities in the case of an emergency;
(d) procedures to ensure compliance with all legislative and industry standard requirements for safe handling and storage of hazardous substances; and,
(e) undertaking hazardous activities such as washing out of concrete delivery vehicles, washing down of construction plant etc. only at appropriate locations that have appropriate environmental protection controls.

Construction Hazards

210. The Proponent may seek the approval of the Director-General for the temporary storage of diesel fuel to permit continuous operation of equipment during the construction of the CCT. In seeking the Director-General's approval, the Proponent shall provide:

(a) details of the location(s), stored volume(s) and storage method(s) for the diesel fuel;
(b) the maximum length of time diesel storage will be required;
(c) assessment of the potential environmental and risk impacts associated with the storage of diesel at the locations required; and
(d) details of the mitigation measures proposed to address potential environmental and risk impacts from diesel storage including bunding of storage area(s).

The Proponent shall not locate any quantity of diesel fuel at any location associated with the CCT without the prior written approval of the Director-General. The Proponent shall implement all measures required by the Director-General to mitigate environmental and risk impacts identified through the information listed from (a) to (d) above, within such period as the Director-General may agree.

Note: Diesel fuel is a combustible liquid and not defined as a dangerous good under the Australian Dangerous Goods Code.

211. The Proponent shall prepare and implement a Construction Safety Study for the approval of the Director-General prior to the commencement of construction of the CCT. The Study shall address all safety-related matters relevant to the construction of the CCT and shall be generally in accordance with the principals outlined in the Department's publication *Hazardous Industry Planning Advisory Paper No. 7 - Construction Safety Study Guidelines.*

Operational Hazards

212. The Proponent shall not permit any vehicle carrying a quantity of goods defined as dangerous under the Australian Dangerous Goods Code, to enter the tunnels forming part of the proposal. Prior to the operation of the CCT, the Proponent shall provide, to the Director-General, details of how this condition will be managed and enforced, including measures such as signage and monitoring via closed-circuit television.

213. At least six months prior to the opening of the tunnel, the Proponent shall prepare an Emergency Response Plan for the CCT, in consultation with the NSW Fire Brigades, the Police Service and State Emergency Services. The Plan shall include, but not necessarily be limited to:

(a) protocols and procedures to be followed during emergency situations associated with the operation of the CCT including vehicle collisions, fires and explosions;
(b) details of traffic management measures to be implemented during emergencies, where appropriate, to minimise the potential for escalation of the emergency;
(c) management and infrastructure measures to address the potential environmental impacts of an emergency situation, including measures for containment of contaminated firefighting water, fuel spills and gaseous combustion products; and
(d) a training and testing program to ensure that all operational staff are familiar with the Plan and coordination with the Fire Brigades, Police and Emergency Services is regularly rehearsed.

The Emergency Response Plan shall be submitted for the approval of the Director-General prior to the operation of the CCT. A rehearsed emergency response in accordance with the approved Emergency Response Plan, including the Proponent, Fire Brigades and Emergency Services, shall be undertaken on at least one occasion prior to the operation of the CCT.

214. Prior to opening the tunnel, the Proponent shall provide the Director-General with details of design and operational measures to be incorporated into the CCT to minimise the likelihood and impact of vehicular accidents within the CCT. The Proponent shall provide the Director-General with written certification that all design and operational measures have been implemented prior to the operation of the CCT.

215. For the first five years of operation, the Proponent shall undertake an annual Hazard Review of the CCT and hazardous incidents that have occurred during the preceding twelve-month period, with the first Review to be undertaken no later than twelve months after the commencement of operation of the CCT. A report outlining the results of the Hazard Review, and any proposed additional safety measures to be implemented in response to the findings of the Review, shall be submitted to the Director-General within one month of completion of the Review. The Proponent shall meet the Director-General's requirements in relation to the findings of the Review, within such time as the Director-General may agree. The Proponent shall undertake further Hazard Review if directed by the Director-General following any major incident in the tunnel.

Security and Crime

216. The Proponent shall prepare and implement two Security and Crime Management Strategies, one for each construction and operation. The aim of the Strategies shall be to prevent unauthorised public ingress to the CCT and to minimise the potential for crime in the vicinity of CCT infrastructure (eg vandalism, loitering, illegal dumping etc). The Strategy shall be generally in accordance with the principles outlined in the joint Department and Police Service publication *Crime Prevention and the Assessment of Development Applications*, and be developed in consultation with the NSW Police Service and relevant councils. The Strategy shall include, but not necessarily be limited to:

(a) details of security arrangements to prevent unauthorised access to the CCT, including physical exclusion measures, detection devices and management mechanisms;
(b) policies and procedures for addressing security issues, should they arise;
(c) specific design features of the CCT intended to discourage the incidence of crime at and in the immediate vicinity of CCT access points;
(d) lighting considerations, including light intensity, direction and hours of operation at and in the immediate vicinity of CCT access points, with the aim of minimising areas that may encourage crime;
(e) policies and procedures for the management and removal of graffiti, amelioration of vandalism, should it occur at or on any component of the CCT; and
(f) policies and procedures for the management and removal of illegal or inappropriate bill-posting and illegally dumped materials, should it occur at or on any component of the CCT.

The Security and Crime Management Strategy shall be submitted for the approval of the Director-General no later than one month prior to the commencement of substantial construction or opening of the tunnel as applicable, or within such period as otherwise agreed by the Director-General.

Utilities and Services

Pre-Construction

217. Prior to the commencement of construction the Proponent shall identify the services potentially affected by construction activities to determine requirements for diversion, protection and/or support. This shall be undertaken in consultation with the relevant service provider(s).

218. The Proponent shall prepare dilapidation surveys and reports (including movement prediction studies on the condition of the rail infrastructure facilities, adjacent tunnels and utilities within the vicinity of the construction area) to the satisfaction of the RIC, SRA and all other relevant infrastructure/service providers. The Proponent shall carry out rectification work at the Proponent's expense and to the satisfaction of the owners.

219. The Proponent shall ensure that, in consultation with the RIC and SRA, during the design process, sufficient provision is made for the future construction of the MetroWest and Metropitt rail links, including the necessary station concourses.

Construction

220. Any alterations to utilities and services shall be carried out to the satisfaction of the relevant service provider(s), and unless otherwise agreed to, at no cost to the service/utility provider(s).

221. The Proponent shall ensure that disruption to any utilities are minimised and shall be responsible for advising local residents and businesses affected prior to any disruption of service.

222. The Proponent shall ensure that emergency access from Sir John Young Crescent to the SRA property adjacent to the Eastern Suburbs rail line is maintained at all times.

Greenhouse Gases

Construction Stage

223. The Proponent shall promote the reduction of greenhouse gases by adopting energy efficient work practices including, but not limited to:

(a) developing and implementing procedures to minimise energy waste in accordance with Conditions 206 to 207;
(b) conducting awareness programs as part of induction for all site personnel regarding energy conservation methods; and,
(c) conducting regular energy audits during the project to identify and address energy wastage.

224. No rainforest timbers shall be used in any construction activities.

Sustainable Energy

225. Green power shall be purchased for the supply of at least 6 percent of the energy requirements for the construction and operation of the project.

Air Quality - Construction Stage

Pre-Construction

226. A detailed Dust Management Sub Plan shall be prepared in consultation with the EPA and incorporated into the Construction Framework EMP. This Sub Plan shall detail the implementation and management of measures and procedures to ensure that dust emissions from the project are either prevented or minimised. This Sub Plan shall include, but not be limited to:

(a) identification of potential sources of dust deposition;
(b) monitoring (by sampling and obtaining results by analysis) the pollutants specified in Column 1 of Table 3 at nearby sensitive receptors. The Proponent must use the sampling method, units of measure, and sample at the frequency, specified in the other columns.
(c) details of mitigation measures to be implemented during normal operations and during periods of extreme climatic conditions where high level dust episodes are likely to occur;
(d) establishment of a protocol for handling dust complaints that includes recording, reporting and acting on complaints; and
(e) a reactive management program detailing how and when operations are to be modified to minimise the potential for dust emissions, should emission levels exceed the criteria.

Table 3

Pollutant	Units of measure	Averaging Period	Frequency	Method[1]
Dust	g/m^2/month	annual	Continuous	AM-19
Other	**Units of measure**	**Averaging Period**	**Frequency**	**Method[1]**
Siting	NA	NA	NA	AM-1 & AM-4

Note: [1]NSW EPA, 2001, Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales.

Construction

227. The Proponent shall undertake a regular dust monitoring program at all locations in close proximity to the public in accordance with the Dust Management Sub Plan.

228. All construction activities shall be carried out in a manner that minimises or prevents the emission of dust.

229. The Proponent shall ensure that trucks entering and leaving all construction sites that are carrying loads of potentially dust generating material are covered.

230. To ensure that any vehicles which leave construction site(s) do not track materials on public roads the Proponent shall construct and maintain wheel wash facilities or equivalent to be utilised by all departing trucks and machinery which have been used in unsealed areas.

231. When conditions are excessively dusty and the dust emissions from operations cannot be maintained within the dust goal specified in Condition 226, then all dust generating activities shall cease until dust suppression can be adequately carried out.

232. In accordance with the *Protection of Environment Operations (Control of Burning) Regulation 2000*, no open burning or incineration shall be permitted at any construction sites.

Flora and Fauna

Pre-Construction

233. The Proponent shall prepare a detailed Tree Protection Plan to manage construction impacts on existing trees. This plan shall identify any significant trees which may be affected during construction and detail appropriate management measures in accordance with Appendix Z of the Supplementary Representations Report.

Construction

234. A suitably qualified tree surgeon or aborist shall be present for the duration of excavation works within the vicinity of any significant trees as identified I in the Tree Protection Plan required under Condition 233 that are not to be removed or relocated and to undertake any root pruning required. The Proponent shall ensure that the condition of any trees affected are monitored throughout the construction period and for 18 months after opening of the tunnel. Any measures necessary to ensure the survival of the trees (e.g. fencing, watering, fertilising) shall be undertaken by a suitably qualified person to the satisfaction of the Director-General.

235. Maintenance of all landscaping works provided under the Urban Design and Landscape Plan referred to in Condition 166 (including the health of all trees) shall be provided for at least two years from the date of opening of the tunnel unless maintenance responsibility is accepted by Council or other agency.

236. Any trees lost during construction shall be replaced with specimens of a similar maturity unless otherwise agree with the relevant Council(s).

237. If, during the course of construction any threatened flora or fauna species are encountered, the Director-General of the NPWS shall be advised immediately. No activity, which places any of these species at risk, shall be undertaken until advice has been received from the NPWS. All recommendations by the NPWS shall be complied with prior to any works likely to affect any threatened species.

Social

238. The Proponent shall co-operate with the local Steering Group on Street Prostitution and other relevant groups to develop measures to mitigate the potential displacement of sex-industry workers from William Street to nearby local streets.

Cumulative Impacts

239. As part of the Construction Framework and Operational EMPs the Proponent shall identify parameters to be monitored during construction and operation which have the potential for cumulative effects to occur. The Proponent shall also define the time period for which the identified parameters would be monitored.

240. Prior to the commencement of construction, the Proponent shall negotiate an agreement with the Airport Motorway Limited dealing with mitigation of the impact of the construction, operation and maintenance of the project on the Eastern Distributor

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NEW CONDITIONS GENERATED AS A RESULTS OF THE PROPOSED MODIFICATION TO THE APPROVED ACTIVITY

Fire Safety

241. Prior to the opening of the Project to traffic, a full audit of the fire safety system as defined by the scope of works shall be undertaken by an independent person(s)/organisation to be approved by the Director-General to be paid for by the Proponent. The objective of the audit shall be to ensure that all design and operational measures outlined in the scope of works have been installed and are operational and achieves the required design criteria. The results of the safety audit shall be made available to the NSW Fire Brigade and the Director-General for review prior to opening of the Project to traffic. The Proponent shall rectify any issues identified by the audit to the satisfaction of the Director-General in consultation with the NSW Fire Brigade.

242. Fire simulation and smoke testing shall be undertaken as part of the rehearsed emergency response to be staged prior to opening of the Project to traffic.

243. A maintenance testing program outlining the methods of testing fire safety facilities and schedule for implementation shall be developed to the satisfaction of the NSW Fire Brigade prior to opening of the Project to traffic. Maintenance testing of fire safety facilities shall be undertaken at least annually or any other interval as required by the NSW Fire Brigade. Results of maintenance testing shall be made available to the NSW Fire Brigade for review and the Proponent shall comply with any requirements to ensure the fire safety systems operate adequately.

244. The Proponent shall develop a community education program for the general public and bus operators regarding the potential implications of incidents and emergencies in the Cross City Tunnel prior to opening of the Project to traffic. The program shall outline the actions that should be taken by drivers and passengers in the tunnel during such incidents/emergencies to minimise the potential for serious injury or loss of life.

    The Proponent shall consider implementation of the education program by methods such as pamphlets to be disseminated with licence/registration renewals, inclusion in the Learner Driver Handbook and test and/or any other appropriate method.

    The program shall be prepared in consultation with the relevant NSW emergency services, NSW Health and DoP.

245. A Tunnel Evaluation Committee is to be established with a representative from RTA, NSW Fire Brigade, NSW Police, State Emergency Services and Planning NSW. For the first five years of operation, the Committee shall undertake an annual review of the fire safety systems and incidents that have occurred during the preceding twelve-month period. Reviews beyond the first five years of operation are to occur on the request of the Director-General. The first review is to be undertaken no later than three months before the commencement of the operation of the project. The review must consider current national and international standards and best practice in the field of fire safety in tunnels and must be in line with current NSW government

standards. A report outlining the results of the review and any recommended modifications in response to findings of the review, shall be submitted to the Director-General and made publicly available upon request. The Proponent shall rectify any issues identified in the Committee's report to the satisfaction of the Director-General in a time frame required by the Director-General.

246. The Proponent shall develop a Fire and Smoke Management Plan to address fire safety in the tunnel during congested conditions. The Plan shall outline fire protection systems and other tunnel equipment and operational protocols required for fire and smoke management. The plan shall demonstrate that the design and operational measures minimise the potential for and impact of fire in the tunnel. The Plan shall be developed in consultation with and to the satisfaction of the NSW Fire Brigades

Air Quality

Physical Requirements

247. Unless otherwise approved under condition 248, the ventilation stack shall be constructed at the location shown on Figure 5.1 of the Director-General's Report (dated September 2001) with the top of the ventilation stack at a height of 65 metres AHD unless otherwise approved by the Director-General.

248. Prior to finalising the ventilation stack design, the Proponent shall in consultation with SHFA and CCS, demonstrate to the satisfaction of the Director-General, that potential opportunities that arise to incorporate the ventilation shaft within an existing, proposed or newly constructed building have been appropriately considered through the selected tendering and final design process. The allowable degree of relocation shall be no greater than 100 metres from the EIS location or at a distance further evaluated in the Report in Appendix F. Any change in location of the ventilation stack shall require provision of Condition 249.

249. Any change to the location and/or height of the ventilation stack as a result of Condition 248 shall be approved by the Director-General following consultation with the EPA and DoH and shall require the Proponent to undertake a comprehensive air quality assessment to the requirements of the Director-General in consultation with the EPA, to demonstrate that the predicted air quality impacts are no greater at sensitive receptors than those predicted for the proposed location shown on Figure 5.1 of the Director- Generals Report (dated September 2001). The assessment must be independently verified to the satisfaction of the Director-General.

250. The tunnel ventilation system shall be designed, constructed and operated to avoid, to the greatest extent practical, tunnel air emissions from the portals. Portal emissions are not permitted except in the following circumstances:

a) emergency situations and/or where emergency personnel are involved,

b) accidents and genuine breakdowns inside the tunnel;

c) maintenance which involves maintenance of the ventilation system and where it can be shown that the in-tunnel CO requirements specified in Tables 5 and 6 cannot be met; and

d) any other situation approved by the Director-General in consultation with the DoH, EPA and the AQCCC.

If portal emissions are required as a result of any of the above events occurring, all practicable measures shall be taken to minimise air quality impacts and the period of portal emissions shall be limited to that necessary until normal traffic operations resume.

251. The tunnel shall be designed and constructed so as to make provision for future installation of an appropriate pollution control system to treat air emissions from the tunnel as may be required by the Director-General. The Proponent shall provide evidence to this effect during the design and construction phases to the satisfaction of the Director-General.

252. All plant and equipment associated with the ventilation stack including possible pollution control systems shall be located below the existing surface level unless incorporated into an existing, proposed or newly constructed building as identified in Condition of Approval No. 248 or otherwise agreed by the Director-General following consultation with the relevant local Councils.

253. The Proponent shall install stack emission sampling points and associated safe access thereto, during construction of the ventilation stack. The sampling points shall be designed and located in accordance with TM-1 of the EPA's *Approved Methods for the Sampling and Analysis of Air Pollutants in NSW, 2001.*

254. The Proponent shall develop a Pre-commissioning Tunnel Ventilation, Incident Response and Traffic Management Systems Integration Protocol (TMSIP) to the satisfaction of the Director-General and in consultation with the RTA's Traffic Management Centre. The TMSIP must be reviewed by an appropriate experienced person/firm to confirm to the satisfaction of the Director-General, before the tunnel is open to traffic, that the systems would operate together to ensure that the primary objective of satisfying Conditions 258 and 259 is achieved. The TMSIP should include a pre-commissioning procedure to be completed before the tunnel is opened to traffic.

Note: Tunnel ventilation design and operation, incident response triggers and procedures, and traffic management, should be fully integrated in accordance with the primary objective of ensuring the safety of tunnel users, tunnel workers and emergency services personnel under all conditions.

255. The Proponent shall install appropriate traffic management devices upstream of the tunnel entrances to regulate traffic flow in the tunnel in addition to the ventilation system, as required to ensure compliance with air quality goals. Traffic management devices shall include ramp metering and/or tunnel closure devices as appropriate. Monitoring devices to measure traffic speeds inside the tunnel shall be installed and operated.

Unless otherwise agreed by the Director-General, the tunnel management system must provide for the automatic closure and subsequent re-opening of one or more of the tunnel entry lanes using sequenced and automatically controlled infrastructure, including stop signs, variable message signs, in-pavements lights and boom gates incorporated into the overall traffic management systems for the route on which the tunnel is located. Where practical this shall also enable tunnel users to be diverted to other routes well before the entrance. The variable message signs must have the ability to inform users of reasons for the closure.

Air Quality Community Consultative Committee

256. An Air Quality Community Consultative Committee (AQCCC) shall be established by the

Proponent. Representatives from CCS, SSCC, SHFA, DoH and local community representatives with interests in tunnel ventilation shall be invited to participate on the Committee. The AQCCC must be established prior to the commencement of substantial construction and shall operate for a minimum of 3 years after opening of the tunnel or as otherwise agreed by the Director-General. The Committee's role shall be defined in a detailed terms of reference document to be submitted for approval by the Director-General before commencement of construction or within any other time as agreed by the Director-General. The terms of reference shall include providing community feedback on air quality monitoring and reporting during the design, construction and operational phases of the project, accessing and disseminating monitoring results and other information on air quality issues. The functions and conduct of the AQCCC shall be in accordance with the terms of reference approved by the Director-General.

Air Quality – In-Tunnel

- Monitoring of In-Tunnel Air Quality

257. Within the Tunnel, the Proponent must monitor (by sampling and obtaining results by analysis) the pollutants, specified in Table 4. The Proponent must use the sampling method, units of measurement and sample at the frequency specified opposite in the other columns. The siting of the monitoring stations inside the tunnel must be independently verified to the satisfaction of the Director-General. The number of the monitoring stations must be independently verified to the satisfaction of the Director-General, at a minimum there should be monitoring stations at the portals, ramp junctions and cross-overs and exhaust intakes ducts. Each sampling point established under this condition shall be audited prior to its commencement of monitoring for compliance with the requirements set out in Table 4. Verification and compliance auditing is to be undertaken by an independent person(s) or organisation(s) approved by the Director-General and paid for by the Proponent.

Table 4 – In-Tunnel CO Monitoring Methodology

Pollutant	Units of measure	Frequency	Method[1]
CO	ppm	Continuous	AM-6

Note: [1]NSW EPA, 2001, Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales

- In-Tunnel Air Quality Limits

258. The tunnel ventilation system must be operated so that the concentration of carbon-monoxide (CO) for exposure to any motorist inside the Tunnel must not exceed the concentration limits specified for that pollutant in Table 5 under all conditions (including fully congested conditions).

Table 5 – In-Tunnel CO Individual Exposure Limits

Pollutant	Units of measurement	Averaging period	Limit
CO	ppm	Rolling 30 – minute	50
CO	ppm	Rolling 15-minute	87

For the purposes of interpreting compliance with the rolling average periods specified in Table 5, the Proponent shall install appropriate real time systems to the satisfaction of the Director-General in consultation with NSW Health and the EPA, to enable as accurate as possible estimate of time spent inside the tunnel by motorists and corresponding CO levels The Proponent must justify that the measuring points present an accurate representation of the CO profile and shall provide data/evidence including appropriate modelling to support that

justification. The pollution concentrations outside the vehicle cabin shall be assumed to be equivalent to the pollution concentration within the cabin for the purposes of interpreting compliance. Emergency services, Proponent or Company personnel shall be dealt with under occupational health and safety procedures.

259. The tunnel ventilation system must be operated so that the concentration of carbon-monoxide (CO) as measured at any single point in the tunnel must not exceed the concentration limit specified for that pollutant in Table 6 under all conditions (including fully congested conditions).

Table 6 – In-Tunnel CO Single Point Limits

Pollutant	Units of measurement	Averaging period	Limit
CO	ppm	Rolling 3-minute	200

- Notification of In-Tunnel Air Quality

260. In addition to the general reporting requirements specified in Condition 276, the Proponent shall notify the Director-General, EPA and DoH of rolling average carbon monoxide monitoring in accordance with a Rolling Average Carbon Monoxide Monitoring Protocol and within 24 hours of the Proponent becoming aware of any single monitoring point for CO recording above the limits of 87 ppm (15 minute averaging period) and 200 ppm (3 minute averaging period). A Rolling Average Carbon Monoxide Monitoring Protocol shall be developed to the satisfaction of the Director General at least 3 months prior to opening.

Note: The requirement to report on any single point recording above the limits for Condition 260 is for information and reporting purposes only.

- Air Quality Compliance

261. If the air quality limits specified in Conditions 258 and/or 259 are exceeded, the Director-General may direct the Proponent to expend an amount, which is to be calculated as the aggregate of $50,000 (CPI adjusted) for each day on which any one (1) or more of the air quality limits specified in Conditions 258 and/or 259 are exceeded, for the implementation of the strategy as referred to in this condition.

In the event that the Proponent is directed to expend any amount as required under this condition, it shall, within 3 months, prepare a Strategy in consultation with the AQCCC and approved by the Director-General, on how any money shall be spent, including options of improvements to in-tunnel and external air quality in the area affected by the Project. The Strategy shall be implemented to the satisfaction of the Director-General.

Nothing in this condition shall prevent, limit or restrict any statutory requirements under any legislation, nor shall it limit any action being taken under the EP&A Act.

Ambient Air Quality

- Monitoring of Ambient Air Quality

262. The Proponent shall monitor (by sampling and obtaining results by analysis) the pollutants and parameters specified in Column 1 of Table 7 at the following three (3) locations as a minimum:

(a) One (1) ground level receptor;and
(b) Two (2) elevated receptors.

All monitoring stations shall be established subject to the owners and occupiers agreement. The Proponent must use the sampling method, units of measure, and sampling frequency specified in Table 7. The Proponent shall commence monitoring within 18 months of this approval or ensure monitoring occurs for at least 12 continuous months prior to opening of the tunnel. The establishment and operation of the stations is to be undertaken in accordance with recognised Australian standards and undertaken by an organisation accredited by NATA for this purpose and approved by the Director-General. The quality of the monitoring results shall be assured through a NATA accredited process prior to the data being considered as a basis for compliance/auditing purposes.

Table 7 – Ambient Air Quality Monitoring Methodologies

Pollutant	**Units of measurement**	**Averaging Period**	**Frequency**	**Method[1]**
NO	pphm	1-hour	Continuous	AM-12
NO_2	pphm	1-hour	Continuous	AM-12
NO_x	pphm	1-hour	Continuous	AM-12
PM_{10}	µg/m^3	24-hour	Continuous	AM-18[1] or AS3580.9.8-2001[2]
$PM_{2.5}$	ug/m^3	24-hour	Continuous	AM-18[1, 4] or AS3580.9.8-2001[2] or any method approved by the Dirctor General in consulation with the EPA
CO	ppm	1-hour, 8-hour	Continuous	AM-6
Parameter[3,]	**Units of measurement**	**Averaging Period**	**Frequency**	**Method[1]**
Wind Speed @ 10 m	m/s	1-hour	Continuous	AM-2 & AM-4
Wind Direction @ 10 m	°	1-hour	Continuous	AM-2 & AM-4
Sigma Theta @ 10 m	°	1-hour	Continuous	AM-2 & AM-4
Temperature @ 2 m	K	1-hour	Continuous	AM-4
Temperature @ 10 m	K	1-hour	Continuous	AM-4
Total Solar Radiation @ 10 m	W/m^2	1-hour	Continuous	AM-4
Other	**Units of measurement**	**Averaging Period**	**Frequency**	**Method[1]**
Siting[3]	NA	NA	NA	AM-1 & AM-4

Note: [1]NSW EPA, 2001, Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales
[2] Standards Australia, 2001, AS3580.9.8-2001, Methods for the Sampling and Analysis of Ambient Air – Determination of Suspended Particulate Matter – PM_{10} Continuous Direct Mass Method using Tapered Element Oscillating Microbalance Analyser.
[3] Location for meteorological monitoring at IMAX station to be at the top of the building or otherwise approved by the Director-General.

[4] Appropriately modified to include size selective inlet for PM2.5 or as otherwise approved by the Director-General.

- Community Based Monitoring Station

263. The Proponent shall establish one (1) community based monitoring station (CBMS) associated with the ventilation stack to monitor ambient air quality consistent with the requirements in Table 7, the locations to be agreed to by the AQCCC, at least two (2) years prior to the opening of the Project to traffic. The Proponent shall meet all operating costs associated with the stations.

The CBMS shall be operated independently of the Proponent and all other authorities and its establishment and operation shall be overseen by the AQCCC on behalf of the community. The establishment and operation of the stations is to be undertaken in accordance with recognised Australian standards and undertaken by a consultant accredited by NATA for this purpose. The quality of the monitoring results shall be assured through a NATA accredited process prior to the data being considered as a basis for compliance/auditing purposes.

Monitoring results shall be made publicly available and shall be subject to audit at 6 monthly intervals or at a longer interval if approved by the Director-General by an independent auditor agreed by the AQCCC, whose report shall be directly provided to the Proponent and the AQCCC.

The Proponent, following consultation with the AQCCC, shall review the need for the continuation of the CBMS after a period of three (3) years after the Project is opened to traffic. Any recommendation to close the CBMS shall require the approval of the Director-General in consultation with the EPA. The Director-General shall approve the independent auditor.

- Operation Stage Monitoring Stations – Residents in High Rise Apartments (Elevated Receptors)

264. Subject to the agreement of the owners and occupiers, the Proponent shall install two (2) monitoring station at the top or most affected point at the nearest residential high rise apartment buildings to the ventilation stack and unless otherwise agreed by the Director-General following consultation with the EPA, in accordance with Condition of Approval No. 262 to monitor for pollutants identified in Table 7. Monitoring shall be undertaken over a period of at least 12 months from opening of the Project to traffic to correlate and verify impacts with the air quality modelling predictions. The results of the monitoring program shall be made available to the Body Corporate and owners of the apartments as applicable and the AQCCC.

- Operation Stage Monitoring Stations –Ground level Receptors

265. The Proponent shall install two (2) ground level monitoring stations (including the CBMS), in accordance with Condition 262 to assess ambient ground level impacts. The location of the stations and pollutants to be monitored shall be developed in consultation with the AQCCC and be approved by the Director-General and shall include the pollutants specified in Table 7 unless otherwise agreed by the Director-General in consultation with the EPA. The location of the ground level monitoring stations shall meet the siting requirements for a background ambient monitoring station in accordance with AS2922-1987.

The monitoring reports must be made available at six (6) monthly intervals from the date the Project commences operation. The reports must be made available to the Director-General, the EPA, relevant Council(s) and the AQCCC, and must be made publicly available. The total duration of the monitoring shall be for at least three (3) years unless otherwise requested by the Director-General. Any closure of the monitoring station shall be approved by the Director-General in consultation with the EPA at least three (3) months prior to closure.

- Verification of Air Quality Assessment

266. The Proponent shall validate the ambient air quality assessment undertaken for tunnel ventilation system as assessed in the Proposed Alterations to the Modified Activity as Outlined in the Supplementary Environmental Impact Statement for the Cross City Tunnel (Holmes Air Sciences, undated October 2002) for the Project utilising actual monitoring data recorded by the Proponent following 12 months of operation of the Project. Validation shall be to the satisfaction of the Director-General in consultation with the EPA.

- Air Quality Goals – Ambient Air

267. Should ambient monitoring of air pollutants exceed the following goals, the provisions of Condition 268 shall apply:

(a) CO – 8 hour rolling average of 9.0 ppm (NEPM);
(b) NO_2 – One hour average of 0.12 ppm (245 $\mu g/m^3$)(NEPM); and
(c) PM_{10} – 24 hour average of 50 $\mu g/m^3$ (NEPM).

Only monitoring station(s) that meet the requirements for ambient monitoring stations in Australian Standard AS2922 – 1987, shall be used for the purposes of assessing compliance with the ambient goals specified in this condition unless otherwise agreed by the Director-General.

268. Should the results of monitoring required under Condition 264 and 265 show that any of the goals specified in Condition 267 have been exceeded for any given event (excluding extra-ordinary events such as bushfires, dust storms etc as to be defined in a Protocol), the Proponent shall immediately notify the DoP, EPA and NSW Health. The Protocol shall be approved by the Director-General in consultation with the EPA, DoH and the AQCCC. The notification shall be followed up with a detailed report within 10 working days which shall be prepared by an independent person/organisation to the Director-General on the cause and major contributor of the exceedance and the options available to prevent recurrence. The Director-General shall approve the independent person/organisation. This report must include consideration of improvements to the installed systems such as ventilation, and traffic management measures to address ambient air and/or the option of installing pollution control systems. If the Report does not propose the installation of pollution control systems then this recommendation must be justified. The Proponent shall comply with any requirements of the Director-General's review of the Report.

Public Access to Monitoring Results

269. Results of hourly updated real-time ambient monitoring of PM_{10}, $PM_{2.5}$, NO_2, and CO at the approved ground level monitoring locations, in-tunnel CO and relevant meteorological data shall be provided on the Internet site and made publicly available each month in hard form in an easy to interpret format for five years after the opening of the tunnel or otherwise approved by the Director-General. These data shall be preliminary until a quality assurance check has been undertaken by a person or organisation accredited by NATA for this purpose. The availability of these data shall be conveyed to the local community by way of newsletter (including translation into common non-English speaking languages in the area) and newspaper advertisement at least one (1) month prior to the opening of the Project to traffic.

Ventilation Stack

- Monitoring

270. The Proponent shall install monitoring equipment to monitor pollutants inside the ventilation stack. Pollutant monitoring inside the ventilation stack (by sampling and obtaining results by analysis) shall be for the pollutants and parameters specified in Column 1 of Table 8. The Proponent must use the sampling method, units of measures and sample at the frequency specified in the other columns. Monitoring equipment installed under this condition is to be independently audited prior to its commencement of monitoring for compliance with the requirements set out in Table 8. Auditing is to be undertaken by an independent person(s) or organisation(s) approved by the Director-General and paid by the Proponent.

Table 8 – Stack Emission Monitoring Methodologies

Pollutant	Units of measure	Frequency[6]	Method[1]
NO	mg/m^3	Continuous	CEM-2
NO_2	mg/m^3	Continuous	CEM-2
NO_x (as NO_2)	mg/m^3	Continuous	CEM-2
PM_{10}	$\mu g/m^3$	Continuous	AS3580.9.8-2001[2], AM18 or method approved by Director General[2]
$PM_{2.5}$	$\mu g/m^3$	Continuous	AS3580.9.8-2001, AM18[5] or method approved by Director General[2]
Solid Particles	$\mu g/m^3$	Quarterly	TM15
PM_{10}	$\mu g/m^3$	Quarterly	OM-5
$PM_{2.5}$[5]	$\mu g/m^3$	Quarterly	OM-5
CO	mg/m^3	Continuous	CEM-4
VOC	mg/m^3	Continuous	CEM-8
Speciated VOC[3]	mg/m^3	Annual	OM-2
PAH[4]	$\mu g/m^3$	Annual	OM-6
Parameter	Units of measure	Frequency	Method[1]
Flow rate	M^3/s	Continuous	CEM-6
Moisture	%	Continuous	TM-22
Temperature	K	Continuous	TM-2
Other	Units of measure	Frequency	Method[1]
Sampling locations	NA	NA	TM-1

Note:
1 NSW EPA, 2001, Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales
2 Standards Australia, 2001, AS3580.9.8-2001, Methods for the Sampling and Analysis of Ambient Air – Determination of Suspended Particulate Matter – PM_{10} Continuous Direct Mass Method using Tapered Element Oscillating Microbalance Analyser
3 Must include, but not limited to; Benzene, Toluene, Xylenes, 1,3-Butadiene, Formaldehyde and Acetaldehyde
4 Must include, but not limited to; 16 USEPA priority PAHs, namely; Naphthalene, Phenanthrene, Benz(a)anthracene, Benzo(a)pyrene, Acenapthylene, Anthracene, Chrysene, Indeno(1,2,3-cd)pyrene, Acenaphthene, Fluoranthene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Fluorene, Pyrene, Benzo(k)fluoranhtene, Benzo(g,h,i)perylene.
5 Appropriately modified to include size selective inlet for PM2.5 or as otherwise approved by the Director-General.
6 Frequency of monitoring can be varied with approval from the Director-General.

- Ventilation Stack Limits

271. The concentration and mass of pollutants discharged from the ventilation stack(s) referred to in Table 9 must not exceed the respective limits specified for that pollutant.

Table 9 – Mass Pollutant Concentrations

	Units of measurement	Averaging period	Total CO	Total NOx	Total PM_{10}	Total VOC
Concentration limit	mg/m^3	1 hour	109	19	1	11
Annual load limit	t/annum	Annual	781	123	7	78

An independent person or organisation, approved by the Director-General shall:

(a) verify that compliance with stack limits detailed in Table 9 will not result in air quality impacts greater than predicted in the report of the Director-General's report;
(b) undertake an appropriate assessment to the satisfaction of the Director General and in consultation with the EPA to indicate how stack discharge velocities have been optimised in consideration of energy requirements and air quality impacts at all sensitive receivers; and,
(c) validate recorded monitoring data and certify compliance with the stack limits.

The ventilation stack limits detailed in Table 9 shall be reviewed on a five (5) yearly basis and may be lowered (i.e. made more stringent), subject to improvements in vehicle fleet emissions, if the Proponent is directed to do so by the Director-General in consultation with the EPA.

- Exceedance of Stack Limits

272. Should the results of monitoring required under Condition 270 show that any of the stack limits specified in Condition 271 have been exceeded, the Proponent shall immediately notify the DoP, EPA and DoH. This notification shall be followed up with a detailed report within 10 working days to be prepared by an independent person/organisation to the Director-General on the cause and major contributor of the exceedance and the options available to ensure the prevention of a recurrence. The report must include consideration of additional traffic management measures to address air quality emissions and also the option of installing pollution control systems. If the Report does not propose the installation of pollution control systems then this recommendation must be justified. The Proponent shall comply with any requirements of the Director-General's review of the Report. Independent verification shall be undertaken by independent person(s) or organisation(s) approved by the Director-General.

- Emergency Discharge

273. Conditions 258, 259, 267 and 271 do not apply:

(a) in an emergency to prevent damage to life or limb other than an emergency arising from a negligent act or omission from the Proponent. The Proponent shall as soon as reasonably practicable, notify the Director-General and the EPA of any such discharge.

(b) as a result of an incident (not including congestion in the tunnel), which is beyond the control of the Proponent or the tunnel operator and could not have been prevented by taking those steps which a prudent, experienced and competent operator would have taken.

The Proponent shall, as soon as reasonably practicable, notify the Director-General and the EPA of any such discharge.

> *Note: Any exceedance of the goals or limits in conditions 258, 259, 267 and 271 which result from a negligent act by the Proponent/Company irrespective of potential damage to life or limb is a breach of these Conditions of Approval.*

Local and Sub-Regional Air Quality Improvements

274. The Proponent shall assist the relevant Councils in developing an air quality assessment process for inclusion in a Development Control Plan or other appropriate planning instrument, in considering planning and building approvals for new development in the area which would be within a potential three (3) dimensional zone of affectation (buffer volume). This process shall include procedures for identifying the width and height of buildings that are likely to be either affected by the plume from the ventilation stack or affect the dispersion of the plume from the ventilation stack through building wake effects. The Proponent shall meet all costs for the development of this process and any necessary amendments to the planning instrument(s) required to implement the process.

275. Prior to the opening of the Project to traffic, the Proponent shall investigate, in consultation with the EPA the measures for smoky vehicle enforcement in areas surrounding the Project, taking into consideration cost effectiveness. Any measures implemented as a result of investigation recommendations shall be in accordance with the Smoky Vehicle Enforcement Program. The Proponent shall report on the effectiveness of the smoky vehicle enforcement.

General Air Quality Reporting Auditing and Quality Assurance

- General Reporting

276. The Proponent must develop and implement a reporting systems for in-tunnel, ambient and ventilation stack limits to the satisfaction of the Director-General in consultation with the EPA. The reporting system must be approved, fully implemented and operational prior to the commencement of tunnel operations. Minimum analytical reporting requirements for air pollution monitoring stations shall be as specified in Section 4 of the EPA's *Approved Methods of Modelling and Assessment of Air Pollutants in NSW, 2001.*

- Auditing/Quality Assurance

277. The provision, operation and maintenance (including all auditing and validation of data) of all air quality monitoring and reporting shall be funded by the Proponent.

278. The Proponent shall appoint an external auditor to conduct an audit of the air quality monitoring

(in tunnel and external) at six (6) monthly intervals or at any longer interval if approved by the Director-General. Air quality audits shall commence six (6) months from opening of the Project to traffic. The auditor shall ensure that the operating procedures and equipment to acquire air monitoring, meteorological data and emission monitoring data and monitoring reporting comply with NATA (or equivalent) requirements and sound laboratory practice. The Proponent must document the results of the audit and make available all audit data for inspection by the Director-General upon request. A copy of the audit report shall also be issued to the Proponent and AQCCC.

279. The Proponent shall undertake appropriate quality assurance (QA) and quality control (QC) measures for air quality and ventilation stack emission monitoring data. This shall include, but not limited to: accreditation/quality systems, staff qualifications and training, auditing, monitoring procedures, service and maintenance, equipment or system malfunction and records/reporting. The QA/QC measures shall be approved by an independent expert approved by the Director-General prior to monitoring of air quality and ventilation stack emissions as appropriate.

Community Consultation

280. The Proponent shall develop and implement an awareness program for motorists prior to opening of the tunnel on:

(a) Use of the tunnel;
(b) Tunnel features;
(c) Electronic tolling; and
(d) Engineering facilities.

281. The Proponent shall erect an appropriate sign on each construction compound and work area advertising the toll- free complaints contact number required by Condition 7 and the address of the internet site required by Condition 10.

Construction Traffic

282. The Proponent shall utilise trucks with a capacity to carry nominally 14 to 15 cubic metres or more for removing tunnel spoil from sites unless the use of smaller trucks is certified by the EMR through the CMS verification process to be absolutely necessary.

283. The Proponent shall conduct an audit of the road safety implications of the lane and road closures and traffic diversions specified in the TMPs required by Condition 46, prior to certification of the TMPs by the experienced transport planner.

284. The Proponent shall closely monitor the Bourke Street Compound access arrangements including the performance of the William Street/Palmer Street intersection to the satisfaction of the experienced transport planner required by Condition 46. If required, remedial works shall be implemented and/or the spoil removal during peak period hours shall be limited.

285. The Proponent shall ensure that the following requirements are met during construction.

(a) closure of the Macquarie Street exit from the Eastern Distributor shall be minimised to the greatest extent possible;
(b) a minimum of four lanes (two in each direction) to remain open in the Kings Cross Tunnel and one lane on Bayswater Road, Kings Cross Road and Craigend Street during peak periods (6 am to 10 am and 3 pm to 7 pm) and a minimum two lanes (one in each direction) during off peak periods, with the exception of the situations outlined in (c) and (d);

(c) if required, full closure of Kings Cross Tunnel shall only occur between 10 pm and 5 am provided that all lanes on Craigend Street, Bayswater Road and Kings Cross Road shall remain open for the duration of the closure;

(d) if required, Craigend Street and Bayswater Road may be closed to traffic between the hours of 10 pm and 5 am provided that the Kings Cross Tunnel remains open in accordance with the requirements of (b); and,

(e) Neither the northbound nor the southbound tunnel of the Eastern Distributor main tunnel may be closed in its entirety on any given day. Lane closures within the main tunnel will be permitted during the period 11pm and 6am on any weekday. This does not preclude the Eastern Distributor operator and the emergency services from responding to incidents within the Eastern Distributor.

286. The spoil hoisting and stockpiling area proposed at the Bourke Street Compound shall be fully enclosed as proposed in the Wilkinson Murray Pty Ltd Report in Appendix F of the Director-Generals Report.

Operational Traffic

287. The Proponent shall ensure that the design of the Sir John Young Crescent roundabout will adequately cater for future traffic flows in Sir John Young Crescent in consultation with the relevant Council. The Proponent shall consider providing two approach lanes on Sir John Young Crescent and the design of the roundabout shall be approved by the Director-General.

288. The proponent shall submit a report within 18 months from the Approval investigating the feasibility of allowing right-hand turn movements from William Street into Bourke Street. The report shall identify ways of limiting rat-runs using Bourke Street, the option to prohibit right turns at various times of the day (for example during peak periods 6 am to 10 am and 3 pm to 7 pm) and any other required traffic management measures. The findings of the report shall be implemented to the satisfaction of the Director-General.

Hazards and Risks

289. The Proponent shall submit a report within 18 months from the Approval investigating the risk associated with the transport and storage of sodium hydroxide and poly aluminium chloride (PAC) in the tunnel for the use in water treatment. The report shall refer to the Hazardous Industry Planning Advisry Papers No. 4 and No. 6. This report shall:

(a) provide justification for the location of the water treatment plant underground;

(b) detail how the plant is to be appropriately located to minimise impact by fire;

(c) identify ameliorative measures to mitigate the risks; and,

(d) if the risk of storage is above acceptable levels, the Proponent shall relocate the water treatment plant to an above ground or near surface site.

The finds of the report shall be implemented to the satisfaction of the Director-General.

290. In the event of a water treatment plant being located below the surface, the applicant shall under take all adequate measures to prevent adverse impact on people in the event of a fire in the vicinity of the polyelectrolyte ULTRION 7157 storage area. A program of these measures is to be prepared to the satisfaction of the Director-General prior to the completion of the tunnel.

291. Transportation of sodium hydroxide and poly aluminium chloride (PAC) to an in-tunnel water

treatment plant must only be carried out during a period of tunnel closure.

Flora and Fauna

292. The Proponent shall in consultation with the Royal Botanic Gardens and Domain Trust prepare a Tree Replacement and Environmental Enhancement Plan prior to substantial construction works on the Cahill Expressway. The Plan shall be prepared with reference to the "Master Plan for the Domain" and the "Tree Management Plan" prepared by the Royal Botanic Gardens. The Plan shall include but not be limited to:

(a) the replacement of the 14 fig trees on the Cahill Expressway median strip;
(b) a tree replacement program for the Phillip Precinct of the Domain, including at least 10 young fig trees and additional new tree plantings in rows or groves adjacent to Hospital Road;
(c) mitigation of noise and visual impacts from the Cahill Expressway utilising built or landscaped noise walls with appropriate plantings;
(d) investigation of new pedestrian links between the Phillip Precinct of the Domain and the Botanic Gardens;
(e) any measures that will prevent polluted runoff from the Cahill Expressway onto Trust lands or watercourses;
(f) improving the legibility of the edges to the Domain along the Cahill Expressway through bold boundary plantings and/or appropriate hard details; and
(g) if possible, the removal of existing redundant structures of little cultural significance.

The Tree Replacement and Environmental Enhancement Plan shall be developed jointly with, and implemented in consultation with, the Royal Botanic Gardens and Domain Trust to the satisfaction of the Director-General.

ATTACHMENT 1

Guidelines for the Establishment of the Community Liaison Group

The proponent shall consider the following when establishing a Community Liaison Group:

1. The Group shall comprise at least two (2) representatives of the Proponent (including the Environmental Management Representative), at least one (1) representative of Council, at least two (2) community representatives and one (1) business representative (where relevant).

2. At its first meeting, the Group shall consider its interrelationship with any existing community liaison/ consultative groups of adjoining or interrelated developments.

3. Representatives from relevant government agencies or other individuals may be invited to attend meetings as required by the Chair.

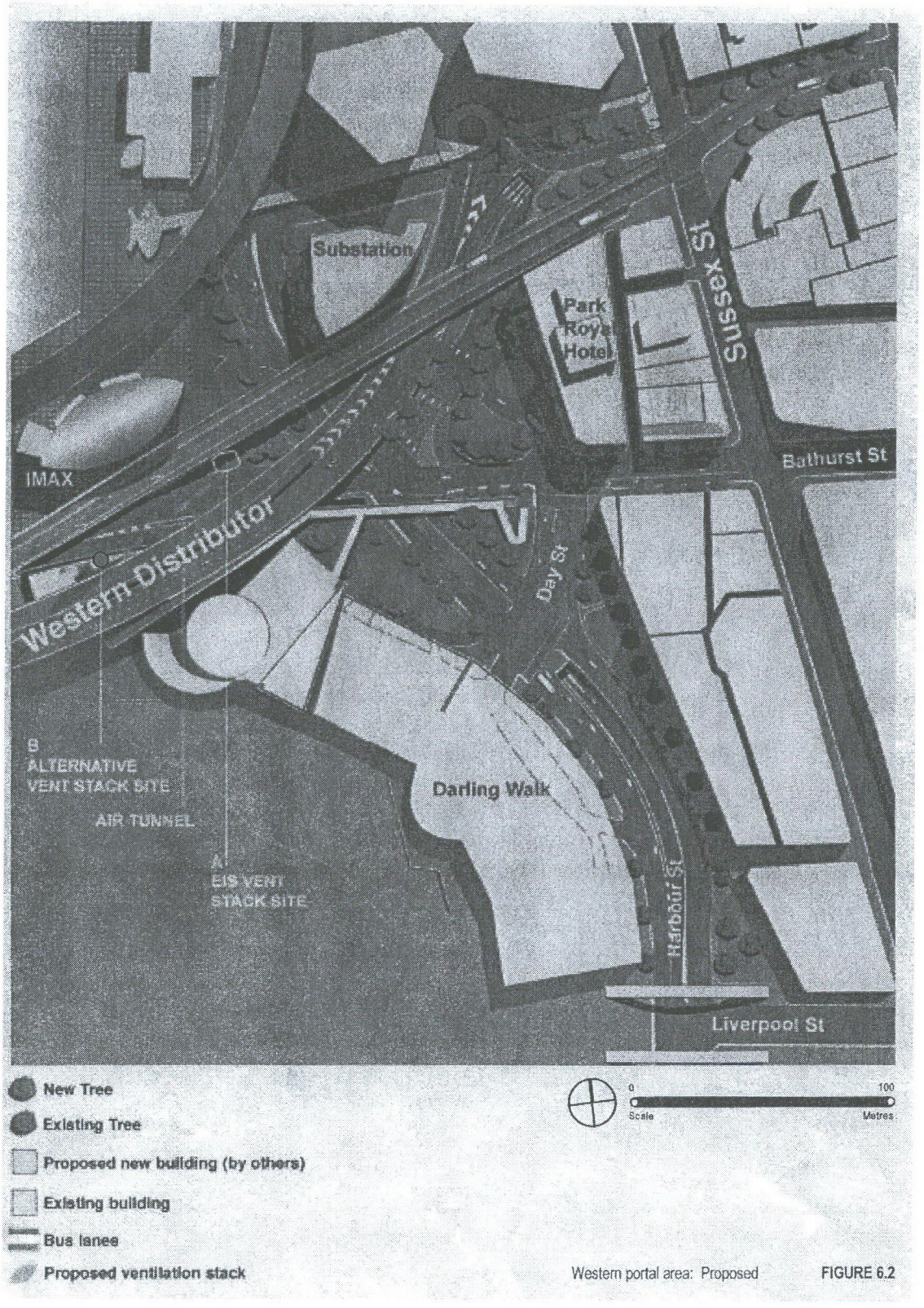
4. Where determined necessary by the Chair, an independent note taker would be provided by the Chair at the expense of the Proponent.

5. The Proponent shall, at its own expense:

- nominate two (2) representatives to attend all meetings of the Committee;
- provide to the Group regular information on the progress of work and monitoring results;
- promptly provide to the Group such other information as the Chair of the Group may reasonably request concerning the environmental performance of the development;
- provide access for site inspections by the Group; and
- provide meeting facilities for the Group, and take minutes of Group meetings. These minutes, once endorsed by the Chair, shall be available for public inspection at Council within 14 days of the meeting.
- The Proponent shall ensure that minutes from Community Liaison Group meetings, annual reports and other public reports required by this approval, and results and interpretation of monitoring required by this Consent are placed on the Internet for public information within 14 days after they are available. The Internet address is to be made publicly available.
- Where reasonably required engage consultants to interpret technical information and tasks of a similar nature.

ATTACHMENT 2

Modified Location of Ventilation Stack (Alternative B)



Western portal area: Proposed FIGURE 6.2

Appendix B

Appendix 6 of Original Representations Report Supplementary Environmental Impact Assessment - Extension of Site Compound Areas and Tunnel Control Building

Appendix 6

Cross City Tunnel EIS Supplementary Environmental Impact Assessment – Extension of Site Compound Areas and Construction of Tunnel Control Building

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Roads & Traffic Authority of NSW

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Attachment 1 Property Descriptions
Attachment 2 Environmental Management - Noise
Attachment 3 Supplementary Study - Noise Impacts of Tunnel Control Building (Richard Heggie & Associates)

1. Introduction

1.1 Background

The Environmental Impact Statement (EIS) for the Cross City Tunnel proposal was publicly exhibited in accordance with the *Environmental Planning and Assessment Act 1979* from 2 August to 6 October 2000. The proponent, the Roads and Traffic Authority (RTA) is currently preparing a Representations Report as required under Clause 91 of the *Environmental Planning and Assessment Regulation*. As a result of reviewing the representations made during the exhibition period, the details of the proposal and its construction, the RTA seeks to include additional land as part of its proposal for the Cross City Tunnel to be used as a site compound area during the period of construction.

Four site compounds are currently described as part of the proposal in *Technical Paper No. 7 - Construction Plan* and Chapter 7 of the Main Volume of the EIS. An indicative layout of a typical site compound is provided as well as possible locations of these site compounds. Other issues such as access to the site compounds and environmental management are also discussed.

The RTA has reviewed the construction plan for the proposal and considers that an extension of the area for site compounds is required to ensure that there is adequate space for storage of equipment and materials and for facilities for the workforce during construction.

It is proposed to use land known as Site 2, Site 3A and Site 3B as shown on *Figure 1.1* as an additional site compound area. For the purpose of this report, these will be referred to as one site. The land under consideration is situated to the immediate north of the auxiliary site compound located on the corner of William and Palmer Streets. Sites 2 and 3B would ultimately be redeveloped as part of a Masterplan for residual land surplus to the requirements of the Eastern Distributor project. The ultimate redevelopment of Sites 2 and 3B would be by way of a Crown development application to South Sydney Council and do not form part of the proposed Cross City Tunnel. The redevelopment of Site 3A would involve the construction and operation of a Control Building for the Cross City Tunnel and is part of the proposal for the Cross City Tunnel. An analysis of the built form and operation of the Control Building is contained in *Appendix 5* of the Representations Report and the potential impacts of constructing the Control Building are addressed in *Section 5.6.2* of this report.

1.2 Proposed Modification of the Activity

The proposed modification of the activity as described in the EIS, seeks to include the use of Sites 2, 3A and 3B described above as a site compound area during the period of construction of the Cross City Tunnel. This site compound would be used in the same manner as those already included in the EIS. It would be used to provide support to the work site proposed at the intersection of William and Bourke Streets, and that proposed at Palmer Street south of William Street. Details of the modification including the use of the site compound, construction hours, access arrangements and other issues such as transportation of excavated material and waste management are included in *Section 3* of this report.

The inclusion of this site as an additional site compound would not change the use of the existing site compounds proposed (particularly Site Compound No. 2, which is located on the southern side of William Street) or the use of the auxiliary site compound. It would only be used in conjunction with, and in addition to, those site compound areas proposed in the EIS.

1.3 Purpose of this Report

This report provides an assessment of the environmental impacts resulting from the use of land for the purposes of a site compound during the period of construction of the Cross City Tunnel and the construction of a Tunnel Control Building on part of the site. It describes this activity (which is a modification to the proposed activity for the Cross City Tunnel as described in the EIS), assesses the impacts and proposes management measures to mitigate any adverse impacts.

2. Site Details

2.1 Location of the Site and Surrounds

The site that is the subject of the proposed modification is located within the vicinity of the connection of the Cross City Tunnel with the Eastern Distributor, at the eastern end of the proposed Cross City Tunnel. This is shown in *Figure 2.1*. For the purposes of this report the site will be referred to as "the site". It is located fronting Palmer Street, north of William Street between Egan Lane and Cathedral Street. The site encompasses all of the land in these three blocks.

2.2 Site Description and Ownership

The site comprises three separate areas of land, being 847.5 square metres for Site 2, 1,220 square metres for Site 3A and 1,450 square metres for Site 3B. The site is currently owned by the RTA and was used previously as a site work area and site compound area for construction of the Eastern Distributor project. The RTA is preparing new boundary data for inclusion on title details prior to lodgement with the Land Titles Office.

Property descriptions are provided in Attachment 1.

3. Description of the Modification

3.1 Modification of the Use of Site Compounds

The establishment of site compounds and the clearing and preparation of work areas would be undertaken in Phase One of the construction period. The additional site compound proposed would be used in the same way as the other four site compounds described in the EIS. An indicative layout of these compounds is provided as *Figure 3.1*. The use of the additional site compound would not alter any of the activities undertaken on Site Compound No. 2 or the auxiliary site compound.

Typically the site compound would comprise:

- offices and meeting rooms for site personnel;
- reception and general administration area;
- amenity and first aid facilities;
- storage for light equipment and tools;
- material storage areas;
- communication facilities; and
- street level parking areas.

The compound buildings could comprise prefabricated sheds or purpose built temporary buildings for the project. Activities undertaken on this new site compound area would supplement Site Compound No. 2 and the auxiliary site compound located on the corner of William and Palmer Streets.

The site compound would be enclosed by fencing with attended security points to control access. Power, water and gas supply to the compound would be obtained from the existing utilities adjacent to the compound. Appropriate security lighting would also be provided around the compound.

Diesel fuel is not expected to be stored on site. Fuel supply for construction equipment would be delivered to site and the equipment would be filled by special tankers. Storage of other inflammable goods such as oxy-acetylene bottles or lubricants for equipment may be required. Inflammable goods would be stored in a bunded area with approved design for fire safety.

Limited on site parking would be provided at the compound for senior site personnel, visitors and delivery vehicles only. Given the availability and proximity of various modes of public transport to the proposed site

adjacent roads occurs is described in *Section 5.1* of this report as one of the environmental management measures to be implemented.

3.5 Transportation of Excavated Material

The use of the site as an additional site compound area would not change the proposed methods for the production, storage, transportation and disposal of material excavated during construction. The auxiliary site compound would still be used to accommodate the proposed driven tunnel access shaft, the associated spoil disposal facilities and area for stockpiling of excavated material. The additional site compound would be used to supplement the use of the auxiliary site compound and Site Compound No. 2. No storage or stockpiling of excavated material would take place on the additional site compound area during construction.

3.6 Construction of the Control Building

Late in the construction period for the Cross City Tunnel proposal, that part of the site referred to as Site 3A would be developed for use as the Cross City Tunnel Control Building. *Appendix 5* of the Representations Report contains an analysis of the impacts of the physical form of the building. *Section 5.6.2* of this Appendix contains an analysis of the impacts of constructing the Control Building.

The four major activities expected to occur during construction of the control building are:

1. Demolition and excavation;
2. Erection of the building structure;
3. Installation of the façade; and
4. Internal fitout.

The main construction activities to occur within these four phases of activity would be:

- demolition activities (of temporary site compound buildings and facilities) and minor excavation works. This would include trucking materials off site;
- site preparation works including:
  - < erecting the proposed four metre high noise barrier wall around the compound perimeter. This barrier wall would coincide with the building walls;
  - < installing temporary security lighting to cover the site;

- < temporary paving of parking and storage areas within the site;
- < excavation and trucking off site of the tunnel overburden material;
- < erecting footpath gantry hoardings along Palmer Street and Egan Place; and
- < extending permanent services (power, water, gas, telecom, drainage, sewerage, etc) onto the site, thence under the building floor;

- construction of the floor of the building;
- erection of the building structural steel frame;
- erection of multi-level scaffolding and shade-cloth for the external cladding works. This would extend around all four side walls of the building, and would involve trucks and cranes in Palmer Street and Egan Place;
- installation of the façade;
- all internal construction of floors, walls, roof, services and the building internal fit-out would take place from within the building, and therefore, except for delivery truck traffic, should not impact externally. These activities would take more than half of the project duration;
- internal fitout, including all internal partitions, painting, joinery, installation of amenities and finishes;
- near completion of the building, the shade-cloth, scaffolding and footpath hoarding would be dismantled and loaded out. This would be done from the road;
- construction and restoration of the footpaths, kerbs and gutters; and
- landscaping, road marking, and erection of signs.

There would be other occasions when cranes would likely be required to operate in Palmer Street, or Egan Place, such as the installation of the lift, roof sited plant and air conditioning. This would involve partial street closures. A crane may also need to operate from Palmer Street to install the operable vertical sun louvres, and the roller shutters. Again this may involve partial street closures.

4. Statutory Planning Context

The proposed use of the site as a compound area would be consistent with the provision of State Environmental Planning Policy No. 63 - Major Transport Projects. The proposed Tunnel Control Centre would also fall under the provisions of this State Environmental Planning Policy as part of the Cross City Tunnel proposal.

State Environmental Planning Policy No. 63 aims to facilitate four major transport projects in the Sydney region, including the Cross City Tunnel. It permits development to be undertaken without development consent and aims to co-ordinate the orderly and economic development of land by providing for development assessment under Part 5 of the *Environmental Planning and Assessment Act 1979*.

The land occupied by the proposed additional site compound is located within South Sydney local government area and is regulated by the *South Sydney Local Environmental Plan 1998.* Under this Plan, the site is zoned 9(a) Arterial Road Reservation. The temporary use of the site as a site compound for the period of construction of the Cross City Tunnel is permissible under this zoning without the consent of South Sydney Council (Clause 55).

No other local statutory planning controls apply to this site. Similarly, no Regional Environmental Plans apply to this site.

5. Environmental Assessment

5.1 Access and Traffic

Access to the additional site compound area would be as described in *Section 3.3* and shown on *Figure 3.2*. As there would be limited parking allowed within the site compound, the majority of traffic generated from the construction sites would be associated with material and equipment deliveries and spoil removal. The estimated volume of construction vehicles would not change from that described in Section 9 of *Technical Paper No. 7*. Each work site is anticipated to generate an average of 100 vehicle movements per day (50 arrivals and 50 departures), with a peak of 150 vehicle movements per day throughout the duration of the construction period of 36 months. Most of these vehicles would be trucks. Pedestrian and bicycle access in public areas around the site would be maintained and any impacts managed through the implementation of measures outlined in the traffic management plan.

During construction of the project, the contractor would be required to develop a traffic management plan to address major work that is proposed that would impact on existing traffic arrangements. If any impacts were predicted on traffic as a result of the use of the site compounds or any activities that were undertaken on the site compound areas, they would be addressed in the traffic management plan.

As there are high levels of traffic already on city streets, the relatively low levels of additional construction traffic associated with this particular site to that assessed in the EIS would have minimal impacts on traffic flows. For example, the additional construction traffic would increase the total daily flow on Palmer Street, south of Sir John Young Crescent and William Street, west of Forbes Street by less than one percent and 0.5 percent respectively in the year 2000. The William Street/ Palmer Street intersection would operate at a level close to capacity in the evening peak. Therefore this intersection would be carefully monitored during the construction period to minimise traffic congestion.

5.2 Noise and Vibration

5.2.1 Description of Works

The additional site compound area is expected to be in operation during almost the entire construction period of the Cross City Tunnel. In addition, to service the construction activities proposed - in particular the

underground tunnelling works - the compound would be in use on a 24-hours per day, seven days per week basis.

The additional site compound would include a full suite of work site infrastructure and associated activities. *Table 5.1* indicates the main usage areas within the compound and potential noise impacts.

Table 5.1: Additional Site Compound Activities and Associated Noise Sources/ Activities

Usage	Noise Source / Activity
Office/Administration (reception and general administration areas, offices, meeting rooms, amenities, first aid facilities, communication rooms, etc)	Generators (power) and Ventilation (AC) 24-hours a day, seven days a week usage People noise and loudspeakers Construction of facilities
Equipment Storage Areas (light equipment and tools only, but no maintenance activities)	Handling (especially at night-time)
Material Storage Areas (limited material stockpiles, piping, electrical, etc, but no fuel storage)	Material handling Vehicle noise
Parking Areas	Vehicle Road Traffic Noise

5.2.2 Prediction of Noise Emissions and Assessment of Impacts

Table 5.2 presents the predicted ranges of noise emission levels for representative noise sensitive areas during the establishment phase of the additional compound. The establishment phase would occur in less than six months and most probably in under four weeks. Construction work associated with the establishment would only take place during daytime construction hours.

Table 5.2: Expected $L_{A10(15minute)}$ Noise Levels - Additional Site Compound, "Construction" Phase

Receiver Location	$L_{A10(15minute)}$ Construction Noise Goal[1]		Calculated $L_{A10(15minute)}$ Construction Noise Level[2]
	<4 weeks	4-26 weeks	
Eight-storey Residential Block (Palmer & Robinson)	80	70	60 - 80
Five-storey Residential Block (Egan Place south end)	80	70	60 - 80
Backpackers Hostel (west side Palmer Street)	78	68	60 - 80
Two-storey Residential Block (Cathedral to St Kilda)	75	65	60 - 80

Notes: 1: Goals based on daytime ambient LA90 noise levels.
2: Range depends upon the number of plant concurrently operating on site, location around the site, etc.

Maximum predicted noise levels have the potential to exceed the noise goals by small margins towards the northern part of the site. Establishment of the compound within the four-week higher noise allowance period is therefore recommended.

In this instance, consultation with the local community detailing establishment plans for the compound would form an important part of the noise management of the site. The benefits provided to the local community through the proposed site layout and operational controls should be conveyed at that time.

Table 5.3 presents the predicted ranges of noise emission levels for representative noise sensitive areas during the operational phase of the additional site compound. The operational phase would occur over the entire period of Cross City Tunnel construction works and on a 24-hours per day and seven days per week basis.

Table 5.3: Expected $L_{A10(15minute)}$ Noise Levels - Additional Site Compound, "Operational" Phase

Receiver Location	LA10(15minute) Construction Noise Goal			Calculated LA10(15minute) Construction Noise Level[2]		
	>26 weeks Daytime	>26 weeks Evening	>26 weeks Night-time	Daytime	Evening	Night-time
Eight-storey Residential Block (Palmer & Robinson)	65	61	55	60	60	55
Five-storey Residential Block (Egan Place south end)	65	61	55	60	60	55
Backpackers Hostel (west side Palmer Street)	63	59	53	65	65	50
Two-storey Residential Block (Cathedral to St Kilda)	60	56	50	65	65	50

Notes 1: Goals based on long-term "background + 5 dBA" criterion.
2: Night-time level has been calculated assuming curtailed activities (refer ***Section 5.2.2***).

Maximum predicted noise levels have the potential to exceed the noise goals by moderate margins towards the northern part of the site.

Curtailment of activities involving material and equipment handling would take place during the "evening" (6.00 pm to 10.00 pm) period of the day. In this instance, only modest exceedences of the set noise goals would then occur for the compound.

5.3 Air Quality

Potential air quality impacts during construction resulting from the use of site compound areas would be limited to dust and vehicle and plant emissions. Management measures would be implemented as described in *Section 6* to mitigate any adverse impacts.

The environmental management plan to be prepared for the Cross City Tunnel would include an air quality management plan addressing these, including monitoring of impacts at construction sites.

5.4 Waste Minimisation and Management

General waste would be generated from this site construction compound. This waste would be actively managed and minimised where possible. Except where sewer is available, site amenities would discharge all sewerage to holding tanks for removal by tankers. Rubbish skips would be provided at all site compounds and regularly removed or emptied. Any soil contamination resulting from a chemical, fuel or oil spill would be excavated and removed to an approved disposal centre. The excavation would be backfilled with clean soil compatible with the residual materials. Waste generated from the site compound would be recycled wher practicable.

Management measures to ensure waste generated from the site compound is minimised and managed properly are included in *Section 6*.

5.5 Other Impacts

Other potential impacts as a result of the use of the additional site for a site compound could be impacts on demands on resources and utilities; impacts on the visual amenity of the surrounding area and impacts on public safety.

5.5.1 Demand on Resources

Construction of the proposal would require the consumption of energy (in the form of electricity, fuel and water), construction materials and human resources. Additional electricity supply to that described in the EIS would be required for the additional site compound area. This would comprise provision of lighting, air conditioning, operation of office equipment and flood lights for external areas. The increase in supply would be negligible in the context of the total consumption of 25 gigawatt hours for the entir project and would be obtained from the existing power grid near the construction compound. No additional fuel would be consumed as a result of the new site compound. Water would be required during construction for

dust control, washing equipment, sewerage and drinking water. It is estimated that any additional water consumed during construction as a result of the additional site compound areas would be minimal in the context of the 15,000 cubic metres to be used for the whole project. Water use would however be minimised and regulated, and where possible water conservation techniques would be used. These are described in *Section 6*.

A negligible increase in materials for construction would be used as a result of the additional site compound area. This would be mainly related to the additional buildings that would be required on the site.

The workforce involved in the project would not be altered as a result of the additional site compound.

5.5.2 Visual Amenity

The visual impacts of the additional site compound area would not be greater than described in Section 8 of *Technical Paper No. 6 - Urban Design*. Management measures to mitigate adverse impacts would be implemented and are described in *Section 6* of this report.

5.5.3 Public Safety

The site compound area would be enclosed by fencing with attended security points to control access. Appropriate security lighting would also be provided around the compound. There would be no public access allowed to the compound. It is considered that public safety would be in no way impacted adversely as a result of the use of this site as a site compound area during construction of the project.

5.6 Future Use of the Site

5.6.1 Control Building and Future Developments

Late in the construction period for the Cross City Tunnel proposal, that part of the site referred to as Site 3A would be developed for use as the Tunnel Control Centre when the tunnel is in operation. This is described in more detail in *Appendix 5* of the Representations Report. The remaining Sites 2 and 3B would be redeveloped in accordance with the Masterplan for the redevelopment of residual land associated with the Eastern Distributor project. The redevelopments of Sites 2 and 3B do not form part of the Preferred Activity and would be subject to separate Council approval.

5.6.2 Impacts of Constructing the Control Building

The control building would be constructed over a period of approximately five months and would be required to be in operation prior to the opening date of the tunnel. The potential impacts of its construction would be typical of a small to medium sized commercial building including impacts on public safety; visual and social amenity; traffic and access; noise; air quality; waste minimisation and management; and runoff and sedimentation. These are briefly described below. Management measures to control and minimise these impacts are provided in Section 6.

Public Safety

Construction of any building in close proximity to public spaces has the potential to impact on public safety. The construction area would be enclosed by footpath gantry hoardings and a four metre high noise barrier which would be erected around the building perimeter. The design, supply and installation of hoardings are guided by the *Code of Practice - Overhead Protective Structures* prepared by the WorkCover Authority of NSW. The hoardings for this site would comply with this code as well as allowing for the provision of safety and structural adequacy in accordance with the Building Code of Australia and adopted Australian Standards.

The design objectives of the hoardings would include:

- maintaining a high standard of pedestrian amenity;
- contributing positively to the streetscape;
- informing pedestrians about the proposed development;
- maintaining materials, finishes, structure and graphics in good condition;
- minimising obstruction to the footpath;
- providing water and weather protection above pedestrians;
- providing a vehicle access gate for access by construction related vehicles and machinery; and
- providing lighting for pedestrians.

For guidance on the structural requirements for hoardings, the construction contractor could use the City of Sydney *Draft Policy for Temporary Protective Structures - Hoardings, Scaffolding, Shoring and Façade Retention* (City of Sydney, 2000). Particular attention would be paid to the existing street trees located along Palmer Street and how the construction hoardings would be installed in relation to these trees so as not to damage them in any manner. Before erecting the hoardings, an application would be made to South Sydney City Council for a Builders Hoarding Permit (for approval under the *Roads Act 1993*). A site inspection would need to be undertaken by Council officers for assistance in determining the type of

hoardings required. An application would also be made to Council for a permit to operate a mobile crane from a public road.

In addition any excavation below the footpath level would require shoring in accordance with South Sydney City Council's Shoring Policy.

Appropriate security lighting would also be provided around the site and no public access to the site would be allowed.

With these measures in place, public safety would be in no way impacted adversely as a result of constructing the control building.

Amenity

The visual and public amenity for surrounding land uses and pedestrians would be temporarily altered during the construction period. Potential impacts on amenity would include noise, dust, traffic and access and visual impacts. These are addressed separately below. As described in Section 6, management measures would be implemented to mitigate any adverse amenity impacts that occur during the building's construction. Extension of permanent services to the control building (power, water, gas, etc.) may result in local short-term outages and shut-downs.

Traffic and Access

Temporary impacts on traffic flow and access along Palmer Street and Egan Place would occur at various times during the construction period. These impacts would likely occur on the following occasions:

- during the erection of footpath gantry hoardings along Palmer Street and Egan Place;
- during the erection of multi-level scaffolding and shade cloth for external cladding works due to the use of trucks and cranes in Palmer Street and Egan Place;
- delivery of concrete to the site;
- general truck traffic making material deliveries to the site;
- when cranes are required to operate in the street such as during installation of the lift, roof sited plant, air conditioning and the vertical sun louvres and roller shutters. These would most likely involve partial street closures; and
- during the dismantling of hoardings, scaffolding etc near completion of the building.

The contractor would ensure that construction activity on, over or adjacent to the public pathways provides a passage free of obstruction and that it has appropriate signage and ramps.

The construction contractor would be required to prepare a traffic and access management plan which would include all of the above potential impacts and nominate how they would be managed. This would be submitted to Council, and the Environment Protection Authority for approval prior to the commencement of construction.

If loading and unloading of construction materials is required to take place on or partially on the street, the contractor would apply to Council for approval of an "on-street construction zone".

Noise

Noise and vibration associated with the construction and operation of the control building would have the potential to adversely impact on nearby residential and other receivers.

Existing accumulated ambient L_{A90} (and L_{A10}) noise levels have been previously measured at locations close to Cross City Tunnel construction sites (refer *Technical Paper No. 18, Noise and Vibration"*. A summary of this data, for the Environment Protection Authority's standard "daytime", "evening" and "night-time" construction hours, can be found in Table 3.2.1 of *Technical Paper No. 18*.

Site specific construction noise objectives at the nearest residential and commercial receivers surrounding the site were determined using this data.

The expected duration of construction phases and relative levels of expected noise impact are summarised in Table 5.4. Methodology for determining these impacts are detailed in Attachment 3 to this report.

Table 5.4 Cross City Tunnel Control Building Construction Phases and Associated Noise Sources/Activities

Phase	Noise Source / Activity	Duration
Demolition and Excavation	Demolition of Additional Site Compound Levelling of ground to terrace levels of Cross City Tunnel Ground Floor Detailed excavation of footing zones There is potential for high noise levels, offset by very modest demolition required and minimal excavation	3 to 4 weeks
Erection of Primary Structure and Façade	Placement of footings and commencement of lift core Erection of building columns, finish lift core Erection of floor slabs (following lift core and columns) Installation of façade (including windows, finished masonry) There is potential for high noise levels due to proximity of neighbouring sensitive receivers and duration of works	20 weeks
Internal Fit-Out	Install floor coverings, fixtures, painting Install special fit-outs (toilets, showers, etc) Install all services: plumbing, electrical lights, lifts, fire, etc The potential for high noise levels is offset by the shielding that would become available once the building façade is installed	6 weeks

Table 5.5 presents the predicted range of noise emission levels for representative noise sensitive areas during the construction of the control building.

Table 5.5 Expected $L_{A10(15minute)}$ Noise Levels - Cross City Tunnel Control Building, "Construction" Phase

Receiver Location	$L_{A10(15minute)}$ Construction Noise Goal [1]		Calculated $L_{A10(15minute)}$ Construction Noise Level [2]
	< 4 weeks	4-26 weeks	
Demolition and Excavation Stage			
2-storey Residential Block (Cathedral to St Kilda, NE of site)	70	na	62 - 82
2-and 3-storey Residential Blocks (Palmer Street opposite site)	73	na	60 - 80
2-storey Suttons Holden Commercial (Bourke Street to Egan Place, E of site)	78	na	65 - 85
5-storey Residential Block (Egan Place, SE of site)	75	na	62 - 82
Erection of Primary Structure and Façade			
2-storey Residential Block (Cathedral to St Kilda, NE of site)	na	60	57 - 79
2-and 3-storey Residential Blocks (Palmer Street opposite site)	na	63	55 - 78
2-storey Suttons Holden Commercial (Bourke Street to Egan Place, E of site)	na	68	60 - 78

Receiver Location	$L_{A10(15minute)}$ Construction Noise Goal [1]		Calculated $L_{A10(15minute)}$ Construction Noise Level [2]
	< 4 weeks	4-26 weeks	
5-storey Residential Block (Egan Place, SE of site)	na	65	57 - 79
Internal Fit-Out			
2-storey Residential Block (Cathedral to St Kilda, NE of site)	na	60	42 - 62
2-and 3-storey Residential Blocks (Palmer Street opposite site)	na	63	40 - 60
2-storey Suttons Holden Commercial (Bourke Street to Egan Place, E of site)	na	68	45 - 65
5-storey Residential Block (Egan Place, SE of site)	na	65	42 - 62

Notes: 1. Goals based on daytime ambient L_{A90} noise levels
2. Range depends upon the number of plant concurrently operating on site, location around the site and hence proximity to particular receiver, etc

Maximum predicted noise levels have varying potential to exceed the noise goals depending upon location of the receiver and phase of the work, as follows:

- there are predicted to be occasional exceedences at surrounding receiver locations during the demolition and excavation phases of the work. Completion of these works within the planned 4-week higher noise allowance period is therefore strongly recommended;
- there are predicted to be slightly more frequent exceedences at surrounding receiver locations during the erection of the primary structure and façade installation phases of the work, and
- there should be no exceedences at surrounding receiver locations during the internal fit-out phases of the work. These works would benefit from the shielding provided once the façade of the building is installed.

Consultation with the local community would form an important part of the noise management of the site.

During operation of the control building, the roof-top ventilation system for the building has the potential to exceed noise goals set out on the Environment Protection Authority's *Industrial Noise Policy*. No details are currently available for the likely ventilation system. However, the noise emissions from the plant, with appropriate acoustic enclosures, should not exceed:

- 60 dBA during day time hours (7.00 am to 6.00 pm);
- 57 dBA during evening hours (6.00 pm to 10.00 pm);
- 55 dBA during night-time hours (10.00 pm to 7.00 am)

at any point on the periphery of the site.

Air Quality

Construction of the control building has the potential to create dust impacts, especially during certain phases of the construction works such as the demolition and excavation activities. These would be controlled using the mitigation measures described in Section 6 so that any adverse impacts are minimised and ameliorated where possible.

The environmental management plan to be prepared for the Cross City Tunnel would include an air quality management plan, addressing these impacts. This would also include monitoring of impacts at construction sites.

Waste Minimisation and Management

General waste and building waste would be generated from this construction site. This waste would be actively managed and minimised where possible. Rubbish skips would be provided at the site and regularly removed or emptied. Building waste would be recycled where possible. Section 6 contains additional management measures that would be implemented.

Runoff and Sedimentation

Any stormwater runoff or other discharges from the site would be controlled on site and discharged to the existing street stormwater outlets using the mitigation measures outlined in Section 6. The contractor would install and maintain suitable measures to ensure that sediment and other materials are not tracked onto the roadway by vehicles leaving the site.

6. Environmental Management

Table 6.1 outlines the environmental management measures to be implemented to minimise adverse impacts as a result of the additional site compound during the period of construction of the Cross City Tunnel. *Table 6.2* outlines the environmental management measures to be implemented during construction of the control building.

Table 6.1: Environmental Management Measures for Site Compound Areas During Construction

Issue	Environmental Management Measures Proposed
Access and Traffic	▪ contractor to develop a traffic management plan for use whenever major work would impact on existing traffic arrangements. This plan would include access to side streets, provision of barriers between site compounds and traffic areas, signposting and access to adjoining properties which are relevant to the use of the sites as a site compound area; ▪ compound site access to be generally left in, left out or signal controlled; and ▪ monitor William Street/Palmer Street intersection during construction to ensure minimal adverse impacts on traffic flow.
Noise and Vibration	Refer Attachment 2.
Air Quality	▪ prepare air quality management plan as part of overall environmental management plan. Measures to be included are contained in Section 9 of *Technical Paper No. 16 - Air Quality*, and ▪ monitor air quality impacts at construction sites and site compound areas.
Waste Minimisation and Management	▪ waste recycled where practicable; ▪ if no sewer is available, site amenities would discharge all sewerage to holding tanks for removal; ▪ regularly remove or empty rubbish skips; and ▪ any other relevant measures would be implemented as contained in Section 3 of *Technical Paper No. 24 - Environmental Management Framework*.
Utilities	▪ minimise water usage where possible and use water conservation techniques for site compound areas including aerated taps, waste efficient appliances, trigger action hoses, low/dual flushing or composting toilets and prompt repair of leaking taps and pipes.
Visual Amenity	▪ paint hoardings and fences to a colour scheme agreed with the RTA, including bold and informative graphics and planned as one system with barriers and signage; ▪ keep site compound areas tidy and regularly cleaned; and ▪ wheel washing and watering of dust raising activities as appropriate.
Public Safety	▪ use site fencing and security attendants and limit public access to reduce impacts on public safety.

Table 6.2: Environmental Management Measures for Construction of the Control Building

Issue	Environmental Management Measures Proposed
Public Safety	▪ enclose construction area with footpath gantry hoardings and a four metre high noise barrier; ▪ the design, supply, installation and structure of hoardings are to be guided by the *Code of Practice - Overhead Protective Structures* prepared by WorkCover and would also allow for safety and structural adequacy in accordance with the Building Code of Australia and adopted Australian Standards; ▪ installation of security lighting around the site; ▪ no public access allowed to the site.
Amenity	▪ visual amenity of the site will be managed by keeping the site areas tidy and regularly cleaned. Other management measures to minimise impacts on public amenity are included in the noise, dust, traffic and access section. ▪ notification to nearby properties of any service (electricity, gas etc) outages during building construction.
Traffic and Access	▪ ensuring that construction activity on, over or adjacent to the public pathways provides a passage free of obstruction and that it has appropriate signage and ramps; ▪ contractor to develop a traffic and access management plan whenever works would impact on existing traffic or access arrangements. This would be submitted to Council and Environment Protection Authority for approval prior to the commencement of construction and would include the use of cranes on streets, access to the building site and deliveries to and from the building site; and ▪ site access to be generally left in, left out or signal controlled.
Noise	Refer Attachment 2.
Air Quality	▪ prepare air quality management plan as part of overall environmental management plan. Measures to be included are contained in Section 9 of *Technical Paper No. 16 - Air Quality*; and ▪ monitor air quality impacts at the construction site.
Waste Minimisation and Management	▪ provide rubbish skips at the site to regularly remove rubbish; ▪ building waste recycled where possible; ▪ any other relevant measures would be implemented as contained in Section 3 of *Technical Paper No. 24 - Environmental Management Framework*.
Run-off and Sedimentation	▪ drainage would be installed early in the construction process to enable on-site run-off to be contained within the site and directed to the existing stormwater outlets; ▪ sedimentation control measures would be used at the boundaries of the site if these are required during large storm events or during construction activities that require the use of water.

References

City of Sydney (2000). *Draft Policy for Temporary Protective Structures - Hoardings, Scaffolding, Shoring and Façade Retention*, Council of the City of Sydney, Sydney.

Attachment 1

Property Descriptions

Property Details of Land Required for Site Compound

Land	Location	Proprietor
Lot 1, DP 221219	No. 120 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Lot 1, DP 61437	No. 118 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Lots A & B, DP 107116	No's. 114-116 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Part DP 979963	No. 112 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Part DP. 979963	No. 110 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Part DP 979963	No. 108 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Part DP 979963	No. 106 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Part DP 979963	No. 104 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Lot B, DP 230686	No. 102 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Lot A, DP 230686	No. 100 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Lot C, DP 230686	No. 9 Egan Place, Woolloomooloo	Roads and Traffic Authority of NSW
Part DP 979963	No. 98 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Part DP 979963	No. 96 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Lot 12, DP 232412	No. 94 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Lot 11, DP 232412	No. 92 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Lot 2, DP 218516	No. 90 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Lot 1, DP 218516	No. 88 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Part DP 979963	No. 7 Egan Place, Woolloomooloo	Roads and Traffic Authority of NSW
Lot 1, DP 537356	No. 86 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW

Land	Location	Proprietor
Lot 2, DP 537356	No. 5 Egan Place, Woolloomooloo	Roads and Traffic Authority of NSW
Part DP 979963	No. 84 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Part DP 979963	No. 3 Egan Place, Woolloomooloo	Roads and Traffic Authority of NSW
Part DP 979963	No. 82 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Part DP 979963	No. 80 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW
Part DP 979963	No 1 Egan Place, Woolloomooloo	Roads and Traffic Authority of NSW
Lot 1, DP 62778	No. 131 Cathedral Street, Woolloomooloo	Roads and Traffic Authority of NSW

Attachment 2

Environmental Management Measures - Noise

Environmental Management Measures – Noise

The general approaches to noise mitigation identified in *Appendix E* of the EIS of this report would be implemented where applicable for both the operation of the additional site compound and the construction of the control building.

1. **The following site-specific noise mitigation measures and other site noise management procedures would also be implemented where practical and cost-effective during operation of the additional site compound:**

Office/Administration

- The main group of office and administration buildings would be located at the southern end of the compound, providing a noise barrier to the five-storey and eight-storey residential apartments on the east side and west side of the compound respectively. Any additional or temporary buildings would be located along the northern end of the compound (between St Kilda Lane and Cathedral Street) adjacent to the two-storey residential dwellings abutting the north-east corner of the site.
- All ventilation equipment (air conditioning) for all offices and generators (including emergency generators) would be positioned facing away from nearby residential receivers and, where appropriate, fitted with acoustic attenuators or enclosed.
- Use of a public address system within the compound would be restricted. Public address speakers, if required, would be located so that their pointing axis is directed away from residential blocks. Except in the case of emergencies, the public address system would not be used during the night-time (10.00 pm to 7.00 am) period.
- Access to the site for personnel (and their vehicles) would be permitted at all times of the day. Administration and office areas would be allowed to operate on a 24-hour per day basis. Training would be provided to site personnel regarding the minimising of noise (for example, car entry and exit behaviour, use of personal radios, etc) throughout the day and especially during the night-time (10.00 pm to 7.00 am) period.

Noise Walls

- A four metre high barrier would be built along all perimeters of the compound not protected by site buildings or other structures acting as effective noise barriers.

Parking and Vehicle Management

- Compound-related traffic, including both private cars and material/ equipment handling trucks, would be confined to the northern part of the site as much as possible. Access for all compound-related traffic would be via a single entry point located off the Palmer Street southbound lanes at St Kilda Lane and a single exit point near the intersection of Cathedral Street and Palmer Street.
- All vehicles would be parked at the northern side of the compound. The access road and parking area within the compound would be paved.
- Heavy vehicles associated with non-compound Cross City Tunnel construction works would not be parked overnight within the site compound, thereby avoiding disturbance due to early morning engine start-ups.
- The contractor (and subcontractors) would be required to ensure that vehicles required within the compound do not "queue" outside the work site prior to the morning 7.00 am start time.

Material Handling

- Areas used for stockpile material handling would be confined to the central west section of the compound (that is, opposite Suttons commercial premises) and where possible covered by awnings or canopy structures providing a noise screen during handling operations.
- Operations involving material handling would be restricted as much as possible to the daytime and evening periods, ie 7.00 am to 10.00 pm.

Equipment Storage and Handling

- Equipment storage would take place within enclosed buildings located within the central east section of the compound (that is, adjacent to Suttons commercial premises). Equipment requiring lifting and handling using forklifts or trucks would be stored in areas covered by awnings or canopy structures.
- Operations involving equipment handling requiring lifting via forklift or truck would be restricted as much as possible to the daytime and evening periods, that is, 7.00 am to 10.00 pm.

Construction of Facilities

- Construction of all facilities within the compound would take place during normal daytime construction hours. Community consultation would take place prior to this period, detailing the site layout, operational controls to be employed and the expected construction schedule for the compound.

Maintenance Activities

- No maintenance activities that would create noise disturbance adjacent properties would take place within the site compound.

2. **The following site-specific noise mitigation measures and other site noise management procedures would also be implemented where practical and cost effective for construction of the control building:**

- Permissible Times of Work - particular attention would be paid to the hours of use of noisy equipment such as angle grinders, impact drills, etc. While the general hours of work would be based on normal Environment Protection Authority's requirements, noise-intensive activities could be minimised for example during the first hour or so of the daytime period (say between 7.00 am and 8.00 am).
- The contractor (and subcontractors) would be required to ensure that vehicles required at the Cross City Tunnel Control Building construction compound do not "queue" outside the worksite in front of residential receivers prior to the morning 7.00 am start time.
- Construction-related traffic, including both cars and trucks, would be confined to the north of the Cross City Tunnel Control Building site, which would also be used for parking related to the operation of the Cross City Tunnel Additional Site Compound. Access for all construction-related traffic would be via a single entry/exit point located off the Palmer Street southbound lanes near St Kilda Lane.
- Wherever possible, areas used for stockpile material handling would be covered by awnings or canopy structures providing a noise screen during handling operations. Enclosed areas within adjacent Cross City Tunnel Additional Site Compound sections would be utilised wherever possible for such activities.
- Maintenance activities for construction equipment would be restricted to the standard Environment Protection Authority daytime construction period. All maintenance activities would take place within an enclosed space. Enclosed areas within adjacent Cross City Tunnel Additional Site Compound sections would be utilised wherever possible for such activities. Wherever possible, maintenance activities would be minimised during the first hour (7.00 am to 8.00 am) of the construction daytime period.
- Use of a public address system within the Cross City Tunnel Control Building construction site would be restricted. Public address speakers, if required, would be located so that their pointing axis was directed away from residential blocks. Except in the case of emergencies, the public address system would not be used during the evening and night-time (6.00 pm to 7.00 am) period.

During operation of the control building:

- acoustic enclosure for roof-top ventilation plant of a height determined by the line of site between exhaust points of the plant and top floor of all adjacent properties.
- mount rubber fixing on any metal grilles on truck exit and entry points to prevent rattling.

- trucks reversing operations carried out with roller doors closed.

Attachment 3

Supplementary Study –
Noise Impacts of Control
Building
(Richard Heggie & Associates)

REPORT 10-1633-R2

Cross City Tunnel
Supplementary EIS Studies
Cross City Tunnel Control Building
88 Palmer Street, Woolloomooloo

Prepared for

PPK Environment & Infrastructure
PPK House 9 Blaxland Road
Rhodes NSW 2138

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RICHARD HEGGIE
ASSOCIATES
ABN 29 001 584 612

Level 2, 2 Lincoln Street Lane Cove NSW 2066 (PO Box 176 Lane Cove NSW 1595)
Telephone 61 2 9427 8100 Facsimile 61 2 9427 8200 sydney@heggies.com.au

Cross City Tunnel
Supplementary EIS Studies
Cross City Tunnel Control Building
88 Palmer Street, Woolloomooloo

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Appendix A *Acoustic Terminology*

1 INTRODUCTION

During the exhibition and public consultation phases of the EIS process for the Cross City Tunnel (CCT) proposal, various parties requested clarification or further details in relation to some noise and vibration issues. These parties included the Department of Urban Affairs and Planning, the NSW Environment Protection Authority, various Local Councils, community groups and numerous private individuals affected by or interested in the project.

Richard Heggie Associates (RHA) Pty Ltd has been engaged by PPK Environment & Infrastructure (PPK) on behalf of the NSW Roads and Traffic Authority (RTA) to assist in the consultation process and to conduct and report on supplementary technical studies to address the issues raised by these parties. RHA has examined construction noise and vibration impacts at the CCT portal construction sites and the proposed Additional Site Compound

This report presents the results of predictions and assessments of anticipated noise and vibration emissions associated with the construction and operation of the proposed Control Centre for the CCT project. The Centre would be located within an area referred to as Site 3A of the DUAP-approved Master Plan covering the precinct occupied by the CCT Additional Site Compound used during the construction stage of the project.

A description of the Acoustic Terminology used in this report is presented in **Appendix A**.

2 PROPOSED CCT CONTROL CENTRE

2.1 Location and Description of Building Form

The proposed CCT Control Building would be bounded by Palmer Street (west), Egan Place (east), St Kilda Lane (north) and Spence Lane (south). The building would occupy an area known as Site 3A of the surplus sites forming the proposed CCT Additional Site Compound. This area can be viewed in Figure 4.4.2 of Technical Paper No.6 of the EIS. The Control Building itself would comprise:

- A Ground Floor for car parking (10 cars, one motorcycle and 6bicycles), truck parking (three CCT maintenance trucks), a Reception Area for the issuing of E-Tags and change rooms and workshop spaces.

- A First Floor for commercial office space plus amenities (toilets, showers, etc) and a north-facing balcony.
- A Second Floor for commercial office space plus amenities (toilets, showers, etc) and a north-facing balcony.
- Roof level plant enclosure, located in the centre of the building floor plan envelope.

2.2 Overview of Construction Activities Associated with the CCT Control Building

Activities expected to occur during the construction of the CCT Control Building can be separated into four broad categories:

- Demolition and Excavation
- Erection of the Primary Structure
- Installation of the Facade
- Internal Fit-Out

Demolition and Excavation

The proposed CCT Control Building would overlay the Eastern Distributor and hence would not have a basement floor. However, the site of the proposed building would occupy the central part of the proposed Additional Site Compound for the CCT, which is proposed to stretch from Cathedral Street (to the north) to William Street (to the south).

Thus, the CCT Control Building construction program would involve a modest amount of demolition works (of Additional Site Compound temporary buildings and facilities) and negligible excavation works (only to bring the existing sloping ground to a series of terraced level areas for the building's Ground Floor). The demolition phase of the project would therefore be quick (ie a matter of days) and involve hammers, possibly angle grinders, bobcats, etc. Any spoil would be trucked off site. The excavation phase of the project would be equally quick and involve the use of a grader and small dozer.

Erection of Primary Structure

The activities involved here would include erection of the main supporting structure for the building (columns, beams, floor slabs, etc) plus the lift core, which is generally constructed in advance of the remainder of the main building structure. For the CCT Control Building, construction activities would involve delivery of materials, erection of formwork, installation of steel reinforcement, pouring of concrete, and stripping of formwork.

Installation of the Facade

The erection of facade system would involve construction of painted and rendered masonry, installation of windows and louvres, fixings and roof top enclosures.

Internal Fit-Out

Internal Fit-Out work would include installation of all internal partitions, painting of walls and ceilings, joinery and the laying of carpet and other finishes, plus the installation of services and fit-out of all amenity areas (eg toilets, showers, etc). The services work would include plumbing, mechanical, lifts, fire and electrical.

2.3 Overview of Operational Activities Associated with the CCT Control Building

The operational activities envisaged for the CCT Control Building would include:

- Use of the building by CCT Control Centre operators.
- The issuing of (electronic) "E Tags" to the public
- Running the fleet of CCT maintenance trucks which would be routinely servicing the CCT.
- Use of the building by lessees of the commercial office spaces.

3 NOISE AND VIBRATION CRITERIA

3.1 Overview of Noise and Vibration Effects

Noise and vibration associated with the construction and operation of the CCT Control Building would have the potential to adversely impact on nearby residential and other receivers. Therefore noise and vibration design goals have been established to assess this impact. These design goals relate to the type of activity that is being conducted, its period of duration and the mode of transmission to the receiver. Noise and vibration impacts can be classified into the following categories:

Construction-Related Noise from Mobile and Fixed Plant

- Noise associated with construction activities arising from mobile plant generating time varying noise levels at receiver locations.
- Noise associated with fixed plant at construction sites (eg compressors, exhaust fans, etc), which is continuous in nature.

Operational-Related Noise

- Noise associated with fixed plant and other mechanical equipment operating within (and on) the building (eg roof top air conditioning plant).
- Noise associated with CCT maintenance truck movements.

The following sections detail the relevant design criteria for each of the above categories and establish the appropriate design goals required to achieve an acceptable standard of acoustic amenity in receiver locations.

3.2 Construction Noise

Airborne Noise Assessment Criteria

Chapter 171-1 of the EPA's Environmental Noise Control Manual recommends the following approaches to mitigating adverse noise impacts from construction sites:

Hours of Construction

The EPA guidelines recommend confining the permissible work times to:

- Monday to Friday — 7.00 am to 6.00 pm,.
- Saturdays — 7.00 am to 1.00 pm (if inaudible at residences) Otherwise, 8.00 am to 1.00 pm.
- Sundays or Public Holidays — No construction

Works outside these hours may be permissible:

- Provided noise emissions are *inaudible* inside dwellings, and
- Only under specific EPA-approved conditions.

Use of Silenced Equipment

All possible steps should be taken to use silenced construction site equipment. This is of particular importance for works where extended hours or 24 hour operation is necessary.

Compliance with Noise Emission Objectives

The EPA recommends that the $L_{A10(15\ minute)}$ noise levels arising from a construction site and measured within the curtilage of an occupied noise-sensitive premises (ie at boundary or within 30 m of dwelling, whichever is the lesser) should not exceed the levels indicated in **Table 3.2.1**.

Table 3.2.1 Recommended EPA Noise Goals for Construction Works

Period of Noise Exposure	$L_{A10(15minute)}$ Construction Noise Goal
Cumulative noise exposure period not exceeding 4 weeks	$L_{A90(15minute)}$ plus 20 dBA
Cumulative noise exposure period of between 4 weeks and 26 weeks	$L_{A90(15minute)}$ plus 10 dBA
Cumulative noise exposure period longer than 26 weeks	$L_{A90(15minute)}$ plus 5 dBA

These noise goals are consistent with community reaction to construction noise.

- The L_{A10} noise level index is the "average maximum" level, and represents the construction noise level exceeded for 10% of the time.

- The L_{A90} is the "average minimum" sound level, or the level exceeded for 90% of the time, and is described as the "background level" when determined in the absence of the noise source under consideration.

Impulsive and/or Tonal Noise

For plant or operations with impulsive or tonal noise characteristics, such as rock hammers, a noise penalty of up to 5 dBA (depending on degree of impulsiveness or tonality) should be added to measured or predicted $L_{A10(15minute)}$ noise levels when comparing L_{A10} noise levels from construction works to the limits presented in **Table 3.2.1**.

Cumulative Duration of Noise Activities

It should be noted that the duration for each of the EPA's noise level objectives set out above refer to the *cumulative* periods of noise exposure at any noise-sensitive premises adjacent to the site, not to the duration of the overall construction project. For example, dwellings adjacent to the Control Building site may expect that the higher noise level limit of background plus 20 dBA should apply for only four weeks. The Contractor should therefore plan the works so that higher noise level activities were confined to as short a period as possible (and use best technology and practices to minimise noise).

Work Outside of EPA's Preferred Hours

Where it is necessary for construction works to be undertaken outside the EPA's preferred construction hours, it is normally the case that additional licences need to be obtained for permission to carry out the necessary works. Under such circumstances, the noise level criteria applied is that the $L_{A10(15minute)}$ noise level emitted by the works shall not exceed the L_{A90} level during the relevant evening or night-time period by a margin of more than 5 dBA, independent of the duration of the construction activity.

Commercial and Retail Receivers

The ENCM's Chapter 171 makes no mention of criteria relevant to commercial or retail receivers. However, in other parts of the ENCM reference is made, in relation to operational noise emissions, to the *generally lesser sensitivity* of commercial or retail receivers relative to residential receivers. Therefore, it may be appropriate to relax the criteria given in **Table 3.2.1** in terms of the exceedance margin between the emitted $L_{A10(15minute)}$ level and local background $L_{A90(15minute)}$ level.

On previous projects and for the CCT, RHA recommends an *increase* of the exceedance margin (refer **Table 3.2.1**) for commercial/retail receivers of 5 dBA.

Furthermore, it is noted that activities taking place in commercial and retail receivers would likely remain similar in nature during evening and night-time periods (if there are in fact any activities at all) and hence the relaxed criteria for these receivers would also apply during these periods of the day.

General Comment on EPA Construction Noise Criteria

In the case of major demolition, excavation and construction projects in close proximity to residential and even commercial buildings, it can be difficult to comply with the EPA's ENCM construction noise criteria (refer **Table 3.2.1**). However, the following is noted:

- The EPA's ENCM criteria are set primarily on the basis of noise emissions that would be likely to create disturbance at nearest affected receivers. Social surveys have shown that the *"background+5 dBA"* criterion is a reliable indicator of community disturbance for residential receivers during night-time. Allowance is made within the ENCM criteria for short-term activities that would be unlikely to create the same disturbance to surrounding receivers as long-term noise sources. In summary, the EPA's ENCM criteria establish a reliable benchmark for gauging the impact of construction noise on affected residential receivers.
- It is also noted that the criteria nominated in the EPA's ENCM are *"noise design goals"*. Where these goals cannot be achieved in practice, the EPA recommends the use of best practical measures in order to minimise the risk of potential noise impacts. These would include mitigation measures such as:
  - Community consultation
  - The use of quietest practical construction equipment
  - Undertaking noise intensive construction works within as short a duration as possible, and
  - Applying relevant guidelines for control of construction noise as outlined in AS 2436-1981.

The essence of the EPA ENCM-based approach then is that:

- The potential for residential (and other receiver) disturbance should firstly be established, regardless of the practicality of achieving the resulting noise goals in specific instances.
- Once potential exceedances are identified, all possible measures should be investigated to minimise the risk of adverse impacts.

3.3 Construction Noise Goals for the CCT Control Building Site

As indicated in **Table 3.2.1**, construction noise level objectives for construction sites using the NSW Environment Protection Authority's (EPA) guidelines are based on permissible margins of exceedance above background L_{A90} sound levels.

Existing accumulated ambient L_{A90} (and L_{A10}) noise levels have been previously measured at locations close to CCT construction sites (refer *"Cross City Tunnel, Technical Paper No.18, Noise and Vibration"*). A summary of this data, for the EPA's standard "daytime", "evening" and "night-time" construction hours, can be found in **Table 3.2.1** of *Technical Paper No.18.*

Site-specific construction noise objectives at the nearest residential and commercial receivers surrounding the CCT Control Building site were determined using this data and are presented in **Table 3.3.1**.

Table 3.3.1 Construction Noise Goals for the CCT Control Building Nearest Sensitive Receivers

Receiver Location	$L_{A10(15minute)}$ Construction Noise Goal [1] (based on duration of construction activities)		
	< 4 weeks	4 -26 weeks	>26 weeks
2-storey Residential Block (Cathedral to St Kilda, NE of site)	70	60	55
2-and 3-storey Residential Blocks (Palmer Street opposite site)	73	63	58
2-storey Suttons Holden Commercial (Bourke Street to Egan Place, E of site)	78	68	63
5-storey Residential Block (Egan Place, SE of site)	75	65	60

Note 1: Goals applying to the EPA's standard construction hours: 7.00 am to 6.00 pm Monday to Friday; 7.00 am to 1.00 pm Saturdays (if inaudible at residential premises), otherwise 8.00 am to 1.00 pm on Saturdays.



3.4 Noise Criteria - Operational Phase: Continuous Noise Sources

Operational noise from continuous and/or mechanical noise sources associated with the operation of the CCT Control Building would be assessed against the noise goals set out in the EPA's *"NSW Industrial Noise Policy (INP)"* (2000).

Noise sources would include mechanical plant (eg roof top ventilation) and operation of the Ground Floor east side and west side roller doors used for the CCT maintenance truck operations.

The EPA's INP requires a determination of the Rating Background Level (RBL) and ambient L_{Aeq} noise levels during daytime, evening and night-time periods to establish the appropriate noise goals. Once again, the unattended noise logging results in the vicinity of the CCT project were utilised to determine the existing L_{A90} background and ambient L_{Aeq} noise levels during the daytime, evening and night-time periods applicable to operational stationary noise sources. These are shown in **Table 3.4.1**. The L_{Aeq} noise levels given in **Table 3.4.1** represent the energy-averaged noise level during each assessment period.

Table 3.4.1 Noise Levels Applicable to CCT Control Building Nearest Sensitive Receivers

Receiver Location	LAeq Noise Levels			
	Daytime [1]		Night-Time [2]	
	LAeq(15hr)	LAeq(1hr)	LAeq(9hr)	LAeq(1hr)
2-storey Residential Block (Cathedral to St Kilda, NE of site)	62	66	58	62
2-and 3-storey Residential Blocks (Palmer Street opposite site)	63	66	60	64
2-storey Suttons Holden Commercial (Bourke Street to Egan Place, E of site)	63	66	60	64
5-storey Residential Block (Egan Place, SE of site)	64	66	62	65

Note 1: EPA Daytime period is 7.00 am to 10.00 pm
Note 2: EPA Night-time period is 10.00 pm to 7.00 am

The assessment procedure for mechanical noise sources has two components:

- Controlling the intrusive noise impacts in the short-term for residents, and
- Maintaining noise level amenity for particular land uses for residences and other land uses.

The intrusive criterion for stationary noise sources limits $L_{Aeq(15minute)}$ noise emissions levels to the RBL plus 5 dBA (note: RBL values can be inferred from the noise goals given in **Table 3.3.1**).

The amenity noise goal depends upon ambient L_{Aeq} noise levels within an area and their relation to the acceptable noise levels specified in **Table 3.4.2**. For example, where existing L_{Aeq} noise levels *exceed* the acceptable noise levels given in **Table 3.4.2**, the L_{Aeq} amenity noise criterion would be set at 10 dBA *below* the existing L_{Aeq} levels in order to limit any further increase in ambient levels.

Table 3.4.2 NSW Industrial Noise Policy Amenity Criteria for Residential Receivers

Type of Receiver	Indicative Noise Amenity Area	Time of Day [1]	Recommended L_{Aeq} Noise Level (dBA)	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
	Urban	Day	60	65
		Evening	50	55
		Night	45	50

1 EPA Governing Periods are Day: 7.00 am to 6.00 pm, Evening: 6.00 pm to 10.00 pm, Night: 10.00pm to 7.00 am.

$L_{Aeq(15minute)}$ design noise goals for intrusive and amenity have been determined and are included in **Table 3.4.3** based on the "urban area" classification. It can be seen that the amenity criterion goal in all cases has been determined to be 10 dBA lower than the measured L_{Aeq} noise level, since measured L_{Aeq} noise level at all locations are at or above the recommended levels given by **Table 3.4.3**.

The final $L_{Aeq(15minute)}$ design noise goal applicable to stationary noise sources is then chosen as the *lower* of the intrusive and amenity goals.

The *lower* of the intrusive and amenity goals in **Table 3.4.3** is shown in bold face type. In all cases, the *amenity criterion* provides the governing condition in selecting the appropriate noise design goal.

Table 3.4.3 Calculated RBL and Ambient L_{Aeq} Noise Levels for the CCT Control Building

Location	Period[1]	Measured RBL	Measured LAeq	Intrusive Criterion	Amenity Criterion
2-storey Residential Block (Cathedral to St Kilda, NE of site)	Day Evening Night	55 dBA 49 dBA 45 dBA	62 dBA 60 dBA 58 dBA	60 dBA 54 dBA 49 dBA	**52 dBA** **50 dBA** **48 dBA**
2-and 3-storey Residential Blocks (Palmer Street opposite site)	Day Evening Night	58 dBA 52 dBA 48 dBA	63 dBA 61 dBA 60 dBA	63 dBA 57 dBA 53 dBA	**53 dBA** **51 dBA** **50 dBA**
2-storey Suttons Holden Commercial (Bourke Street to Egan Place, E of site)	Day Evening Night	58 dBA 52 dBA 48 dBA	63 dBA 61 dBA 60 dBA	63 dBA 57 dBA 53 dBA	**53 dBA** **51 dBA** **50 dBA**
5-storey Residential Block (Egan Place, SE of site)	Day Evening Night	60 dBA 54 dBA 50 dBA	64 dBA 63 dBA 62 dBA	65 dBA 59 dBA 55 dBA	**54 dBA** **53 dBA** **52 dBA**

1 EPA Governing Periods are Day: 7.00 am to 6.00pm, Evening: 6.00pm to 10.00pm, Night: 10.00pm to 7.00 am.

2 Criteria are for Residences in an Urban Area

3.5 Noise Criteria - Operational Phase: CCT Maintenance Trucks

The maintenance truck routes proposed for the CCT project are described in **Section 6.3.4** of the JTCW Report *"Cross City Tunnel Control Building at 88 Palmer Street, Woolloomooloo"* (January 2001). These routes comprise pre-determined runs along the various different branches of the CCT and loops using arterial roads at CCT end points for return journeys.

In relation to traffic noise associated with CCT Control Building maintenance trucks, reference may be made to the EPA's *"Environmental Criteria for Road Traffic Noise (1999)"*. Relevant criteria for arterial, collector and local roads are detailed in **Table 3.5.1**.

Table 3.5.1 EPA Road Traffic Noise Criteria

Road Type	Daytime Criteria (7.00 am to 10.00 pm)	Night-time Criteria (10.00 pm to 7.00 am)	Guidance when the Existing Ambient Noise Already Exceeds the Base Criteria
Land use developments with the potential to create additional traffic on existing freeway/arterial road	LAeq(15hour) 60 dBA	LAeq(9hour) 55 dBA	Where feasible, 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.
Land use developments with the potential to create additional traffic on collector roads	LAeq(1hr) 60 dBA	LAeq(1hr) 55 dBA	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.

A review of the L_{Aeq} ambient noise levels contained in *"Cross City Tunnel, Technical Paper No.18, Noise and Vibration"* suggests that existing L_{Aeq} noise levels on many streets in the vicinity of the CCT works are already well in excess of the goals given above.

Therefore, to maintain the acoustic amenity of all affected residents, the "baseline" noise goal suggested by the EPA's operational road traffic guidelines would be that existing L_{Aeq} noise levels should not be permitted to increase by more than 2 dBA at residential receivers during nominated operational hours.

An initial analysis of maintenance truck-related noise is contained within this report. When further detail regarding maintenance truck routes becomes known, a more definitive noise impact assessment would be possible.

However, it is noted that only three maintenance trucks are involved and that their impact is expected to be minimal given their intended usage profile (ie the expected frequency of conducting routine CCT inspections).

3.6 Vibration Assessment Criteria

Section 5 of *"Cross City Tunnel, Technical Paper No.18, Noise and Vibration"* details vibration criteria covering human perception, structural damage and damage to building contents relevant to the CCT proposal.

In relation to the construction of the CCT Control Building, there would be no requirement for excavation works (the building would overlay the Eastern Distributor) and demolition works of the construction compound buildings would similarly be minimal. Accordingly, vibration emissions are not expected to be of significance at the site.

4 NOISE AND VIBRATION PREDICTION AND MITIGATION

4.1 Noise Modelling Methodology

In order to assess the noise impact during construction and operation of the CCT Control Building, noise levels were calculated at the most sensitive receiver locations during the anticipated construction activities. The calculated noise levels at receivers of interest were then compared to the standard criteria used for construction noise and operational noise based on the ambient noise levels measured at each location. SoundPLAN V4.2 software was used for the noise modelling calculations.

The building information used to carry out noise emission computations was largely derived from the building descriptions and operational details provided in the JTCW Report *"Cross City Tunnel Control Building at 88 Palmer Street, Woolloomooloo"* (January 2001).

4.2 Mobile and Diesel-Engine Plant and Equipment

The start point for construction stage noise emission calculations is a listing of representative sound pressure levels for all items of plant and equipment likely to be used at the site. **Table 4.2.1** presents this data. These levels of airborne noise emission are representative of modern machinery in good condition. The noise levels shown also provide noise limits for use during ongoing plant noise monitoring, to ensure that appropriate equipment are selected for use on noise-sensitive sites, and to ensure that equipment is adequately maintained during the course of the works.

To apply the construction noise criteria for the project, it is necessary to convert these levels to L_{A10} noise emissions. From numerous field studies on large construction projects, the measured difference values between the L_{Amax} and L_{A10} noise level has been found by RHA to be between 4 dBA and 10 dBA.

In the present study, an adjustment of 4 dBA has been applied to convert the L_{Amax} noise levels shown in **Table 4.2.1** to L_{A10} noise levels for comparison with the construction noise design objectives.

Table 4.2.1 Noise Emission Levels for Construction Plant and Operations

Item	Typical Plant Type	Maximum Noise Level LAmax dBA at 7 m
Demolition and Excavation Stage		
Heavy Rockbreaker	Hydraulic, Excavator KATO 75086	97
Vibrator Hammer	Hydraulic, on excavator	86
Bulldozer	Crawler, Caterpillar D9	93
Excavator	Kato 750	85
Grader		73
Bobcat		80
Front-end Loader	Wheeled	90
Multi-Tyred Roller		77
Boring Rig	Diesel	85
Drilling Rig	Crane Mounted	83
Crane	Truck Mounted	85
Dump Truck	15 tonne	83
Dust Extraction Unit		90
Erection of Primary Structure and Façade, Internal Fit-Out		
Crane	60 t Crawler	85
Crane	Truck Mounted	85
Concrete Truck		83
Concrete Pump		84
Compressor	600 CFM	75
Angle Grinders		85
Electric Saw		82
Semi Trailer	25-28 Tonne	87
Dump Truck	15 tonne	83
Product Truck	12-15 Tonne	83
Water Truck		75
Asphalt Paver		80
Generator	Diesel	79
Air Compressors		75
Dust Extraction Unit		90
Hoist		68

The construction calculated noise levels would inevitably depend upon the number of plant items and equipment operating at any one time and their precise location relative to the receiver of interest. Predicted noise levels were based on typical construction operations using the appropriate plant placed within the work site area.

A range of values at each receiver has been calculated to account for the fact that plant and equipment would be moved about the site and would not always be operating at the same time. The effect of employing "standard" noise mitigation practices at the work site (refer **Section 4.3**) have been included in the modelling.

A more precise definition of noise mitigation would be conducted when the details of future contractors' construction methods, equipment selections and timetable are available.

4.3 General Noise Mitigation and Management (Construction Stage)

Without mitigation, it is almost certain that noise levels from construction activities would exceed the nominated construction noise design goals at surrounding receivers at some time during the construction phase.

A range of general approaches to reducing the impact of construction noise and vibration is described below. It is proposed that all these strategies would be applied at the CCT Control Building construction site, where reasonable and feasible. A fundamental project objective is to ensure that contractors employ the Best Available Technology (BAT) and the Best Management Practices (BMP) to minimise the extent of adverse acoustical impacts (particularly at sites where residual exceedances of the noise level objectives are identified).

An effective community relations programme would also be put in place to keep the community appraised of progress of the works, and to forewarn potentially affected groups (eg by the structured approach described below, plus letterbox drops, meetings with community groups, etc) of progress with the works, any anticipated changes in noise and vibration emissions prior to critical stages of the works, and to explain complaint procedures and response mechanisms.

Close liaison would be maintained between the communities near the work site and the parties associated with the construction works to provide effective feedback in regard to perceived emissions. In this manner, equipment selections and work activities can be coordinated where necessary to minimise disturbance to neighbouring communities, and to ensure prompt response to complaints and other issues of concern, should they arise.

- *Noise and Vibration Management Plans and Monitoring Programme* - A well-planned, noise monitoring programme would assist in identifying the site-specific potential for disturbance at particularly sensitive localities as the works progress. Mitigation measures, such as time restrictions, changes in work sequences or selection of smaller items of equipment could then be put in place before significant disturbance occurred.

  The programme would include initial and ongoing monitoring of emissions from the work site to assist in planning of ongoing works.

  The RTA recognises the need for an improvement in the effectiveness and responsiveness of the noise and vibration monitoring regimes compared to some other recent major infrastructure projects.

  A key element of the Management Plans would therefore be the preparation of supplementary "mini impact assessments" at defined intervals (eg commencement of demolition and excavation, commencement of building erection, etc) for review prior to the works proceeding. This approach would ensure that the initial impact assessment is kept constantly under review so that monitoring and mitigation remain effective and responsive to changing conditions.

  This approach would enable the contractor to optimise work methodologies and equipment selections, to assess impacts, design mitigation measures and examine alternative, quieter options, all using the best available information and knowledge. It would also assist in focussing community information and complaint response programmes and in targeting the emissions monitoring strategies - all in a substantially more precise manner than is possible with only the general methodologies anticipated at present.

  The community liaison process and the monitoring procedures would be progressively *"fine-tuned"* to meet the specific requirements of the particular works under consideration.

  Modern, automatic noise and vibration loggers would be used for the monitoring, supplemented with operator-attended measurements to assist in ensuring that the logger results are properly interpreted. At fixed sites, loggers would be deployed at key receiver locations permanently.

  Logger and operator survey results would be published for public review as soon as data is available. It is intended to make innovative use of the Internet and email to disseminate this information to the community and authorities as quickly and broadly as possible.

It has been well established that resident sensitivity thresholds are strongly influenced by "fear of the unknown or unexpected" and by concern regarding potential for damage to dwellings. While these typical reactions are clearly understandable, the underlying concerns are usually technically unjustified.

It is therefore proposed to implement a well-planned, focussed community education programme to improve understanding of the noise and vibration issues and to assist in allaying unfounded fears and concerns. This would be undertaken as part of the general consultation with adjacent property owners and residents regarding construction of the building.

- *Permissible Hours of Work* - Construction of the CCT Control Building would take place during normal (EPA) daytime construction hours. Extension of hours would likely be linked to restrictions on the type of activity. Community consultation would take place prior to this period, detailing the site layout, operational controls to be employed and the expected construction schedule for the building.

- *Noise Sensitive Sites - Alternative Work Methods* - The quietest available plant and equipment that can economically undertake the work required should be selected. Mobile plant such as excavators, front-end loaders and other diesel-engined equipment should be fitted with residential class mufflers and other silencing equipment, as applicable.

  The use of "quiet" type impact hammers in instances that have been identified as exceeding the nominated noise level objective is recommended.

- *Plant Noise Audit* - Noise emission levels of all critical items of mobile plant and equipment would be checked for compliance with noise limits appropriate to those items prior to the equipment going into regular service. Periodic noise monitoring would be conducted to ensure that items of plant continue were well maintained in compliance with the noise emission limits for that class of equipment.

- *Operator Instruction* - Operators would be trained in order to raise their awareness of potential noise problems and to increase their use of techniques to minimise noise emission. Opportunities for providing "real time" feedback of emission levels to operators would be implemented where feasible. This approach has been found to greatly assist operators in minimising emissions from certain types of plant and equipment.

- *Equipment Selection* - All fixed plant at the above-ground work sites would be appropriately selected, and where necessary, fitted with silencers, acoustical enclosures and other noise attenuation measures in order to ensure that the total noise emission from each work site complied with EPA guidelines.
- *Site Noise Planning* - Where practical, the layout and positioning of noise-producing plant and activities would be optimised to minimise noise emission levels.
- *Noise Barriers* - Where they are likely to be effective, solid hoardings and/or other noise barriers would be erected around critical work areas to act as acoustical barriers and minimise noise emissions.
- *Periodic Noise Monitoring* - Monitoring of overall noise emissions would be carried out in order to check compliance with the EPA's construction noise emission guidelines, which have been adopted for this project. This will also provide feedback to guide improvements in procedures or equipment selections to minimise noise.

5 PREDICTED NOISE EMISSIONS AND ASSESSMENT OF IMPACTS

5.1 Introduction

Assessment of the noise impacts have been separated as follows:

- Construction Stage Impacts
- Operational Stage Impacts

5.2 Construction Stage Impacts

5.2.1 Description of Works

The CCT Control Building would be required to be in operation prior to the opening date of the CCT and would be expected to have a construction period of approximately five months.

Table 5.2.1.1 indicates the main construction stages and relative levels of expected noise impact.

Table 5.2.1.1 CCT Control Building Construction Phases and Associated Noise Sources/Activities

Phase	Noise Source / Activity	Duration
Demolition and Excavation	Demolition of Additional Site Compound Levelling of ground to terrace levels of CCT Ground Floor Detailed excavation of footing zones There is potential for high noise levels, offset by very modest demolition required and minimal excavation	3 to 4 weeks
Erection of Primary Structure and Facade	Placement of footings and commencement of lift core Erection of building columns, finish lift core Erection of floor slabs (following lift core and columns) Installation of façade (including windows, finished masonry) There is potential for high noise levels due to proximity of neighbouring sensitive receivers and duration of works .	20 weeks
Internal Fit-Out	Install floor coverings, fixtures, painting Install special fit-outs (toilets, showers, etc) Install all services: plumbing, electrical lights, lifts, fire, etc The potential for high noise levels is offset by the shielding that would become available once the building façade is installed	6 weeks

5.3 Construction Stage Noise Mitigation and Management

The general approaches to noise mitigation identified in **Section 4.3** of this report would be implemented where applicable.

The following site-specific noise mitigation measures and other site noise management procedures would also be implemented where practical and cost-effective. Some of these measures would take advantage of the continuing presence of the Additional Site Compound buildings to provide shielding for storage, handling and other activities.

- *Permissible Times of Work* – particular attention would be paid to the hours of use of noisy equipment such as angle grinders, impact drills, etc. While the general hours of work would be based on normal EPA requirements, noise-intensive activities could be minimised for example during the first hour or so of the daytime period (say between 7.00 am and 8.00 am)
- The contractor (and subcontractors) would be required to ensure that vehicles required at the CCT Control Building construction compound do not "queue" outside the worksite in front of residential receivers prior to the morning 7.00 am start time.



- Construction-related traffic, including both cars and trucks, would be confined to the north of the CCT Control Building site, which would also be used for parking related to the operation of the CCT Additional Site Compound. Access for all construction-related traffic would be via a single entry/exit point located off the Palmer Street southbound lanes near St Kilda Lane.
- Wherever possible, areas used for stockpile material handling would be covered by awnings or canopy structures providing a noise screen during handling operations. Enclosed areas within adjacent CCT Additional Site Compound sections would be utilised wherever possible for such activities.
- Maintenance activities for construction equipment would be restricted to the standard EPA daytime construction period (refer **Section 3.2**). All maintenance activities would take place within an enclosed space. Enclosed areas within adjacent CCT Additional Site Compound sections would be utilised wherever possible for such activities. Wherever possible, maintenance activities would be minimised during the first hour (7.00 am to 8.00 am) of the construction daytime period.
- Use of a PA System within the CCT Control Building construction site would be restricted. PA speakers, if required, would be located so that their pointing axis was directed away from residential blocks. Except in the case of emergencies, the PA System would not be used during the evening and night-time (6.00 pm to 7.00 am) period.

5.4 Regarding the Variability of Construction Noise

Noise emission levels from most construction sites during daytime vary considerably (almost from moment to moment) as activities change and equipment moves around the site. On-site vehicle movements are also often constantly changing.

It should therefore be appreciated that prediction of daytime construction noise emissions is somewhat imprecise (eg compared to, say, the operational noise from the building's roof top ventilation equipment). The predicted daytime noise levels presented in this report should therefore be regarded as *indicative* estimates (probably to a precision of around 5 dBA), rather than absolute noise levels.

Where, during the actual works, monitoring and/or predictions (based on better information available when the works are about to proceed) indicate an exceedance of the appropriate EPA construction noise objectives, it will be incumbent upon the proponent and the contractor to demonstrate that Best Available Technology (BAT) and Best Management Practices (BMP) are being employed to minimise noise emissions.

During daytime therefore, compliance with the EPA noise level objectives (targets) should be sought by all parties, however the objectives should not be mandatory limits, providing that BMP and BAT are being employed. The types of measures and precautions that constitute BAT and BMP have been discussed in **Section 4.3** (General Measures) and **Section 5.3** (Site-Specific Measures).

At night-time, special consent under a separate EPA approval process would be required for any construction activity. Such works should be subject to strictly enforced noise limits and noise management practices, as identified in the information presented to the EPA at the time of applying for such approvals.

5.5 Prediction of Construction Stage Emissions and Assessment of Impacts

Table 5.5.1 presents the predicted range of noise emission levels for representative noise sensitive areas during the construction of the CCT Control Building.

Table 5.5.1 Expected $L_{A10(15minute)}$ Noise Levels - CCT Control Building, "Construction" Phase

Receiver Location	$L_{A10(15minute)}$ Construction Noise Goal [1]		Calculated $L_{A10(15minute)}$ Construction Noise Level [2]
	< 4 weeks	4-26 weeks	
Demolition and Excavation Stage			
2-storey Residential Block (Cathedral to St Kilda, NE of site)	70	na	62 – 82
2-and 3-storey Residential Blocks (Palmer Street opposite site)	73	na	60 – 80
2-storey Suttons Holden Commercial (Bourke Street to Egan Place, E of site)	78	na	65 – 85
5-storey Residential Block (Egan Place, SE of site)	75	na	62 – 82
Erection of Primary Structure and Façade			
2-storey Residential Block (Cathedral to St Kilda, NE of site)	na	60	57 – 79
2-and 3-storey Residential Blocks (Palmer Street opposite site)	na	63	55 – 78
2-storey Suttons Holden Commercial (Bourke Street to Egan Place, E of site)	na	68	60 – 78
5-storey Residential Block (Egan Place, SE of site)	na	65	57 – 79
Internal Fit-Out			
2-storey Residential Block (Cathedral to St Kilda, NE of site)	na	60	42 – 62
2-and 3-storey Residential Blocks (Palmer Street opposite site)	na	63	40 – 60
2-storey Suttons Holden Commercial (Bourke Street to Egan Place, E of site)	na	68	45 – 65
5-storey Residential Block (Egan Place, SE of site)	na	65	42 – 62

Note 1 Goals based on daytime ambient L_{A90} noise levels

Note 2 Range depends upon the number of plant concurrently operating on site, location around the site and hence proximity to particular receiver, etc

Maximum predicted noise levels have varying potential to exceed the noise goals depending upon location of the receiver and phase of the work:

- There are predicted to be occasional exceedances at surrounding receiver locations during the demolition and excavation phases of the work. Completion of these works within the planned 4-week higher noise allowance period is therefore strongly recommended.

- There are predicted to be slightly more frequent exceedances at surrounding receiver locations during the erection of the primary structure and façade installation phases of the work.
- There should be no exceedances at surrounding receiver locations during the internal fit-out phases of the work. These works clearly benefit from the shielding provided once the façade of the building is installed.

From the above, it is clear that consultation with the local community detailing plans for the various construction phases of the CCT Control Building would form an important part of the noise management of the site. Attention is drawn to the reader also to the comments included in **Section 5.4** of this Report regarding the potential for exceedances identified above.

5.6 Operational Impacts - Mechanical Noise Sources

No details are available yet as to the likely ventilation system supplied for the building. There is potential however for noise emissions from roof top plant to exceed the noise goals set out in the EPA's industrial Noise Policy. The following recommendation are therefore made in relation to roof top plant:

- Ventilation plant should be provided with an acoustic enclosure of a height determined by the line of sight between the exhaust point of the ventilation system and the top floor of all adjacent residential properties.
- Taking into account the shielding provided by such enclosures, noise emissions from roof top ventilation plant should be limited to no greater than the following levels when calculated at any point on the periphery of the site (ie site boundary) as indicated below:
  - 60 dBA during daytime hours (7.00 am to 6.00 pm)
  - 57 dBA during evening hours (6.00 pm to 10.00 pm)
  - 55 dBA during night-time hours (10.00 pm to 7.00 am)

Operation of the roller doors servicing the maintenance truck entry and exit would also need to satisfy the requirements of the EPA's Industrial Noise Policy. Allowable L_{Aeq} levels however would require an assessment of likely frequency of use, which at the present time is unknown. Attention is likely to be of concern only during the night-time (10.00 pm to 7.00 am) assessment period.

- It is recommended that any metal grills placed externally to the maintenance truck entry and exit locations be mounted on rubber fixings to prevent "rattling" noise particularly at night-time.

Finally, it is noted that the proposed layout of the maintenance truck parking on the Ground Floor requires the trucks to carry out a reversing operation (either for parking or prior to exit). It is assumed that this would involve (for safety reasons) the use of reversing alarms.

- It is recommended that the reversing operations of maintenance trucks (especially at night-time) be carried out with roller doors closed to prevent the un-attenuated emission of reversing alarms noise to neighbouring residences.

5.7 Operational Impacts – Maintenance Trucks

The maintenance truck routes proposed for the CCT project are described in *Section 6.3.4* of the JTCW Report *"Cross City Tunnel Control Building at 88 Palmer Street, Woolloomooloo"* (January 2001). These routes comprise pre-determined runs along the various different branches of the CCT and loops using arterial roads at CCT end points for return journeys.

Most importantly, the traffic noise associated with CCT Control Building maintenance trucks would involve only a single truck being out on inspection duty at any one time and hence noise emissions would be minimal.

No noise control measures, with respect to the traffic noise associated with the operation of the maintenance trucks, would therefore be required.

Appendix A

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Pages 3

Acoustic Terminology

ACOUSTIC TERMINOLOGY

1 Sound Level or Noise Level

The terms "sound" and "noise" are almost interchangeable, except that in common usage "noise" is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or L_P are commonly used to represent Sound Pressure Level. The symbol L_A represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2E-5 Pa.

2 "A" Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an "A-weighting" filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dBA or 2 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120 110	Heavy rock concert Grinding on steel	Extremely noisy
100 90	Loud car horn at 3 m Construction site with pneumatic hammering	Very noisy
80 70	Kerbside of busy street Loud radio or television	Loud
60 50	Department store General Office	Moderate to quiet
40 30	Inside private office Inside bedroom	Quiet to very quiet
20	Unoccupied recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as "linear", and the units are expressed as dB(lin) or dB.

3 Sound Power Level

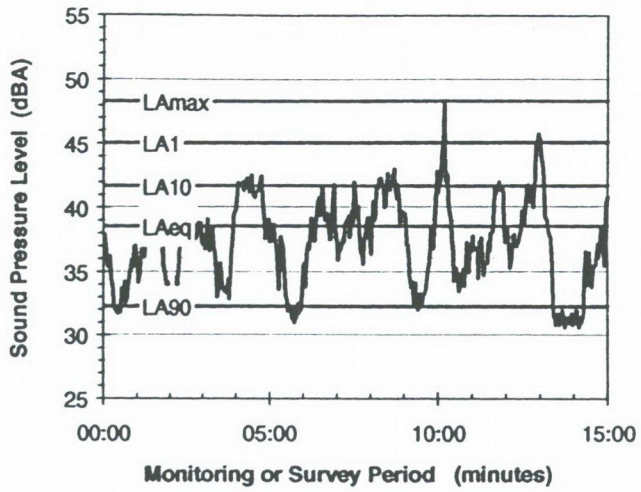
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or Lw, or by the reference unit 1E-12 W.

The relationship between Sound Power and Sound Pressure may be likened to an electric radiator, which is characterised by a power rating, but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels L_{AN}, where L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the L_{A1} is the noise level exceeded for 1% of the time, L_{A10} the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} The noise level exceed for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

L_{A90} The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

L_{Aeq} The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. A standardised method is available for determining these representative levels.

This method produces a level representing the "repeatable minimum" L_{A90} noise level over the daytime and night-time measurement periods, as required by the EPA. In addition the method produces mean or "average" levels representative of the other descriptors (L_{Aeq}, L_{A10}, etc).

5 Tonality

Tonal noise contains one or more prominent tones (ie distinct frequency components), and is normally regarded as more offensive than "broad band" noise.

6 Impulsiveness

An impulsive noise is characterised by one or more short sharp pe[illegible]n the time domain, such as occurs during hammering.

ACOUSTIC TERMINOLOGY

7 Frequency Analysis

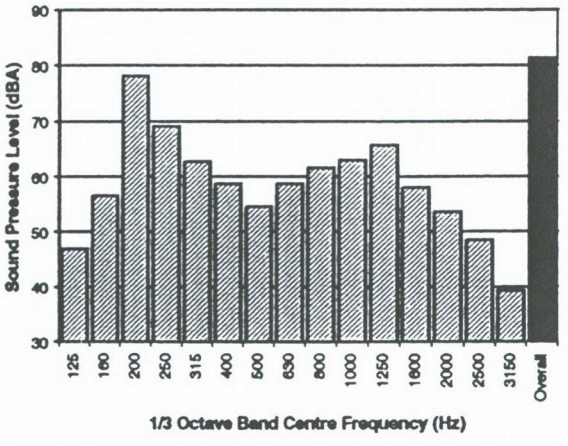
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal. This analysis was traditionally carried out using analogue electronic filters, but is now normally carried out using Fast Fourier Transform (FFT) analysers.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (3 bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



8 Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of "peak" velocity or "rms" velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as "peak particle velocity", or PPV. The latter incorporates "root mean squared" averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements. Where triaxial measurements are used, the axes are commonly designated vertical, longitudinal (aligned toward the source) and transverse.

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/Vo), where Vo is the reference level (1E-6 mm/s). Care is required in this regard, as other reference levels are used by some organizations.

9 Human Perception of Vibration

People are able to "feel" vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as "normal" in a car, bus or train is considerably higher than what is perceived as "normal" in a shop, office or dwelling.

10 Over-Pressure

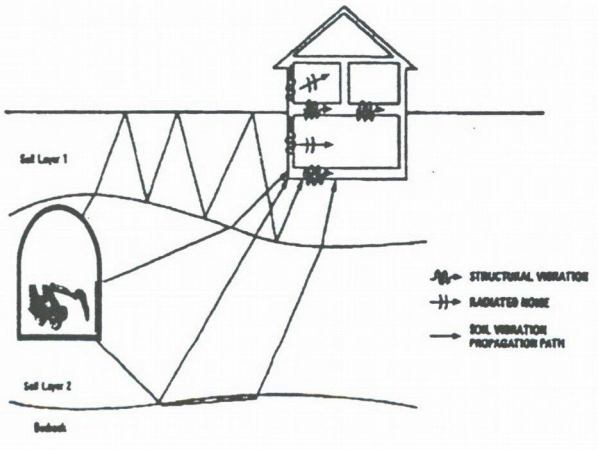
The term "over-pressure" is used to describe the air pressure pulse emitted during blasting or similar events. The peak level of an event is normally measured using a microphone in the same manner as linear noise (ie unweighted), at frequencies both in and below the audible range.

11 Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed "regenerated noise", "structure-borne noise", or sometimes "ground-borne noise". Regenerated noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of regenerated noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents the various paths by which vibration and regenerated noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term "regenerated noise" is also used to describe other types of noise that are emitted from the primary source as a different form of energy. One example would be a fan with a silencer, where the fan is the energy source and primary noise source. The silencer may effectively reduce the fan noise, but some additional noise may be created by the aerodynamic effect of the silencer in the airstream. This "secondary" noise may be referred to as regenerated noise.

Appendix C

Details of Development Application and Approval for Site 2 Building Under Part 4 of the EP&A Act

Received
2 OCT 2001
J.T.C.W.

SOUTH SYDNEY COUNCIL

Roads and Traffic Authority
C/o JTCW
Level 3, 101 Sussex Street
Sydney 2000

Attention: Scott Mullen and Brian Welsh

Notice of Determination of a Development Application

issued under the Environmental Planning and Assessment Act 1979
Section 81 (1) (a)

Our Ref: U00-01360/JMT/MIB/339533

Development Application Number	U00-01360
Development Application	
Applicant name	Roads and Traffic Authority
Applicant address	Level 3, 101 Sussex Street Sydney 2000
Address of land to be Developed	131 Cathedral Street Woolloomooloo
Proposed development	Erect three storey building for use as commercial offices over eastern distributor tunnel
Building Code of Australia building classification	Classes 7 & 5
Determination Date	15 OCT 2001
Determination	Consent granted subject to conditions
Details of conditions or reasons for refusal	See attached schedule

Note: (1) If approved, this consent becomes effective from the date of this notice to you.

(2) This consent will lapse 5 years after the date of the effective consent date, unless a specific condition of the consent stipulates a lesser period or the consent is subject to a "deferred commencement" consent.

Other approvals list Local Government Act 1993 approvals granted under s78A (5)	Nil
general terms of other approvals integrated as part of the consent (list approvals)	Nil

Right of appeal

If you are dissatisfied with this decision section 97 of the Environmental Planning and Assessment Act 1979 gives you the right to appeal to the Land and Environment Court within 12 months after the date on which you receive this notice

Section 97 of the Environmental Planning and Assessment Act 1979 does not apply to the determination of a development application for State significant development or local designated development that has been the subject of a Commission of Inquiry

For any further information regarding this matter, please contact Jason Taylor on 9288 5037.

Signed on behalf of South Sydney City Council

Jodie Harris
Area Planning Manager

SCHEDULE

Address: 131 Cathedral Street, Woolloomooloo
Ref: U00-01360

(1) That the proposal shall be generally in accordance with plans numbered A 01/DA to A 08/DA inclusive and marked in red ink by Council, dated November 2000, drawn by Jackson Teece Chesterman Willis and stamped and endorsed by Council.

(1) That prior to the commencement of work, it will be necessary to lodge with Council a fee of $57 750 in the form of Cash or non expiry Bank Guarantee being the building damage deposit for the public way. This deposit will be returned upon the satisfactory completion of the work approved under this application and the submission of all relevant certificates provided that there is no damage to the public way. A written request shall be made to the Council for the return of the deposit.

(2) That the kerb line on the north-west corner of the proposed new lane and St Kilda Lane shall follow the curve of the building

(3) That the following modifications shall be made to the car parking area fronting St Kilda Lane.

(a) That parking space 7 shall be deleted from the plan;

(b) That access to parking spaces numbered 2 to 6 inclusive, shall be restricted using a series of mesh tilt-a-lift doors constructed of metal

(c) That physical barricades shall be provided between parking spaces 1 and 2 and between parking space 6 and the western boundary to secure the car parking area

(d) Access to car pace number 1 shall not be restricted by any physical barricade.

(4) That a separate Development Application or Complying Development Certificate shall be lodged with/submitted to Council for the use of the four tenancies. Note this consent grants approval for the construction of the building and division of the building into four commercial office tenancies and does not include signage or hours of operation. The applicant is advised to refer to Council's Exempt and Complying Development DCP 1999 to determine an appropriate course of action.

(5) That the applicant shall accept responsibility for all costs associated with the design; construction; alteration; adjustment; relocation or restoration of any works on the public way including: Kerb; gutter; pavement; footpath paving; landscaping; drainage; street furniture; signage and public utility services. The reinstatement of any damaged kerb and gutters are to be in materials similar to

those existing. Such works are to be carried out by Council's workforce unless otherwise agreed in writing by the Director of Public Works and Services.

(6) That the existing lots shall be consolidated into one single lot prior to the issuing an Occupation Certificate;

(7) That the street number(s) shall be clearly displayed, with such number(s) being of contrasting colour and adequate size and location for viewing from the footway and roadway, prior to the issuing an Occupation Certificate;

(8) Before erecting any hoarding, an application must be made to the Director of Public Works and Services for a Builders Hoarding Permit (for approval under the Roads Act 1993). No excavation shall be carried out on the public way beneath or adjacent to the hoarding without the approval of the Director of Public Works and Services;

(9) That prior to the commencement of work (and any excavation or building work on the public way), a Road Opening Permit shall be obtained from Council's One Stop Shop (required for approval under the Roads Act 1993);

(10) That prior to the commencement of work, the developer/owner shall make an application to the Director of Public Works and Services for the provision of the necessary footway crossing and also bear the cost of the crossing and reinstatement of the footpath where any existing crossings adjacent to the site are no longer required (such approval is required under the Roads Act 1993). The work shall be done by the Council, unless other arrangements are approved in writing by the Director of Public Works and Services;

(11) That prior to the release of the commencement of work, the developer/owner shall make an application to the Director of Public Works and Services for the provision of the necessary footway crossing and also bear the cost of the crossing and reinstatement of the footpath where any existing crossings adjacent to the site are no longer required (such approval is required under the Roads Act 1993). The work shall be done by the Council, unless other arrangements are approved in writing by the Director of Public Works and Services;

(12) That during demolition, excavation and building work, the public way shall not be obstructed by building materials or materials from the site in any way;

(13) That all loading and unloading of construction materials shall take place off street at all times unless the South Sydney Local Traffic Committee approves an on-street Construction Zone;

(14) That stormwater shall not be connected to the sewerage system and shall be disposed from the site in accordance with Council's standard requirements for stormwater discharge. Stormwater shall not be connected to the sewerage system. All details of stormwater discharge shall be approved by a Council-registered stormwater certifier prior to the approval of the construction certificate;

(15) That only clean and unpolluted water shall be permitted to discharge from the subject development/site into Council's stormwater drainage system, in accordance with Council's requirements;

(16) That details of providing and maintaining an overland flowpath shall be approved by the Director of Public Works and Services prior to the approval of the commencement of work;

(17) That any connection to Council's stormwater system shall be subject to a positive covenant on the land title. A separate application for works on the public way related to the connection must be made to the Director of Public Works and Services and approval obtained prior to commencement of work. The applicant/owner will be responsible for the full cost of the work, payment of fees, lodgement of a security deposit and public liability insurance;

(18) That no garbage or industrial waste shall be placed on the public way (eg footpaths, roadways, plazas, reserves etc) at any time;

(19) That only refuse skips by approved suppliers who comply with Council's Code for the Placement of Waste containers on the Public Way shall be delivered and placed on the public way (contact Council's One Stop Shop for a list of approved suppliers);

(20) That the applicant shall enter into a commercial contract for the daily collection of trade waste;

(21) That a separate garbage/recycling storage area for commercial use shall be provided

(22) That the garbage/recyclable materials room shall be constructed in accordance with the requirements of Council's Waste Management/Minimisation Facts Sheets;

(23) That a certificate shall be submitted from a registered certifier confirming that the design of the drainage system is in accordance with AS3500 Part 3 and "Code of Standard Requirements for the Discharge of Storm Water";

(24) That a certificate shall be submitted at the completion of the proposed drainage system from a registered certifier confirming that all work complies with the approved certified plans;

(25) That all proposed work shall be wholly within the boundaries of the site;

(26) Despite any works to the public way implicit in the approval or anything indicated on the plans, no work is to be undertaken on the public way without a separate application to, and approval by, the Director of Public Works and Services;

(27) That all relevant sections of the BCA shall be complied with;

(28) That the storage and handling of garbage and recyclable materials shall comply with the requirements of Council's Waste Management/Minimisation Facts Sheets;

(29) That noise from construction/demolition activities associated with the development shall comply with the guidelines contained in the NSW, EPA, Environmental Noise Control Manual Chapter 171, that is:

Construction periods of 4 weeks and under:

The LA10 level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background (LA90) noise level by more than 20dB(A) when assessed to any sensitive noise receiver.

Construction periods greater than 4 weeks and not exceeding 26 weeks:

The LA10 level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background (LA90) noise level by more than 10dB(A) when assessed to any sensitive noise receiver.

NOTE: the above noise levels are applicable for construction hours of:

Mondays to Fridays, 7.00am to 5.00pm
Saturdays, 7.00am to 3.00pm

No construction work outside of the above hours is permissible without the prior approval of Council.

(30) That plans and specifications demonstrating compliance with the nominated standards and requirements for the following aspects of the development shall be submitted to Council for approval prior to the issue of a Occupation Certificate:

(a) all proposed mechanical ventilation systems;
(b) the garbage room or garbage receptacle storage area;

NOTE: That the applicant be advised that this application has not been assessed for compliance with the BCA or the Local government (Approvals) regulation. Further this consent does not ensure compliance with the Disability Discrimination Act 1992. The Applicant is advised to investigate their liability under the Act.

Planning and Building Department

Development Application

Delegated Report

Reference: U01-01360/JMT

SUBJECT: 131 CATHEDRAL STREET, WOOLLOOMOOLOO

Date: 9 October 2001

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1. GENERAL

1.1 Description of Site and Surrounds

The subject site is a vacant piece of surplus land resulting from the Eastern Distributor development. The site is located for the most part over a cut and cover tunnel which forms part of the distributors southbound roadway. The site is approximately 683m^2 in area and is located on the south-east corner of Palmer and Cathedral Street's. Access to the rear is also provided by St Kilda Lane. The site slopes from the north to the south with a change in level of 3 metres.

The surrounding area is mixed in use and form resulting in several different building types and structures. The prominent scale of the area is between two and four stories, with some larger scale development to the south toward William Street. To the east of the site are rows of two storey terraces fronting Cathedral Street and St Kilda Lane. To the north of the site is the Eastern Distributor roadway and two storey terraces. To the west of the site is a three storey commercial building, residential units and terraces. To the south of the site is vacant land, also associated with the Eastern Distributor.

1.2 Proposed Development

It is proposed to erect a three storey commercial building fronting Cathedral and Palmer Streets with laneway access from a proposed new lane on the western side of the building and via St Kilda lane. The building is proposed to contain two commercial tenancies on the ground floor accessed from Palmer Street (160m^2 and 221m^2 respectively) and 640m^2 commercial tenancies on both the first and second floors, accessed via a lobby from Cathedral Street. The proposal also includes a roof deck adjacent to Cathedral Street.

1.3 Background

A masterplan of residual sites resulting from the eastern distributor development was submitted to Council in August 2000. The subject site is

identified as site number 2. The masterplan was not formerly endorsed by Council, however it contained a number of planning, urban design and heritage objectives that are applied to each site. The current proposal for site 2 is generally consistent with these objectives.

Since a preliminary assessment of the property was made, Council has been in negotiation regrading the RTA's concurrence with conditions of consent. Final concurrence for these condition was received on 25 September 2001.

2. REFERRALS

2.1 Heritage

The proposal was referred to Councils Heritage Adviser for comment. There is no objection to the proposal however comment was received requesting the following amendments to the plan.

- The scale of the immediate context is 2/3 storey warehouses and terraces. The design overpowers the adjacent terraces and should be reduced in scale at this point.

The applicant has proposed a new 4.5 metre laneway between the proposed commercial building and adjacent terraces. The visual separation created by this laneway is considered sufficient to provide a step up in scale.

2.2 Urban Design

The proposal was referred to Councils Urban Design coordinator for comment. There is no objection to the proposal and the following is noted.

- The proposal reflects the masterplan
- The proposed massing and scaling is considered appropriate
- The architectural design is contemporary and reflects traditional industrial design similar to a number of warehouses in the area

3. STATE ENVIRONMENTAL PLANNING POLICIES (SEPPs)

The proposed development is not subject to any relevant State Environmental Planning Policies.

4 LEP 1998

4.1 Zoning Controls (Clause 18)

The site is zoned Arterial Road Reservation 9(a) under the provisions of LEP 1998. Objective 1(b) of this clause states that "to provide flexibility in the development of sites identified for future arterial roads by allowing development which is permissible in an adjacent zone and consistent with the objectives for that zone". The zone immediately adjacent to the site is Mixed

Use 10. The proposal is permissible with the consent of Council and is compatible with the Mixed Use 10 zone objectives, subject to conditions.

4.2 Heritage Conservation (Clauses 22 to 27)

The site is listed is located in the Woolloomooloo Conservation Area under LEP 1998. The proposal is compatible with heritage objectives contained within the LEP and will not compromise the significance of the streetscape or surrounding area.

The built form of the proposal is acceptable with regard to its response to the surrounding built environment. The surrounding area contains a mixture of residential, industrial and commercial building forms. The proposed development is generally reflective of commercial/industrial insertions within the area.

The potential for archaeological deposits has been removed by the construction of the tunnel underneath the site and subsequent covering works. The proposal does not involve any further substantial excavation works, other than the placement of footings.

4.3 Urban Design Principles (Clause 28)

The proposal is generally acceptable with regard to this clause and the Strategy for a Sustainable City of South Sydney, subject to conditions outlined in the recommendation.

4.4 Non Residential Development in Zone 10 (Clause 37)

The previous known use for the site prior to the construction of the eastern distributor was as a car park.

4.5 Eastern Distributor

The site is located within the Eastern Distributor Tunnel Zone as indicated on the LEP 1998 Zoning map and requires RTA concurrence. As the RTA is the applicant it is assumed that concurrence has been received.

5. DEVELOPMENT CONTROL PLANS

5.1 Floorspace

The permissible FSR contained under Part E clause 2.2 of DCP 1997 is 2:1. The applicant has stated that the proposed FSR is approximately 2.6:1, however notes that this does not include the dedication of the laneway area. As the site is one consolidated lot it is appropriate to include the lane way area in the assessment of the FSR. Thus the proposed FSR, including the laneway portion is approximately 1.93:1. This complies with the DCP control and the proposal is consistent with the objectives and performance criteria contained under the above clause.

5.2 Height

The permissible height contained under part E clause 2.3 of DCP 1997 is 12 metres. The proposed height is 14 metres measured from the top of layer of the tunnel covering to the ceiling level of the saw tooth roof on the upper most commercial storey. It is noted that the plant room is not included in this calculation. Non-compliance with the DCP standard is acceptable is this instance due to the following:

- the additional height does incorporate a complete commercial storey and only contains a roof structure designed to give the building a more industrial appearance whilst providing a greater level of natural light to the upper storey.
- the scale of the proposal is consistent with the surrounding built form
- there are no overshadowing concerns related to the proposal

5.3 Building Envelope

The proposed building envelope and massing is considered appropriate within the local context. The proposals cubic form is reflective of later industrial insertions within the area and reinforces the street block.

5.4 Streetscape & Facade Treatment

The applicant has proposed a facade that is simple in terms of articulation and uses a combination of horizontal and vehicle facade treatments. These are appropriate given the buildings industrial/commercial appearance, within a mixed streetscape and surrounding area.

5.5 Setbacks

The proposed building is built to the street on all frontages. This complies with part E, Clause 2.4 of DCP 1997 as it is consistent with the prevailing setback pattern within the surrounding streets and promotes a sense of continuality along Cathedral Street. The proposed set back is also consistent with the proposed future development to the south, as indicated within the masterplan submitted to Council.

Requirements for splays on the south western, south eastern and north eastern corners were recommended by Public Works and Services. The applicant has only proposed a splay on the corner of Cathedral and Palmers Streets. The additional requirements were rejected by the applicant on the basis that they were unnecessary due to the proposed restrictions on vehicular access as follows:

- The requirement for a 4.5m x 4.5 metre splay on the corner of Cathedral Street and the proposed new lane is unnecessary as the turn from Cathedral Street is to be signposted as 'no right turn'. The lane is also proposed to be one way heading south.

- The requirement for a 4.5m x 4.5 metre splay on the corner of St Kilda lane and Palmer Street is unnecessary as there is no vehicle access between these two roadways.

- The requirement for the 4.5 x 4.5 metre splay on the corner of the proposed new lane and St Kilda lane is unnecessary given it is a laneway environment.

The requirements for splays was discussed with councils transport planner and it is concurred with the applicant that the requirements are unnecessary. These requirement have been removed from the recommended consent.

5.6 Active Street Frontage & Building Interface

The application is consistent with the safety and security provisions of part D of DCP 1997 in regard to Palmer and Cathedral Street frontages. Access to the ground floor of the two commercial tenancies is proposed from Palmer Street and to the upper floor tenancies from the main foyer in Cathedral Street. This distributes activity to both of the proposed buildings main frontages. The development also contains large expanses of glass at the on both the Cathedral Street and Palmer Street facades promoting passive surveillance.

Vehicular access is restricted to the rear, away from the main areas of pedestrian activity. However there are safety concerns related the proposed open parking area fronting St Kilda Lane. Surveillance of this area is poor and activity could take place in this area where it is obscured from pedestrian view. A condition is added to the consent that the car parking area, excluding the disabled space be restricted using a series of mesh tilt-a-lift doors constructed of metal.

5.7 Materials and Details.

The submitted plans indicates that the building is proposed to be rendered and painted and that windows are to be aluminium framed. This is acceptable as it in keeping with the contemporary streamlined design of the building and will not compromise the integrity of the adjacent streetscapes.

5.8 Land Use

The applicant has stated that the use of the site wholly as a commercial building is appropriate as the inclusion of a residential component would be unfeasible, due to the sites location over the cut and cover tunnel. The construction of a residential component will require internal walls of a heavier construction to comply with the BCA which has structural implications for the tunnel, further it would also require substantial insulation works due to vibration and noise from the tunnel below. This is acceptable in this instance and no amenity concerns are raised by the use of the site as a commercial office in general.

5.9 Overshadowing

The applicant has submitted shadow diagrams with the application. The diagrams generally demonstrate the following at the winter/autumn/spring:

- Shadow will be cast over Palmer Street, St Kilda lane and the vacant site to the north during the morning period.
- Shadow will be cast over St Kilda lane and the vacant site to the north during the morning period.
- Shadow will be cast over the proposed new lane, vacant site to the north and the terraces houses fronting St Kilda lane and Cathedral Street to the east. Additional shadow will be mainly restricted to the rear yards of Nos. 133 and 135 Cathedral Street and 2-4 St Kilda Lane.

Part E, Clause 5.1 of DCP 1997 requires that solar access is maintained to 50% of private open space and the windows of primary living spaces (excluding those on a side passage) for a minimum of two hours. The proposal satisfies this clause and the overshadowing impacts are acceptable. It is noted that the bulk of overshadowing will be cast over the site to the north which is also owned by the RTA.

5.10 Visual and Acoustic Privacy

There are no privacy concerns related to the openings on the Cathedral Street, Palmer Street or St Kilda lane frontages as they look directly out onto the public domain. Windows on the new lane elevation look over laneway, to the rear yards of adjacent terrace houses. Hoever the windows are restircted in number with varying floor to sill heights. Views into internal spaces are oblique and do not compromise privacy. This is considered accessible and will not compromise the amenity of the terraces.

The proposed roof deck faces out over Cathedral Street which is subject to high levels of day time activity. There are acoustic amenity issues associated with the use of this area at night, however this application seeks only to erect the structure and use the building as commercial offices. The use of this area outside the office hours specified in the Complying and Development DCP1999 will be subject of a separate application and the impacts should be further assessed at this time.

5.11 Parking, Access, & Servicing

Vehicular access to the site will be from the new unnamed one way lane and from St Kilda lane. The applicant has stated that vehicular access from Cathedral and Palmer Streets has been due to traffic volumes. This is appropriate and has been endorsed by Council's transport planner and Public Works.

Under the provisions of table 3 of DCP No. 11 the maximum permissible number of parking spaces is 14.3 car spaces, 1 motorcycle space and 1

bicycle space per staff member, based on a GFA of 1797m^2. The applicant has proposed 11 car parking spaces, 1 motorcycle space and a secure room to hold nine bicycle. This complies with the DCP requirements and is considered acceptable, subject to the deletion of parking space No. 7 as a vehicle would not be able to safely enter/exist the site without either making several short turns or reversing down St Kilda lane. The RTA has given concurrence to the a condition requiring the deletion of this space. There is sufficient access to public transport and parking restrictions exist in surrounding streets to discourage further private vehicle use which may otherwise put pressure on local parking and traffic conditions.

Council's transport planner has requested the curb and gutter on the corner of the proposed new lane and St Kilda Lane follows the curve of the proposed building to allow better manoeuvrability. The RTA has given concurrence to a condition reflecting this.

Access to the ground floor for wheelchairs is provided via the main door. Access to the upper commercial floor levels would require a lift installation. The applicant has stated that this is not feasible given the sites structural constraints. The applicant is therefore claiming for Unjustifiable Hardship pursuant to section 23 of the Disability Discrimination Act 1992. No supporting information has been provided about the likely cost of structural concerns. However installation of a lift would require additional heavy construction a claim for Unjustifiable Hardship is considered legitimate. A note is added to the recommended consent stating that this consent does not ensure compliance with the Disability Discrimination Act 1992. The Applicant is advised to investigate their liability under the Act.

5.12 Operational Controls (including Hours of Operation and Trading)

The applicant has proposed operating hours of 6am to 9pm Monday to Friday and 6am to 9pm Saturday. However as Council does not the exact nature of each use these need to be the subject of a further development application should they be outside of those hours identified within the Except and Complying DCP 2001.

5.13 Open Space & Landscaping

The site is currently free of all vegetation, resulting from the construction of the Eastern Distributor. Opportunities to provide landscaping on site are limited and would require setbacks that would conflict with heritage objectives. The cut and cover tunnel also limits the ability to provide street trees, however trees have been proposed on the part of the site not over the tunnel. Public Works has concurred to waive the inclusion of standard landscaping conditions given these limitations.

6. INTERNAL REVIEW PANEL

The application was taken to an IRP on 12 September 2001. The application was considered acceptable, subject to conditions outlined in the proposed consent.

7. NOTIFICATION

The proposal was notified to 370 surrounding owners and occupiers. Two submissions were received. One submission is from the State Rail Authority who have drawn attention to the sites location near the Eastern Suburbs Railway duct and noise and vibration impacts on the structural integrity of the building and required that a detailed report addressing this be prepared by qualified acoustic engineers. There are no concerns related to acoustic impact of the railway due to the commercial nature of the building. A structural report has been prepared for the site, and the application has been prepared in accordance with its findings.

The other submission was in the form of an objection. The basis of objection is as follows:

- **The application is on a corner site and the advertising description of the address does not reflect the impact of the DA on other street fronts. Also the address is not displayed on the site an no mention the new laneway is made. As such the application should be readvertised for clarity.**

Comment: The application was advertised extensively to the owners and occupiers both Cathedral Street, Palmer Street and St Kilda lane. It is clearly The details of the assessing officer are clearly stated on the notification letters should any clarification of the proposal be necessary.

- **The proposal does not sufficiently identify any potential archaeological deposits.**

Comment: The potential for archaeological deposits has been removed by the construction of the tunnel underneath the site and subsequent covering works. The proposal does not involve any further substantial excavation works.

- **The masterplan should have been exhibited.**

Comment: The masterplan was not submitted for overall assessment, rather it was submitted to assist Council in the assessment of individual development applications for surplus RTA sites.

- **The site is only part of 131 Cathedral Street and details of the subdivision are not given.**

Comment: The application relates to the whole of the site known to council as 131 Cathedral Street bounded by Cathedral Street, 133 Cathedral Street, St Kilda Lane and Palmer Street. .

- **Both the height and FSR are exceeded, also the residential mix is ignored. Setbacks, splays and streetscape improvements are also needed.**

Comment: The proposal complies with the FSR limit. The proposal does not comply with the numerical permissible height limit however it is consistent with the performance criteria and objectives contained within Part E, Clause 2.3 of DCP 1997. Setting the building back from the street is not appropriate given the prevailing patterns of the surrounding area and its location within a heritage Conservation Area under LEP 1998. Splays are not need given the proposed vehicular restriction applied to the site. The streetscape improvement are restricted by the cut and cover tunnel under the site and the improvements proposed in the plan are acceptable.

- **The saw tooth roof is not sympathetic to St Kilda or the surrounding area.**

Comment: The saw tooth roof is of a form associated with warehouse and other commercial/industrial development. Given the buildings overall appearance it is considered acceptable as it related to later industrial and commercial development in the area.

- **The hours of operation should be reviewed.**

Comment: The hours of operation be subject to further applications should they fall outside if the hours stated within Council's Exempt and Complying DCP 2001.

8. CONCLUSION

The proposal has been assessed in accordance with the provisions of the Environmental Planning and Assessment Act, 1979 and Regulations 2000 and is consistent with the matters in Section 79C and Council's plans and policies and is considered acceptable, subject to conditions.

6. RECOMMENDATION

That approval be granted subject to conditions.

Jason Taylor
Statutory Planner

Statement Of Environmental Effects
To accompany a Development Application for a

NEW COMMERCIAL BUILDING

at

131 CATHEDRAL STREET, WOOLLOOMOOLOO
(The Corner of Cathedral and Palmer Street)

(Noted as Site 2 in the master plan)

Prepared by:

jackson teece chesterman willis pty ltd
ACN 083 837 290
101 Sussex Street
SYDNEY NSW 2000
Telephone: 9290 2722
Facsimile: 9290 1150
Email: jtcwhome@jtcw.com.au

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1.0 EXECUTIVE SUMMARY

This Statement of Environmental Effects accompanies a Development Application (DA) to South Sydney Council for a new Commercial Building located on the southeast corner of the Cathedral Street and Palmer Street intersection in Woolloomooloo. The site is to be subdivided to create a new one-way lane to extend to the existing Egan Place, and provide access to St Kilda Lane. The proposed development comprises three full levels of commercial space, the total area being 1,797m^2.

The site is vacant and for the most part over a cut and cover tunnel which forms a section of the newly opened Eastern Distributor.

The site's corner location and high level of exposure to both local and exiting motorway traffic generates an opportunity for a development whose impact expresses the corner site and building as a landmark feature. The impact of the site's major constraint, the presence of the tunnel structure below, limits the size of the development to 3 storeys. This level of development is similar to the surrounding area, and is of the order permitted by Council's planning controls.

Recently an over-arching master plan for this and other residual sites being made available by the Roads and Traffic Authority of New South Wales (RTA), was lodged with Council. This master plan was the result of discussion with Council, UDAS (consultants to Council and representing the Department of Urban Affairs and Planning) and affected residents. This site-specific application follows the direction set in the master plan and refines the proposal to a level appropriate to a development submission.

The development is contemporary in expression and engages with current concerns regarding issues of context to surrounding buildings, solar access, cross ventilation and ecologically sustained design (ESD). Its commercial nature continues a theme found in the area and will contribute to the cultural diversity that characterises this part of Woolloomooloo. It Its construction will complete the corner and form an important element in an area which has experienced, and appears will continue to experience, rapid change and improvement.

2.0 OVERVIEW

2.1 INTRODUCTION

A planning map from the mid-1980s shows the intersection of Palmer and Cathedral Streets in a much different configuration than that which currently exists. With the completion of the Eastern Distributor the proposed development site (Number 131 Cathedral Street) was transformed from a mid-block site to a corner site. Its owner, the Roads and Traffic Authority, have advised us that they wish to dispose of it with an approved development in place, and have deemed the site residual.

The Department of Urban Affairs and Planning (DUAP) required as part of their conditions of approval for the Eastern Distributor that the RTA prepare an Urban Design Guideline Master Plan prior to the disposal of any surplus sites. The master plan has recently been lodged with Council and its stated intention is to propose development controls specific to the various sites within the framework of the existing Council Planning Controls as set out in the South Sydney Plan.

It is anticipated that the master plan will be adopted by Council as a means of assessing any development that it applies to, i.e. any surplus RTA land associated with the Eastern Distributor.

The development proposed generally complies with the master plan.

The building presents a continuous 'active' presence at the street level in the form of a display area to both Cathedral Street and Palmer Street, and entry lobby to the upper levels from Cathedral Street. This continues the commercial/showroom activities already found in the area. The development reflects the planning principals displayed in the surrounding neighbourhood, with the three-storey height emphasising the corner thereby reinforcing the scale of Cathedral Street and proposals further along Palmer Street, which are also part of the Master Plan currently submitted to Council. The proposal creates a roof profile that relates to the small-scale semi domestic nature of commercial ventures in the area.

Located in an important local nodal point the proposal will fill in the corner and continue the urban renewal process characteristic to the area with the completion of the Eastern Distributor.

Issues of ESD, cross ventilation, solar access, and visual security to the laneways to the east and south to all levels have guided the location of windows. Open plan layouts have been designed with future partitioning of the spaces as required.

2.2 THE PROPOSAL

This application seeks approval for the construction of a three storey commercial building fronting Cathedral and Palmer Streets with rear lane access via a new one-way lane, yet to be named, and St Kilda Lane.

SCHEDULE OF ACCOMMODATION

Parking (Ground Floor Level)

- 7 car spaces (including 1 accessible car space) accessed from St Kilda Lane
- 4 car spaces accessed from new one way lane (with the assistance of a motorised vehicle turntable)
- 7 bicycle spaces in locked area accessed from new one way lane

Ground Floor Level

- Commercial space divided into two tenancies, with a combined GFA of 431 sq.m (approx.), with both areas accessed from Palmer Street
- Main stair lobby (to access upper commercial levels) from Cathedral Street
- Required stair to exit to new unnamed lane way, with access to rear parking
- Rubbish room
- Telecom and Electrical switch room

First Floor Level

- Commercial space of GFA 683 sq.m (approx.) with the possibility of dividing into multiple tenancies at a future application

Second Floor Level

- Commercial space of GFA 683 sq.m (approx.) with the possibility of dividing into multiple tenancies at a future application

Roof Level

- Roof deck accessed from main entry stair

The proposal is outlined in the following drawings and figures which accompany the application to Council:

Drawing Number	Revision	Title
A.01/DA	A	Site Plan
A.02/DA	A	Ground Floor Plan
A.03/DA	A	First Floor Plan
A.04/DA	A	Second Floor Plan
A.05/DA	A	Roof Plan
A.06/DA	A	North and West Elevations
A.07/DA	A	South and East Elevations
A.08/DA	A	Section One and Section Two

Figure Number	Revision	Title
Figure No.1	A	Site Analysis Drawing

3.0 THE CONTEXT

3.1 LOCAL

This area of South Sydney has, since the 1970s, been the focus of major infrastructure improvement projects, namely:

- The Eastern Suburbs Railway
- The now removed William Street underpass
- The Eastern Distributor Motorway

It is understood that no further projects are planned for the area around the site, as the proposed Cross City Tunnel being basically under William Street.

With the completion of the Eastern Distributor and the consequent reduction of traffic, it is anticipated that the positive aspects of the area, namely its close proximity to the CBD, public transport and green space, will drive a transformation of the area with residential, small scale commercial and showrooms creating a real village atmosphere.

This area of South Sydney has been affected by major constructed projects aimed at improving access from the CBD to the Airport, namely the Eastern Distributor and the rail link from Central.

There are numerous small refurbishments have or are occurring in the surrounding area of both a commercial, retail, and/or residential nature, all of which contribute to a general renewal of the area. A number of the local sites are similar RTA residual sites that are being developed for DA Application.

3.2 IMMEDIATE

The buildings situated on Cathedral Street to the east are a row of two storey brick Federation style residential terraces. There is also a row of two storey terraces to the rear of the site on St Kilda Lane backing onto the Cathedral Street terraces.

The height limit of the adjoining terraces is well within the 12m limit proposed in the LEP and the Master Plan currently before council.

RTA residual land exists to the south of the site (identified as Site 3a on the Master Plan), and is identified as a possible 2 to 3 storey commercial building. An existing 2 storey brick car showroom and workshop is located to the south east corner.

Two further sites proposed for development by the RTA (identified as Sites 1A and 1B) are located on the northern side of Cathedral Street opposite. Both are 2 storey commercial buildings.

Existing buildings to the west of Palmer Street are non-descript brick 2 and 3 storey commercial buildings.

The remaining immediate context is roadway, either Cathedral Street, Palmer Street of the Cathedral Street off-ramp.

3.4 POSSIBLE FUTURE CHARACTER OF LOCAL CONTEXT

It is anticipated that as the major infrastructure works in the area are complete the immediate area will return to a more low intensity development environment. Nevertheless the areas obvious advantages, i.e. closeness to the CBD, major open spaces and entertainment precincts, will continue to encourage mostly refurbishment of existing and new building stock.

4.0 THE SITE

4.1 REAL ESTATE / SURVEY DESCRIPTION

The RTA is currently preparing new boundary data for inclusion on title details prior to lodgement with the Land Titles Office. Included in the appendix is the current survey drawing.

Current street address is: 130 Cathedral Street.

The site is now vacant and free of buildings and trees. The surrounding footpath/kerbs and guttering are fully formed up.

Site area:

- 683m^2 approx. (not including the new unnamed laneway which covers 164.5 m^2).

4.2 SITE ANALYSIS

A summary of factors which influence he possible development of the site is listed below in terms of the opportunities and constraints:

Opportunities include:

- The opportunity to "heal" the gap in the streetscape at the important corner position.
- Site displays well to road network and enjoys excellent exposure.
- Existing zoning permits use which matches real estate advice as to the "highest and best" use of the site.
- Creation of new (unnamed) laneway to the east and St Kida Lane to the south provide rear access for service and car parking.
- Close proximity to CBD, major public green spaces and entertainment precincts.
- Convenient access to public transport.

Constraints include:

- The site is directly over the pre-cast concrete planks that form the top of the cut and cover Eastern Distributor Tunnel underneath.

The following diagram outlines graphically the site analysis undertaken.

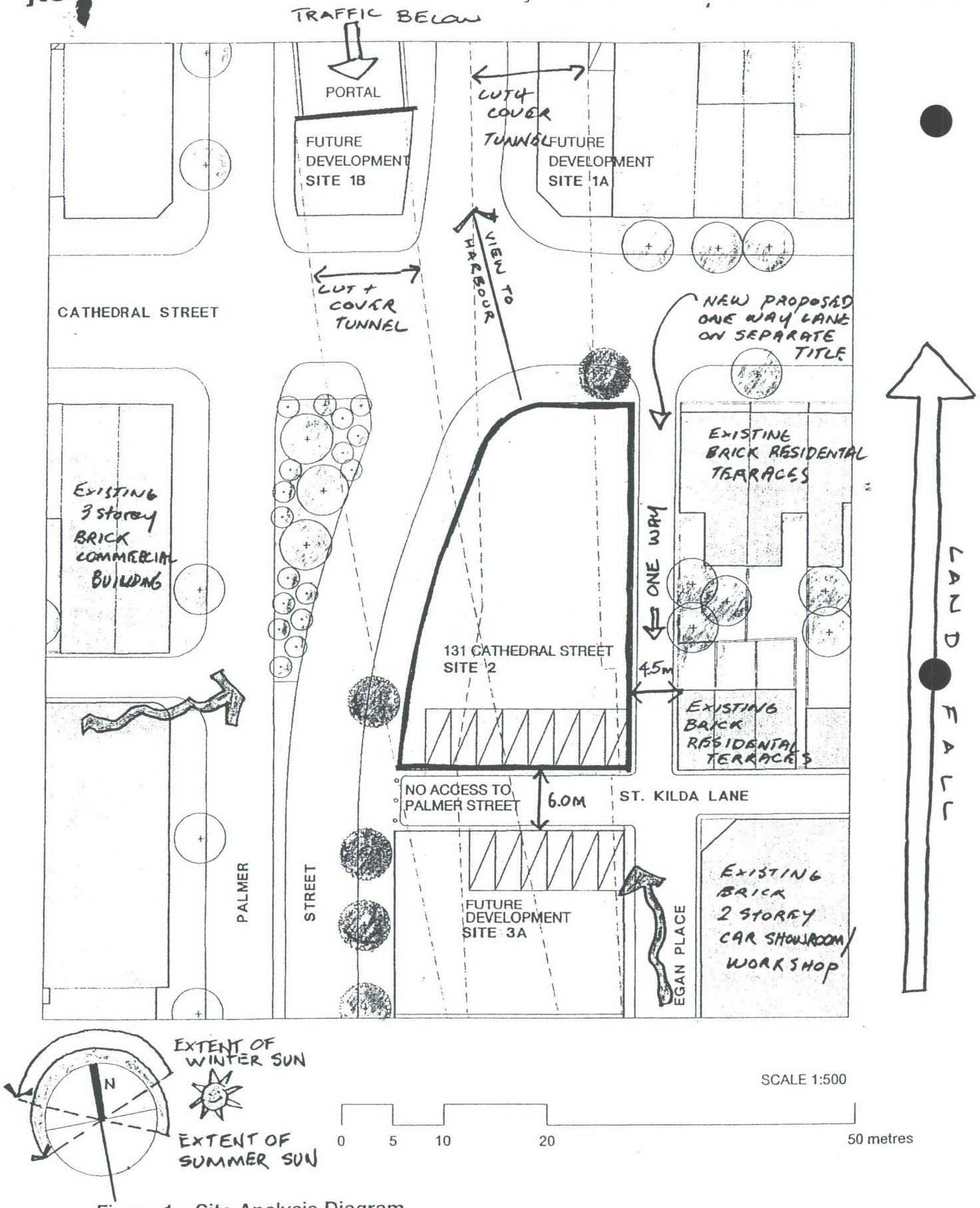


Figure 1 – Site Analysis Diagram

4.3 TOPOGRAPHY

The site rises from Cathedral Street along Palmer Street, with an approximate overall change in level of 3.0 metres. It is located in the Woolloomooloo basin and has northerly views across to the harbour and westerly views along Cathedral Street to the CBD. Views to the south up Palmer Street are also possible.

4.4 VISUAL CHARACTER

The surrounding buildings are 2 to 3 storey in scale with a mix of residential and commercial uses being accommodated. The Council has defined the "thematic character" (Part C: Public Domain 5, Eastern Districts Public Domain Plan). The visual character of the development proposed is consistent with Council description.

4.5 HERITAGE – STATEMENT OF HERITAGE IMPACT

The site is located within a Heritage Conservation Area. Nearby heritage items (as identified in Schedule 2 of the LEP) include:

Item Number	Address	Description
93	108-118 Cathedral Street	Late Victorian terrace house and shop group
94	168-174 Cathedral Street	Terrace house and former shop group.

In the LEP Part 4 – Special Provisions, Clause 23 – Protection Heritage Items, Heritage Conservation Areas and Relics, Council policy requires the submission of a Development Application which must contain a Statement of Heritage Impact.

STATEMENT OF HERITAGE IMPACT

This statement has been prepared with reference to the NSW Heritage Manual published by the Department of Urban Affairs and Planning and the Heritage Office.

The following aspects of the proposal respect or enhance the conservation area for the following reasons. Where the proposal could be detrimental to the heritage significance of the area, measures taken to minimise the impact are outlined.

Proposed Change to Conservation Area	**Issues/Queries raised as result of proposed change**	**Resultant Enhancement of Conservation Area**
Demolition of a building structure	• Not applicable. Site vacant.	• Intrusive impact of vacant site on streetscape eliminated.
Change of use	• Not applicable	• Not applicable.
New development in Conservation Area	• *How is impact of new development to be minimised?* Setback from existing terraces established with new lane. Servicing from rear reflects existing pattern in area.	• Gap in existing streetscape repaired by new development., corner site creates landmark feature
	• *Why is new development required?* Previous building was demolished for construction of the Eastern Distributor project creating a vacant site that has a negative impact within the setting of the conservation area.	• New development will minimise the negative impact the currently vacant site has within the setting of the conservation area..
	• *How does the curtilage allowed around the heritage item contribute to the retention of its heritage significance?* Not applicable. Proposal relates to development within a conservation area. Nearest heritage item (Item No. 93,94)	• New development has no impact on the curtilage of the nearest heritage item.
	• *How does the new development affect views to and from the heritage item? What has been done to minimise negative effects?* Nearest item (Item No. 93,94)is not affected with respect to views from the proposed development.	• New development has no impact on the views to and from the nearest heritage item.
	• *Is the development sited on any known or potentially significant archaeological deposits? If so, have alternative sites been considered? Why were they rejected.* It is assumed that the cut and cover excavation carried out for the Eastern Distributor tunnel under the site would have removed any prior deposits with archaeological interest.	• New development has no impact on known existing deposits with archaeological interest.
	• *Is the new development sympathetic to the heritage item? In what way (e.g. form, siting, proportion, design)?* The development is obliquely visible from the nearest heritage items (Item No. 93,94), however within the setting of the Conservation Area the proposed development is sympathetic for the following reasons: - A parapet is introduced, with pitched roof profile to reflect surrounding neighbourhood residential and commercial buildings therefore reinforcing the cohesive streetscape typical of the area.	• The proposal's architectural qualities seek to reinforce the existing attributes present in the context. This will achieve a more cohesive nature to the setting.

Proposed Change to Conservation Area	Issues/Queries raised as result of proposed change	Resultant Enhancement of Conservation Area
	- The facades are articulated in a way that reflects the particular street environment with the Cathedral Street and Palmer Street elevations having painted render and punched window openings thereby reinforcing the existing street pattern. The façade to Cathedral Street has less glass and more painted rendered wall, whilst the façade to Palmer Street has more glass in recognition of the higher traffic speed and more commercial nature of this street. - The level of "fine detail" present in the conservation setting is matched in the proposed development.	
	• *Will the additions visually dominate the heritage item? How has this been minimised?* The development is only obliquely visible from the nearest heritage items (Item No. 93,94), therefore the possibility of visual dominance does not occur.	• The existing visual properties associated with Item 93 and 94 are not changed by the proposed development.
	• *Will the public and the users of the item still be able to view and appreciate its significance?* Public and users of Item 93 and 94 will not be affected by the proposed development and therefore the level of appreciation remains unchanged.	• The existing view patterns are maintained.
Subdivision	• Not applicable.	• Not applicable
Repainting	• Not applicable.	• Not applicable
Re-roofing / recladding	• Not applicable.	• Not applicable
New services proposed for installation in heritage fabric.	• Not applicable.	• Not applicable
Fire upgrade to heritage item	• Not applicable.	• Not applicable
New landscape works	• Not applicable.	• Not applicable
Tree removal or re-placement	• Not applicable.	• Not applicable
New signage	• *How has the impact of the new signage on the heritage significance of the item been assessed?* No signage is proposed to the development. As the building is likely to be occupied by commercial tenants it is anticipated that some form of signage will be required. This will be the subject of a further application to Council.	• Future signage, if designed appropriately, will enhance the visual character of the conservation setting.

Proposed Change to Conservation Area	Issues/Queries raised as result of proposed change	Resultant Enhancement of Conservation Area
	- The facades are articulated in a way that reflects the particular street environment with the Cathedral Street and Palmer Street elevations having painted render and punched window openings thereby reinforcing the existing street pattern. The façade to Cathedral Street has less glass and more painted rendered wall, whilst the façade to Palmer Street has more glass in recognition of the higher traffic speed and more commercial nature of this street. - The level of "fine detail" present in the conservation setting is matched in the proposed development.	
	• *Will the additions visually dominate the heritage item? How has this been minimised?* The development is only obliquely visible from the nearest heritage items (Item No. 93,94), therefore the possibility of visual dominance does not occur.	• The existing visual properties associated with Item 93 and 94 are not changed by the proposed development.
	• *Will the public and the users of the item still be able to view and appreciate its significance?* Public and users of Item 93 and 94 will not be affected by the proposed development and therefore the level of appreciation remains unchanged.	• The existing view patterns are maintained.
Subdivision	• Not applicable.	• Not applicable
Repainting	• Not applicable.	• Not applicable
Re-roofing / recladding	• Not applicable.	• Not applicable
New services proposed for installation in heritage fabric.	• Not applicable.	• Not applicable
Fire upgrade to heritage item	• Not applicable.	• Not applicable
New landscape works	• Not applicable.	• Not applicable
Tree removal or re-placement	• Not applicable.	• Not applicable
New signage	• *How has the impact of the new signage on the heritage significance of the item been assessed?* No signage is proposed to the development. As the building is likely to be occupied by commercial tenants it is anticipated that some form of signage will be required. This will be the subject of a further application to Council.	• Future signage, if designed appropriately, will enhance the visual character of the conservation setting.

4.6 STORMWATER

Council's Public Works Department has advised that on-site stormwater detention systems are required for sites over 1,800 sq.m. The proposed development site area is 638m^2 approx. (excluding proposed new laneway), therefore stormwater detention is not required.

There are no known stormwater disposal problems associated with the site. The proposed development will dispose of its stormwater directly to existing underground stormwater lines.

4.7 VEGETATION

Currently the site is bare of vegetation. Street tree planting is proposed for the north east and south west corner where the site is not over the cut and cover tunnel.

4.8 GEO-TECHNICAL

The proposed development site overlies the primary northern entry tunnel of the Eastern Distributor heading south. The subject section of tunnel was formed by cut and cover methods.

As part of the preparation of the master plan Hyder Consulting have drafted a structural assessment report (refer Appendix).

The report findings are summarised below:

The additional allowable live load capacity of the tunnel roof structure is estimated to be in the range of 24kPa to 32kPa for load factors of 2.0 and 1.5 respectively. This assumes removal of all overburden material.

A typical three-storey development would impose the following loads:

• Concrete Ground Floor level with lightweight partitions	9kPa
• Concrete First Floor level with lightweight partitions	9kPa
• Concrete Second Floor level with lightweight partitions	9kPa
• Lightweight metal deck roof	1.0kPa
	28kPa

The type of three storey developments that could be supported off the tunnel roof subject to building code requirements are:

- Concrete ground, first and second floor slabs with lightweight partitions and roof.

This will need to be approved by a structural engineer.

4.9 URBAN SERVICES

A full range of standard urban utility services (water, sewerage, drainage, communications and energy) is available to the site.

4.10 WASTE MANAGEMENT

It is anticipated that a private contractor will be engaged to remove waste generated in the development. A rubbish enclosure is provided with direct access via new unnamed Lane. Its design, finishes, etc, will be in accordance with Council guidelines.

4.11 ACOUSTIC (TRAFFIC)

As the site is located at an intersection it is anticipated that high speed traffic noise will not be generated.

As there is no residential component to the development no specific acoustic report has been commissioned.

4.12 VEHICLE ACCESS

The site has frontages to Cathedral Street, Palmer Street and St Kilda Lane. A new one way unnamed lane is proposed to access St Kilda Lane and continue into Egan Place. Due to the volume of traffic and the close proximity to their intersection no vehicular access is proposed from either Cathedral Street or Palmer Street.

All vehicular access will be via the proposed new one way unnamed lane, and St Kilda Lane. This access includes car parking, rubbish pickup and deliveries. The new one-way lane will ensure that the existing traffic network can be accessed in an efficient and easy manner. It is proposed as part of the development to place low vehicle bollards at the end of St Kilda Lane to prevent vehicles entering into Plamer Street, and allows pedestrians access to the Palmer Street frontage via the car park.

4.13 SOIL CONTAMINATION

The known past use of the site was a car park. This use is not noted as "High Risk" in Council's High Risk Land Use table.

The point should also be made that the site has been fully excavated to a depth of 12m approx. below natural ground level, effectively sanitising the area.

5.0 THE PROPOSAL

5.1 URBAN PLANNING OBJECTIVES

An area of concern related to the construction of the Eastern Distributor (ED) has been management of the disposal of residual RTA sites in a manner that results in successful urban outcomes. The outcome should benefit both the ultimate owner of the site and the broader community. This objective is consistent with the scale of the ED and its impact on inner Sydney as a whole.

The Department of Urban Affairs and Planning (DUAP) acknowledged this goal by making approval of the ED conditional on the adoption by Council of a master plan for development of the respective sites. This master plan is currently with Council for their consideration. Its objectives are based on applying Council's overarching planning requirements set out in the South Sydney Plan and are summarised below.

PART B: URBAN DESIGN PRINCIPLES

Setting (pp.8-9)
Buildings are to:

- Reinforce the urban character;
- be generally residential or mixed use;
- incorporate "fine grain" textures that enhance the historic character;
- create places and streetscapes that are defined and have a sense of enclosure.
- emphasise neighbourhood identity, community life and street living.

Development is to:

- Protect and enhance significant topographical elements, existing skylines and areas of high visibility that highlight the city's distinctive form.
- reinforce existing block and street patterns;
- address and define streets and public spaces;
- reinforce the predominant scale of the streetscape;
- use appropriate tree planting to reinforce the street hierarchy.

Buildings and Heritage (p. 16)
Ensure development:

- is sympathetic to the prevailing height, bulk, scale, design and external appearance of adjacent buildings;
- incorporates predominantly masonry facades with vertical and horizontal proportions and harmonious fenestration patterns;
- adopts richly articulated profiles and roof forms designed to create varied and visually interesting facades;
- is consistent with the alignment of neighbouring buildings;
- creates spaces with a sense of enclosure; and
- creatively responds to important internal vistas of the city.

Development relating to heritage places, buildings or relics, is to observe conservation principles and uses are to be compatible to ensure the preservation of the place, building or relic.

Public Spaces and Pedestrian Networks (p.18)

Buildings are to maintain the visual cohesion of the streetscape taking into account:

- the site's position in relation to the streetscape;
- the continuity and character of the street in terms of use, scale and architectural entity;
- the intrinsic scale or the atmosphere of the place;
- local patterns and linkages;
- community values and expectations.

Enhance public spaces by contributing to and creating:

- landmarks and buildings of civic importance;
- public art;
- thematic tree planting;
- urban spaces that enhance the Public Domain, such as plazas and squares and publicly accessible pedestrian forecourts to buildings;
- promenades, pedestrian links, etc;
- outdoor activity and street life.

Incorporate street design and traffic management measures that restrict through traffic and improve pedestrian networks, safety and amenity for local precincts.

Design for a Sustainable, Healthy Environment (p. 21)

Energy Efficiency

- Ensure new development does not unreasonably reduce the energy efficiency of adjoining buildings.
- Use passive and active solar design methods to increase the comfort level of buildings and minimise energy consumption from non-renewable energy sources.
- Use ecologically sound building materials that are renewable, energy efficient and can reduce fossil-based energy consumption.

Environmental Amenity

- Ensure non-residential buildings are designed and specified to reduce their operational impact on adjacent residential areas.
- Provide adequate separation or noise attenuation measures between land uses and activities to minimise noise transmission.

Stormwater

- Reduce stormwater runoff by on-site detention.

Transport

- Enhance local pedestrian routes and cycleways.
- Restrict the number of on-site parking spaces having regard to the site's proximity to public transport.

PART C: PUBLIC DOMAIN

Security and the Public Domain (p. 26)

- Provide communal open space that facilitates social interaction and a sense of community, however, the design of communal and private space must ensure safety and security for residents.

Implementation (p.27)

- A bonus floor space incentive of up to 0.25:1 of the total site area, may be applicable to sites requiring the provision of:
  - Dedication of public open space... in addition to section 94 requirements
  - Public through site links in large development sites
  - Public art

PART D: SOCIAL PLANNING CRITERIA

Access (p. 56)

- Ensure buildings and associated spaces are accessible to all people in the community.
- Developments provide active street frontages which are friendly to the streetscape and create linkages with the broader community.

Social and Housing Mix (p.57)

- Social mix requirements for new developments to reflect existing mix pattern for that area.

Cumulative impacts and trade-offs (p. 59)

- Development takes into account cumulative impacts of past development activity and does not exacerbate existing negative social impacts or issues.
- Development identifies and responds to opportunities to benefit the local community and provides measures to mitigate against negative impacts.

PART E: ENVIRONMENTAL DESIGN CRITERIA

Landscaping (p.70)

- Ensure landscaping enhances the setting of the buildings...
- Maximise landscaped areas available for on-site infiltration of stormwater.
- Encourage native landscaping that requires minimal maintenance and irrigation.
- Retain existing large trees where possible.

Parking, access and servicing (pp.72-74)

- Traffic calming measures and restricted numbers of on-site parking spaces available are encouraged
- Car parking is to be underground where possible. Above ground parking is to be screened and or integrated with the building and complement the streetscape
- All servicing operations occur wholly within the site
- Bicycle lockers and inverted U stands are to be provided
- Corner sites include splay setbacks to improve visibility of pedestrians and motorists and improve pedestrian amenity.

Building Form and Appearance (pp. 80-89)

Building Envelope

- A sympathetic scale relationship between new and existing buildings can be achieved through appropriate design, including careful massing and site arrangement.

Height and scale

- Buildings should maximise solar access in the Public Domain and areas of private open space.
- Buildings should achieve high environmental amenity.

Setbacks

- Setbacks should:
  - protect adjoining buildings from overlooking, overshadowing and general loss of amenity;
  - protect sunlight and daylight to habitable rooms;
  - protect and optimise useable semi-private and public open space; and
  - provide a landscaped visual setting for the building.
- Corner sites include splay setbacks of ... 2.5m where one or both the streets are less than 15m wide.

Signage

- Signage should not compromise the dominant character of surrounding buildings and areas.

5.2 OVERALL BUILDING PLANNING STRATEGIES AND OUTCOMES

Displaying zero setbacks to Cathedral Street and Palmer Street, the proposed building footprint reflects the existing street pattern and reinforces it by its application to this "gap" in the streetscape. In addition a 4.5m setback is established by creating a one way lane to the east of the site.

The building is given a parapet of various heights around the perimeter of the building to maintain the importance of the surrounding street parapet relationship and reflect the existing layout of the neighbour. The roof form proposed has been designed to allow natural lighting and ventilation to the development as well as to articulate and break up the bulk of the roof, to be more empathetic to the surrounding small scale commercial and residential context.

The facades are articulated in a way that reflects the particular street environment with the Cathedral Street and Palmer Street elevations having painted render and punched window openings thereby reinforcing the existing street pattern. The façade to Cathedral Street has less glass and more painted rendered wall, whilst the façade to Palmer Street has more glass in recognition of the higher traffic speed and more commercial nature of this street.

As the main façade available for windows faces due both north and west, some means of effectively shading the high level windows from the sun, (especially late afternoon) is required. It is proposed in the form of fixed aluminium louvres, the use of which also introduces the following effects:

- It provides a level of "fine detail" characteristic of the area.
- It is anticipated that the sun shading provided will add an element of visual interest to the proposal.

The north elevation will be more horizontal in nature, with the façade being articulated in a fashion which relates to the more traditional language of punched openings in rendered and painted walls in keeping with the Cathedral Street elevation, whilst the Palmer street elevation will be more vertical. This combination of vertical screened windows is also seen as appropriate in the context of Palmer Street, which is wide and carries more traffic than Cathedral Street.

This dual face approach is intended to ensure the development is compatible with the specifics of its unusual site and provides an active and interesting façade treatment.

5.3 PROPOSAL DESCRIPTION

The development comprises the following:

Parking (Ground Floor Level)

- 7 car spaces (including 1 accessible car space) accessed from St Kilda Lane
- 4 car spaces accessed from new one way lane (with the assistance of a motorised vehicle turntable)
- 7 bicycle spaces in locked area accessed from new one way lane

Ground Floor Level

- Commercial space divided into two tenancies of 160 sq.m and 221 sq.m (Net Floor Area approx.) both accessed from Palmer Street
- Main stair lobby (to access upper commercial levels) from Cathedral Street
- Required stair to exit to new unnamed lane way, with access to rear parking
- Rubbish room
- Telecom and Electrical switch room

First Floor Level

- Commercial space of 640 sq.m (Net Floor Area approx.) with the possibility of dividing into multiple tenancies at a future application

Second Floor Level

- Commercial space of 640 sq.m (Net Floor Area approx.) with the possibility of dividing into multiple tenancies at a future application

Roof Level

- Roof deck accessed from main entry stair

5.4 MATERIALS

External material selection is depicted on the drawings that accompany this application. In general walls are proposed to be masonry, rendered and painted.

Solar control louvres will be in anodised aluminium to match the window framing. Glazing is to be clear.

5.5 VEGETATION AND LANDSCAPING

There is no existing vegetation on the site. Given that the site is currently the concrete topping on the tunnel roof structure below, this lack of vegetation is not surprising (refer Appendix).

Due to this particular site characteristic it is only feasible to plant street trees to parts of the site not covering the tunnel. These include the north east corner and the south west corner of the site.

The other possible avenue to achieve the necessary soil depth is some form of built up garden beds that have not been proposed as there is no local example of their use and it is expected that they will quickly become de facto rubbish bins to the general detriment of the area.

5.6 ACCESS AND TRAFFIC / PUBLIC TRANSPORT

Vehicular Access

Access is via the proposed unnamed one-way lane via Cathedral Street to the service points and car parks. A motorised roller shutter provides security to the car park from the unnamed lane. The car park accessed from St Kilda Lane is located under the building overhang, with a galvanised metal louvre to provide ventilation and visual screening from Palmer Street.

Due to the negligible pedestrian load at the end of St Kilda Lane it is anticipated that the proposed arrangement will not create a safety problem to foot traffic in the area.

The configuration of the access is such that the headlights of vehicles entering/exiting the proposed development will not cause a nuisance to nearby residential properties.

Pedestrian Access

Due the variation in height levels across the site, pedestrian access was addressed with regard to the following conditions;

- Provision of parking including one accessible space from St Kilda Lane with pedestrian access onto Palmer Street, allowing accessible entry into the ground level commercial suites via the footpath located on Palmer Street.

- Provision of pedestrian entry into the first and second level of the commercial suites via an entry lobby located on Cathedral Street.

The entry lobby located at the corner of the building fronting Cathedral Street is considered to be the most appropriate as it reflects the existing urban character of the area with the main entries to Cathedral Street and service entry points access from the rear lane.

Public Transport

The site's close proximity to William Street ensures easy access to buses that operate along that roadway. Kings Cross railway station is located within 15 minutes walk thereby providing reasonable level of access.

5.7 STORMWATER

The proposed stormwater disposal system will consist of a fully piped system with collection points to roof drainage sumps. Downpipes will be located in columns. Discharge will be direct to Council stormwater lines in accordance with the relevant Australian Standards and Council Codes.

Drainage Management Plan

Due to the site area being 683 sq.m. (Excluding the proposed laneway) which is less than Council's threshold of 1,800 sq.m., no Drainage Management Plan has been prepared.

On-Site Detention/Retention
Refer 4.6 Stormwater.

5.8 URBAN SERVICES AND WASTE MANAGEMENT

The detailed resolution of service requirements for the proposed development will be resolved as part of the detailed design process in discussion with the relevant utility providers following development consent.

WASTE MANAGEMENT

Commercial waste will be stored in the rubbish enclosure to the proposed one way unnamed lane and removed from that point by an authorised contractor engaged by the building owner. The rubbish enclosure will comply to Council specification.

The applicant proposes that building management would develop a Waste Management Plan for the building that would identify responsibilities for the collection of recyclables, the operation of the garbage storage area, the containment of unwanted odour, and maintaining a liaison with the rubbish collector.

5.9 TRAFFIC NOISE

As explained in Section 4.11 of this report, the noise generated by local traffic is not extraordinary when compared to the surroundings.

This context, together with the proposed use - i.e. commercial, which is less sensitive than residential - results in a development that, it is anticipated, will not require any special sound reduction measures.

5.10 ECOLOGICALLY SUSTAINABLE DESIGN

This proposal recognises the value of consideration of energy efficiency in the design of the building, the construction energy required to build it, the operational energy needed to ensure its proper functioning and, within the constraints of the site, seeks to address these concerns in the following fashion:

- Where good solar access is possible, i.e. to the north and west, appropriate sun shading is proposed to limit the heat load imposed on the building.
- The nature of the open plan, and column configuration of the first and second levels are designed to ensure that natural ventilation is encouraged.

5.11 SECURITY

Access to the various individual portions of the development will be achieved via standar electronic means that will be discrete but effective. These measures are summarised below:

- Security card access to car park via motorised roller shutter.
- Security video/voice intercom at the main door to allow the users to screen and remotel permit access to the entry lobby after hours.
- Visual security to the east and south is achieved by windows to the first and second leve which directly overlook the lane ways.

5.12 DEVELOPMENT STATISTICS

Refer Drawing A.01 for area calculations.

6.0 ENVIRONMENTAL EFFECTS ASSESSMENT WITHIN REQUIREMENTS OF PLANNING INSTRUMENTS

This section will discuss issues and aspects raised for consideration/addressing within the constraints imposed by the Planning Policies that apply to the site. The relevant instruments consist of:

- The South Sydney Plan made up of:
  - South Sydney Local Environmental Plan 1998 (LEP)
  - South Sydney Development Control Plan 1997: Urban Design (DCP)
- South Sydney Council Development Control Plan No. 11 "Transport Guidelines for Development 1996".

In addition to these instruments the report will incorporate reference to the Master Plan for disposal of sites associated with the Eastern Distributor.

6.1 SOUTH SYDNEY LEP

PART 3 – GENERAL RESTRICTIONS ON DEVELOPMENT

Item 18 – Zoning 9a – Arterial Road Reservation

Comment: With the completion of the Eastern Distributor, it is expected that land [illegible] shown to be surplus to this project will revert to the nearest adjacent zoning, which in this case is Zone No. 10 – Mixed Use. The proposal is consistent with the objectives stated..

PART 4 – SPECIAL PROVISIONS

Item 22 – Heritage aims

Comment: In accordance with 1(e) a development application has been lodged as the subject land is located within a conservation area.

Item 23 – Protection of heritage items, heritage conservation areas and relics

Comment: In accordance with 5 a Statement of Heritage Impact has been drafted and accompanies the Development Application.

Item 27 – Development of known or potential archaeological sites

Comment: Existing basement assumed to have eliminated any potential for archaeological deposits.

Item 28 – Built environment design principles and master plans

Comment: The proposal is consistent with the issues identified. Refer additional, more detailed comments in the discussion of the DCP.

Item 29 – Sub-division of land

Comment: It is proposed that a portion of the site be placed on a separate title to create a new one way laneway to the east of the site to link with the existing Egan Place. This would most likely take the form of a Section 94 Contribution.

Item 32 – Tree Preservation Orders

Comment: There are no existing trees on the proposed development site.

Item 37 – Non-residential development in Zone No. 1

Comment: The known past use of the currently vacant site was car parking. It is argued that the proposed development would not be appropriate for partial residential uses for the following reasons:

- *The site area and permitted floor space would render the commercial area uneconomical.*
- *The site's location over the tunnel exposes any residential development to vibration generated by the traffic below. It is not economically viable to reduce this vibration to within the limits set by the EPA.*

Item 38 – Flood liable land

Comment: The proposed development is not located in an area known to be flood liable. The presence of a drainage easement is incorporated into the design.

Item 39 – Contaminated land

Comment: The site is not known to have had a previous industrial use, and for the most part has been excavated and filled as part of the cut and cover tunnel. For this reason the site is not considered a risk with regard to contamination.

Item 49 – Eastern Distributor Tunnel

Comment: As the RTA is the site owner and proponent of the application it can safely be assumed that this proposal has the consent of the RTA.

6.2 SOUTH SYDNEY DCP 1997

6.2.1 PART B: URBAN DESIGN PRINCIPLES

Reinforce and protect the city's urban form settings.

Comment: The proposal is located in the 'north sector' which character is described as:

- *Residential/Mixed use.*
- *"Fine Grain" texture to relate to historical context.*
- *Place and streetscape are well defined with a sense of enclosure.*
- *Neighbourhood, community and street life.*

The proposal is consistent with those basic principles.

6.2.2 PART C: PUBLIC DOMAIN

Development supports and implements initiatives and improvements to the Public Domain.

The site is located with the Eastern Districts Public Domain Plan and it is noted as having the following opportunities:

- Urban village locality with defined thematic character.
- "Avenue" street type – Cathedral Street.
- Located adjacent to an active street frontage type.
- Key corner location.

Comment: The proposal addresses these opportunities to improve the public domain as follows:

- *Stated thematic character is reinforced in the building's design.*
- *Corner location acknowledged with a building of confident massing and articulation.*
- *Due to the presence of the tunnel and the consequent lack of topsoil it is feasible to plant street trees only to two locations not over the new tunnel.*

6.2.3 PART D: SOCIAL PLANNING DESIGN CRITERIA

Ensure that appropriate facilities and services are provided for current and future needs of the community and that the quality of life of the community is maintained and improved.

Comment: The proposal is non-residential and there has been no formal requirement to lodge a social impact study with this DA.

Access

The ground floor is "accessible" to wheelchair users via the main door to both commercial suites, and the WC facilities in this level will be part of a future application to Council. Due to the small scale of the development, and the proximity of the cut and cover tunnel underneath the proposal, no lift is proposed. However the access stair to the upper levels is designed for ambulant disabled users.

6.2.4 ENVIRONMENTAL DESIGN CRITERIA

Site Planning – Site Analysis

To ensure proper consideration of the characteristics of a site and its context to achieve compatible development that is well designed and makes a positive contribution to its surroundings.

Comment: Refer Site Analysis drawings in Section 4.2. Points considered include:

- *Site orientation with regard to climatic factors.*
- *Scale of surrounding buildings and type.*
- *Overshadowing, acoustics.*
- *Heritage.*
- *Street and block patterns.*
- *Public Domain opportunities.*

Site Planning – Site Layout

To achieve a site layout that considers the opportunities and constraints of the site, to provide a safe, convenient and attractive environment.

Comment: Refer Site Analysis drawings in Section 4.2.

Site Planning – Public Open Space
To ensure urban consolidation provides material public benefit.

Comment: Within the constraints and opportunities of the site the establishment of a one-way laneway is considered as an appropriate material benefit to the local traffic circulation and community.

Site Planning – Private Open Space
The design of private open space should focus on the quality of the space in terms of outlook, orientation, relationship with buildings size and shape, level of enclosure and landscape treatment.

Comment: The site constraints are such that the only opportunities for open space enhancements are in the form of a roof terraces to the north. It is anticipated that the users will occasionally inhabit this space and introduce a pleasant semi-domestic quality to the street.

Site Planning – Landscaping
Landscaping incorporates vegetation and existing features such as rock features, external paving, outdoor structures and furniture.

Comment: The site is clear of all existing vegetation and trees, two new trees are proposed to the footpath on the east and north elevation.

Site Planning – Parking, Access and Servicing
Accommodate cars and service vehicles with a view to reducing their potentially negative impact on the surroundings.

Comment: Separate section will discuss Council's DCP 11 – Transport Guidelines.

Splays to Corners of Site
Comment: This requirement is has been incorporated into the design of the proposal.

Site Planning – Stormwater Drainage
The stormwater drainage system is designed to ensure existing downstream systems are not adversely affected by new developments.

Comment: Council requires sites over 1,800 sq.m. to lodge with a DA a Local Drainage Management Plan. The proposed development is located on a site of 170m² in area thereby not triggering the requirement.

Site Planning – Site Contamination
For sites that are contaminated or potentially contaminated, an Environmental Site Assessment (ESA) is required.

Comment: With reference to Council's list of high risk land uses, the known past use – Residential – is not noted. Therefore it is assumed that the site poses little likelihood of being contaminated.

Site Planning – Site Facilities

To ensure site facilities are designed for easy access, to be visually attractive, and well integrated into the overall design of the development.

Comment: The various facilities associated with the site will be accommodated in the following manner within the proposed development:

- *Garbage: Central collection room located in the ground floor for commercial waste to be constructed to Council's specification.*
- *Mail boxes: To be integrated into an internally accessible location adjacent to the entry lobby on the ground floor.*
- *External storage areas: Not applicable.*
- *Recyclable materials: Rubbish room at ground floor will house recyclable waste containers prior to pickup by rubbish pickup company.*
- *Access to compost facilities: Not applicable.*
- *Satellite dishes, telecommunications, antennae: If required will be roof mounted outside the line of vision of pedestrians and all units will be connected to a single antennae.*

6.2.5 BUILDING FORM AND APPEARANCE

Building Envelope

Of primary significance in the successful integration of new development within existing precincts is the appropriateness of the scale of the new building to its immediate context.

Comment: Careful consideration has been given to the massing of the proposal. The primary parapet height , whilst not matching its immediate neighbours conforms to other more commercial developments in the immediate vicinity, and establishes a precedent for the continuation of the streetscape for future development to Palmer Street.

Floor Space Ratio

This ratio is used to indicate intensity of development.

Comment: The site is noted as being located in an area with a floor space ratio of 2:1. It is argued that, given the following issues, strict adherence to this figure is inappropriate:

- *The existing buildings in the location generally appear to exceed the ratio.*
- *The corner nature of the site provides valid reason for a development that is at least as big as its immediate neighbours.*

The FSR currently proposed is 2.6:1. Note that this is based on a site area that does not include that portion of the site dedicated to the new one way lane.

Height and Scale

To ensure buildings are an appropriate scale, compatible and complementary with areas of townscape significance.

Comment: The site is noted on Council planning documents as being in a location with a 12m-height limit. The development generally complies with this requirement. Refer Elevations for additional details.

Setbacks
The relationship and proximity of buildings to each other and to the street significantly influences the form of development and how it relates to the neighbourhood. Provide setbacks to protect adjacent buildings from overlooking and overshadowing.

Comment: As part of the application a new lane way is proposed to the east of the site providing a set back of 4.5 metres. Due to the site's configuration, namely north/south orientation with roadways to the north, west and lane-way to the east the potential for overshadowing will occur over the neighbouring eastern residential terraces. Shadow diagrams have been prepared for the dates of 22 June, and 22 September 2000, for the times of 9am, 12 noon, and 3pm. It is assumed that since the site is currently vacant existing shadow diagrams are unnecessary.

Façade Treatment
Building facades reinforce the character and continuity of the streetscape by recognising contextual clues. The façade, roof and materials of buildings should contribute to harmonious and robust streetscapes. Façade treatment should respond to environmental conditions.

Comment: The façade treatment has been addressed in 4.5 Heritage Impact Statement.

Signage
Signage should act as a unifying element in the streetscape.

Comment: Signage is not included in this application. It is anticipated that future users will make a separate application to Council.

6.2.6 HERITAGE AND CONSERVATION

Addressed elsewhere in Section 4.5 of the report.

6.2.7 AMENITY

Visual and Acoustic Privacy
The need for both visual and acoustic privacy should be considered when deciding the location of a building, the room layout, the location of windows, private open space and landscaping.

Comment: The only area of perceived lack of visual privacy is with regard to the windows to the east elevation overlooking the rear of the adjacent terraces. The windows do however increase the visual security of the area.

For these reasons, it is anticipated that potential privacy issues have been addressed and minimised.

Safety and Security
Streets, sites and buildings can be designed to discourage crime and increase occupants' sense of security.

Comment: In a general sense the development, by filling a currently vacant site, contributes greatly to the community's sense of security. This is reinforced by the presence of windows to both the east and south frontages thereby allowing the possibility of casual surveillance of the rear lanes, and rear adjacent properties by the users of the proposed building.

Access and Mobility
Addressed elsewhere in the report.

Fire Regulations
To ensure building design includes adequate fire safety measures.

Comment: The building has been designed to comply with the requirements of the Building Code of Australia. Note that specific detail as to service requirements of the BCA have not been addressed as that level of detail is more appropriately addressed at the Construction Certificate stage. However, their inclusion is not seen as problematic.

6.2.8 ENERGY EFFICIENCY

Energy efficient site layout and building design and construction
To encourage use of energy from renewable sources.
To encourage site planning and building design that optimises site conditions to achieve energy efficiency.
To ensure reasonable solar and daylight access to within the building.

Comment: The orientation and internal layout of the proposal is, as much as possible given the surrounding development patterns, designed to minimise energy useage by employing a number of recognised features, namely:

- *Providing good solar access to the work spaces which is shaded to limit potential overheating.*
- *Generous floor to ceiling heights which encourage air flow and circulation.*
- *The building will have adequate insulation to ensure heat rejection in summer and retention in winter.*

6.3 SOUTH SYDNEY COUNCIL: DEVELOPMENT CONTROL PLAN NO. 11 – TRANSPORT GUIDELINES FOR DEVELOPMENTS 1996

This section of the report is formatted in accordance with the requirements advised in 2.2 Transport Information to accompany Development Applications.

6.3.1 TRANSPORT FACILITIES INCLUDED IN THE DEVELOPMENT

It is proposed to provide 4 car park spaces that are accessed via a motorised roller shutter from the proposed laneway (with the assistance of a motorised vehicle turntable), and 7 car spaces accessed from St Kilda Lane, including 1 accessible space.

6.3.2 GUIDELINE PARKING REQUIREMENTS

The criteria of the DCP guidelines, when applied to the specifics of this development, generate the following car parking requirements.

Office/Commercial • 1797m² GFA @ 1/125 m² GFA	14.3 car spaces
Servicing • 1 car + 1 motor cycle (nom.)	1 car space 1 motor cycle space
Total required	**15.3 car spaces** **1 motor cycle space**
Total provided	**11 car spaces**

The criteria of the DCP guidelines when applied to the specifics of this development generate the following bicycle parking requirements:

Office/Commercial • 1 space per 20 staff – reference to BCA Table D1.13 gives an estimated staff population of 180	9 bicycle spaces
Total required	**9 bicycle space**
Total provided	**9 bicycle space in locked room**

Car spaces are sized 2.4 x 6.0 (generally), and 3.1 x 6.0 (accessible).

Resolution of car parking:

Total required	15.3 car spaces 1 motor cycle space 9 bicycle space
Total provided	11 car space 9 bicycle space

Reasons for the departure from Guideline Rates

- Public Transportation: The site is well placed to take advantage of the following public transport nodes/transitways:
  - William Street is a trunk bus route and due for improvement with the completion of the proposed dedicated bus lanes to the Cross City Tunnel project.
  - Reasonable proximity to both Kings Cross Station and St James Station via the Domain Car Park moving walkway.
  - Close proximity to the Domain Car Parking Station.
- Intrusive impact on the streetscape: The provision of 4to 5 more off-street car spaces along the new lane will result in a building form of extended roller shutters and louvre grilles which is at odds within the existing heritage setting.

6.3.3 Access Arrangements

Urban Design

Car park entry is via the rear lane and there are ventilation louvres proposed for both the St Kilda Lane and unnamed lane. These approaches are consistent with Council policy.

Driveway Locations

The criteria outlined by Council is addressed as follows:

- All vehicles should enter and leave in a forward direction – The development does not comply, however the use of a motorised vehicle turntable and the dead end nature of St Kilda Lane result in a very slow moving traffic environment. It is anticipated that departure from this criteria will not cause undue problems with respect to traffic flow and safety.
- Site entry should be located to cause least interference – Development complies.
- No direct access to arterial and sub-arterial roads – Development complies with the proposed one way lane.
- No driveway at an angle less than 60° to kerb line – Development complies.

Sightline Distance

Traffic speeds in laneways are typically low and this characteristic, when combined with a site accessed via a lane as is the case in this proposal, will result in a very low traffic speed environment. For this reason it is anticipated that safety issues resulting from inadequate sightline distances will not result.

6.3.4 Traffic Generation, Directional Distribution

Reference to Council's guide for determining traffic generation, the following outcomes result.

Week day peak hour trips

Office and Commercial = 2 per 100m^2 GFA.

i.e. 2 x 18 = 36 per hour

Daily vehicle trips

Office and Commercial = 10 per 100m^2 GFA.

i.e. 10 x 18 = 180 per day.

It is anticipated that the visitor/retail car parking will not significantly impact these generation outcomes.

St Kida Lane and the proposed one way lane discharge into Bourke Street which, due to the completion of the Eastern Distributor, is now a less heavily trafficked road, and further up into Palmer Street. It is anticipated that the extra traffic the development generates will not significantly affect the newly reduced traffic pattern in the area.

6.3.5 State Environmental Planning Policy No. 11 (SEPP 11)

It is believed that, as the proposal is below the threshold described in both Schedules 1 and 2 of SEPP 11, notification by Council of the RTA is not required.

6.4 THE MASTER PLAN FOR AREAS AFFECTED BY THE EASTERN DISTRIBUTOR

The master plan is a document which plots the outcome of applying existing Council policy (namely the LEP and DCP) to the specific sites deemed 'residual' and earmarked for disposal by the RTA.

In the context of this site (denoted as Site 2), the master plan has proposed the development of a 2 to 3 storey commercial type building, with a height limit of 12 metres, and an FSR of 2:1, with a parking requirement for a maximum of 10 cars (8 proposed), and minimum 7 bicycles..

The master plan for Site 2 shows a possible massing form that is driven by streetscape/heritage issues.

The approach advocated in the master plan has been adopted in this proposal.

7.0 APPENDIX

- 7.1 HYDER STRUCTURAL ASSESSMENT
- 7.2 COMPUTER 3-D MODEL
- 7.3 SHADOW DIAGRAMS
- 7.4 SURVEY INFORMATION

Eastern Distributor, Sydney Structural Assessment of Development Sites in Woolloomooloo and East Sydney

Author:	Paul Lovarini	P. Lovarini
Approver:	Paul Lovarini	P. Lovarini

NT007F3E.doc 26 April 2000

This report has been prepared for Evans & Peck Management on behalf of the Roads & Traffic Authority of NSW in accordance with the terms and conditions of appointment for Eastern Distributor, Sydney Structural Assessment of Development Sites in Woolloomooloo and East Sydney dated . Hyder Consulting (Australia) Pty Limited cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

Hyder

1 Summary

At the request of Evans and Peck, Hyder Consulting have reviewed documentation in relation to the Eastern Distributor project in order to provide structural engineering advice for various potential development sites. A review of relevant documentation supplied (refer to Appendix 1) in conjunction with some preliminary structural analysis has resulted in an assessment of:

i) the structural load capacity of the various sites

ii) the fire resistance level of the prestressed concrete roof structures in the cut and cover tunnel sites.

The fire resistance level has been determined in accordance with AS3600-1994 the Australian Concrete Structures Code. The Building Code of Australia does not prescribe fire resistance levels for tunnel structures and consequently we cannot comment on the adequacy of the fire resistance levels achieved. However, it may be prudent to undertake a fire/explosion risk assessment particularly if dangerous goods are transported through the tunnels.

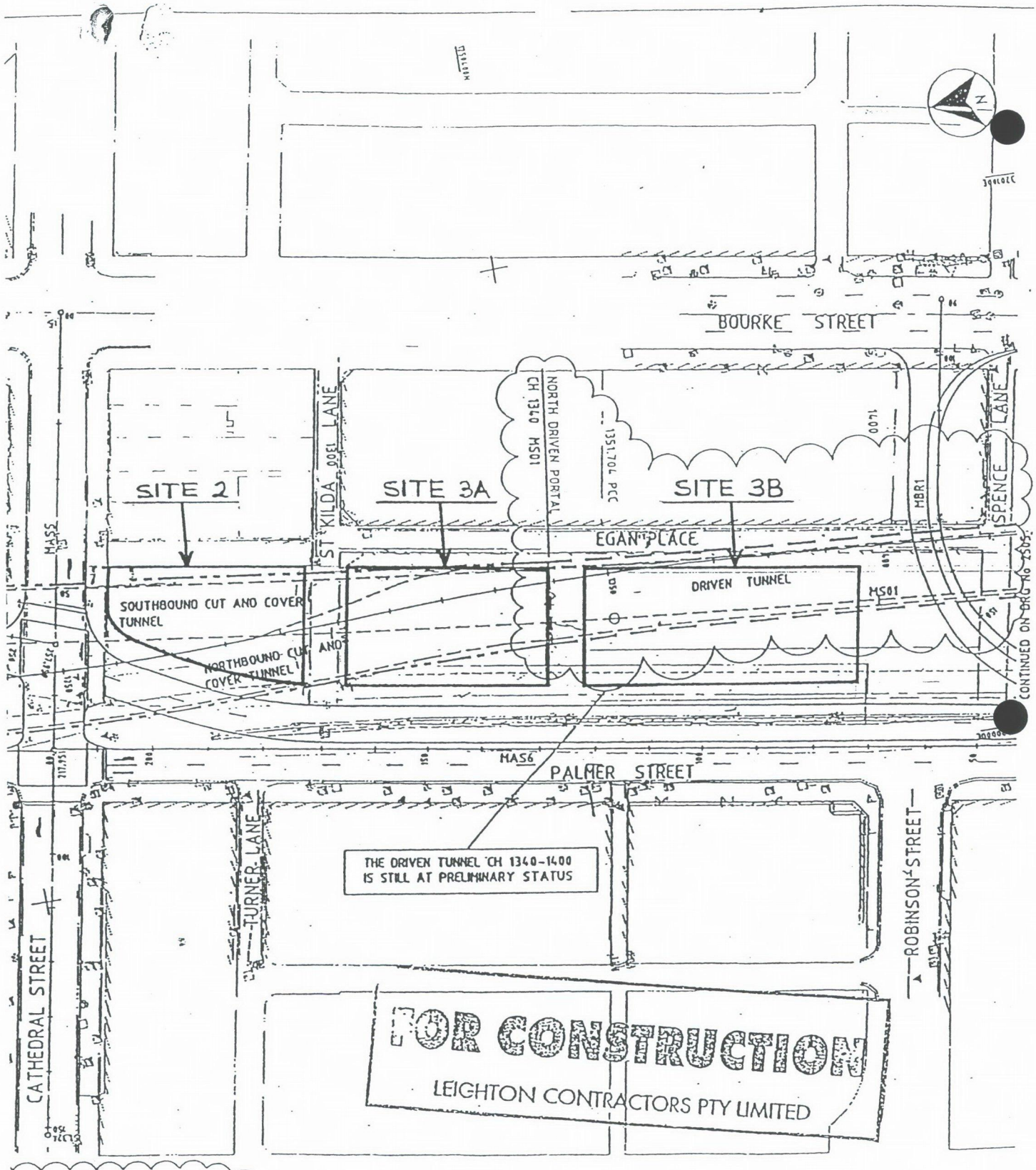
This report should be read in conjunction with the report prepared by Jackson Teece Chesterman Willis, titled: Eastern Distributor in Woolloomooloo and East Sydney, Surface Works and The Redevelopment of Residual Lands and Air Rights, Master Plan.

4 Site 2

- The site is located above a cut and cover tunnel with the tunnel roof comprised of precast pretensioned concrete planks and girders with an insitu concrete topping. Refer to the Sites 2/3 Plan.
- The additional allowable live load capacity of the tunnel roof structure is estimated to be in the range of 24kPa to 32kPa for load factors of 2.0 and 1.5 respectively. This assumes removal of all overburden material.
- The site could accommodate a three-storey development as described below, which would impose the following loads:

Concrete Ground Floor level with lightweight partitions	9kPa
Concrete First Floor level with lightweight partitions	2 x 9kPa
Lightweight Metal Deck Roof	1 kPa
	28 kPa

- The site could also accommodate two-storey development as described for Site 1A.
- The impact of vibration and noise may need to be assessed for this site and vibration/acoustic isolation measures may need to be incorporated into the future development.
- In the event that the imposed loads from a development exceeds the capacity of the tunnel roof it does not appear feasible to bridge over the tunnel, except along the eastern edge, where it may be possible to construct foundations and columns outside the tunnel alignment, subject to boundary clearances. Strengthening of the tunnel roof structure at a future date would also not be feasible.
- The tunnel roof structure comprises of pretensioned concrete planks of type TF3, and TF4 with 67mm of concrete cover and also comprises of pretensioned girders with 81mm of concrete cover. These structural elements achieve a 4 hour fire resistance level.



NOTES:

1. FOR GENERAL NOTES REFER DRG. No. 1005.
2. FOR COMBINED SERVICES LAYOUT REFER DRG. No. 2003.
3. FOR SERVICE RELOCATIONS REFER DRG. No. 2054.
4. FOR TYPICAL CROSS SECTIONS REFER DRG. No. 2573.
5. FOR DRAINAGE LAYOUT REFER DRG. No. 3104
6. FOR PAVEMENT LAYOUT REFER DRG. No. 3204.
7. FOR LINEMARKING AND SIGNS REFER DRG. No. 3304.
8. FOR STREET LIGHTING AND ROAD FURNITURE LAYOUT REFER DRG. No. 3404.

SITES 2/3 PLAN

Scale 1:1000 Approx.

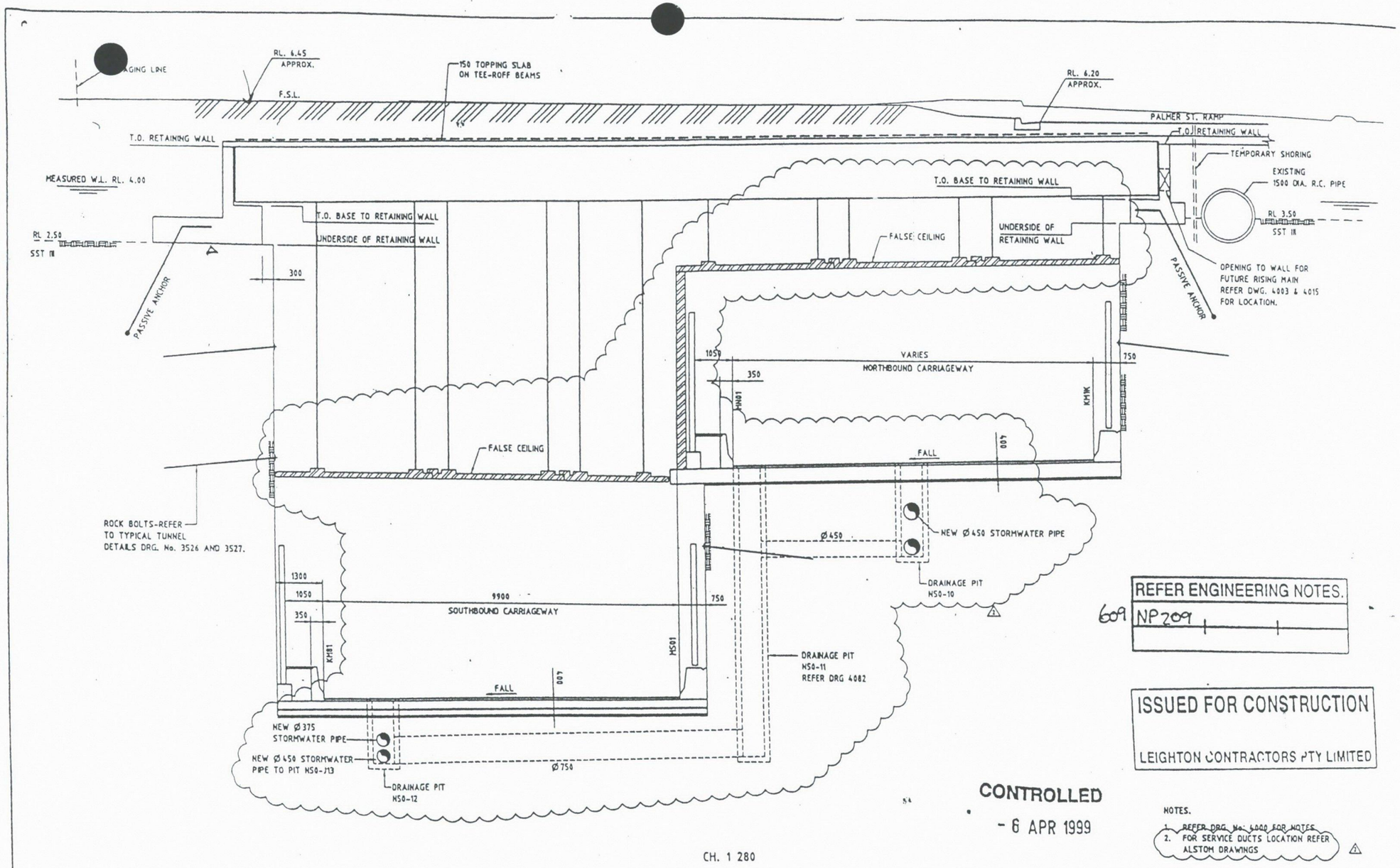
Leighton Contractors Pty Limited
Level 10, 12 Help Street
Chatswood NSW 2067
Australia

EASTERN DISTRIBUTOR

NORTHERN

ALIGNMENT PLAN

CH. 1050 - 1400 MS01



REFER ENGINEERING NOTES.

609 NP209

ISSUED FOR CONSTRUCTION

LEIGHTON CONTRACTORS PTY LIMITED

CONTROLLED

- 6 APR 1999

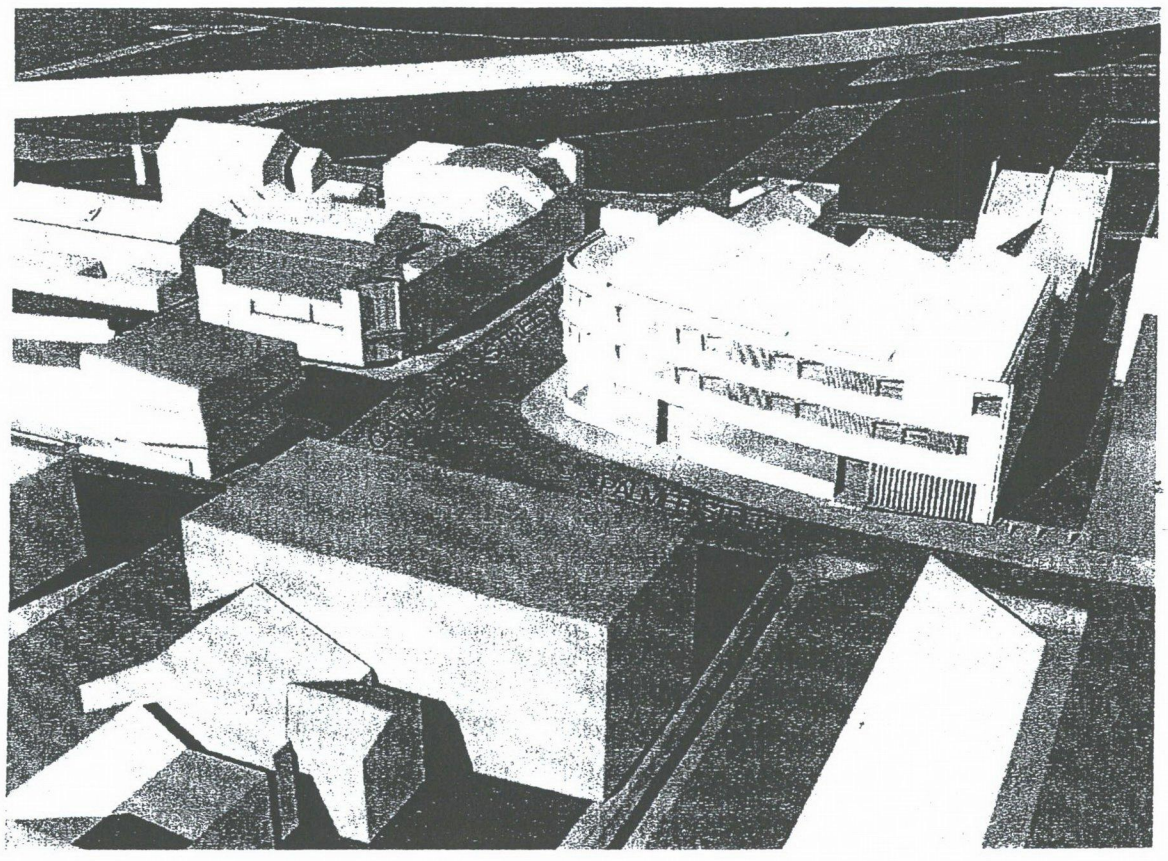
NOTES.

1. REFER DRG. No. 4000 FOR NOTES
2. FOR SERVICE DUCTS LOCATION REFER ALSTOM DRAWINGS

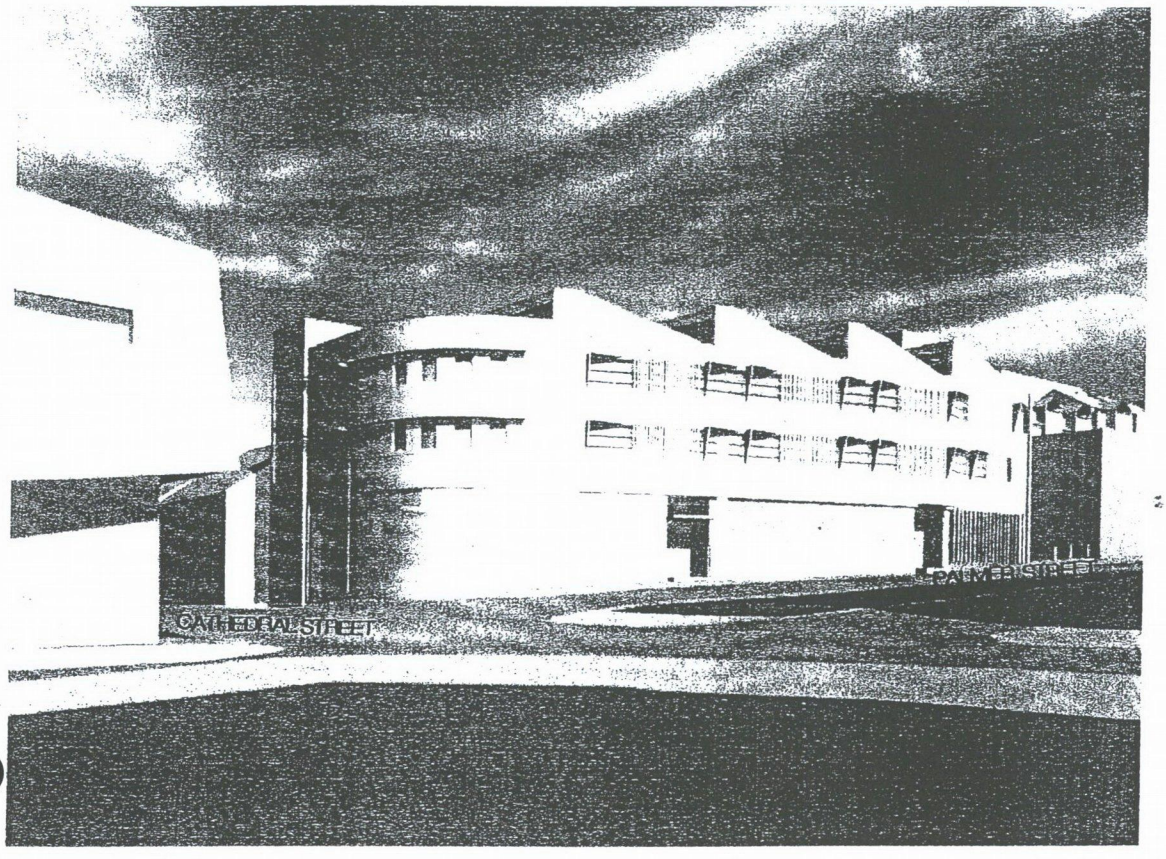
CD 2	02.03.99	KERB AMENDED, DRAINAGE & FALSE CEILING ADDED, SLAB MODIFIED, WVR: N-CCT-78
CD 1	29.09.97	EXIST. PIPE ADDED WVR: N-CCT-28 & 38
CD 0	11.04.97	ISSUED FOR CONSTRUCTION WVR: N-CCT-34
WO E	03.8.97	RE-ISSUED FOR APPROVAL
WO D	22.7.97	ISSUED FOR APPROVAL
PO C	09.7.97	ISSUED FOR REVIEW AND COMMENTS
PO B	24.6.97	GENERAL DESIGN DEVELOPMENT

Maunsell

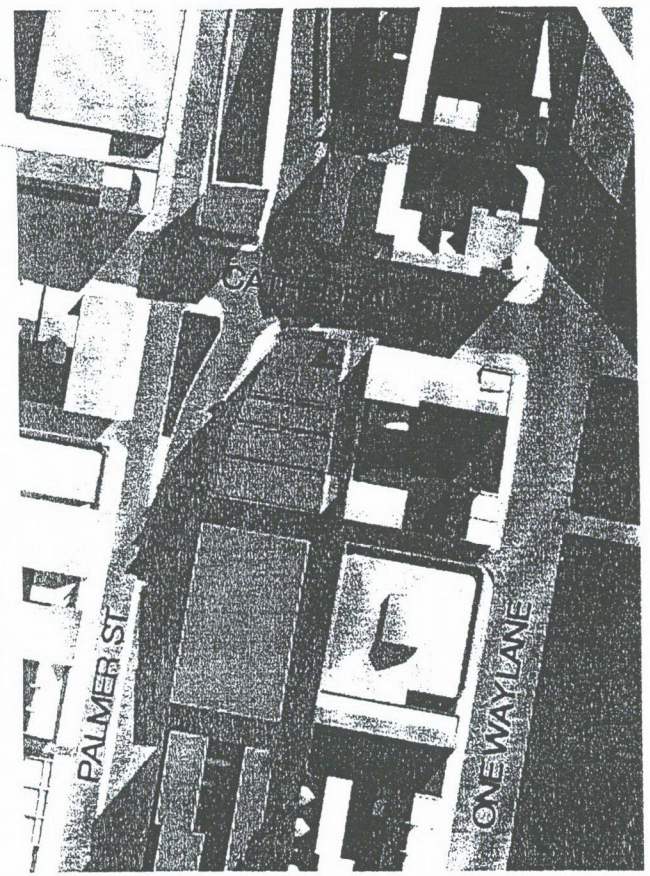
LEIGHTON Leighton Contractors



Aerial view looking east.



Street level view looking southeast.



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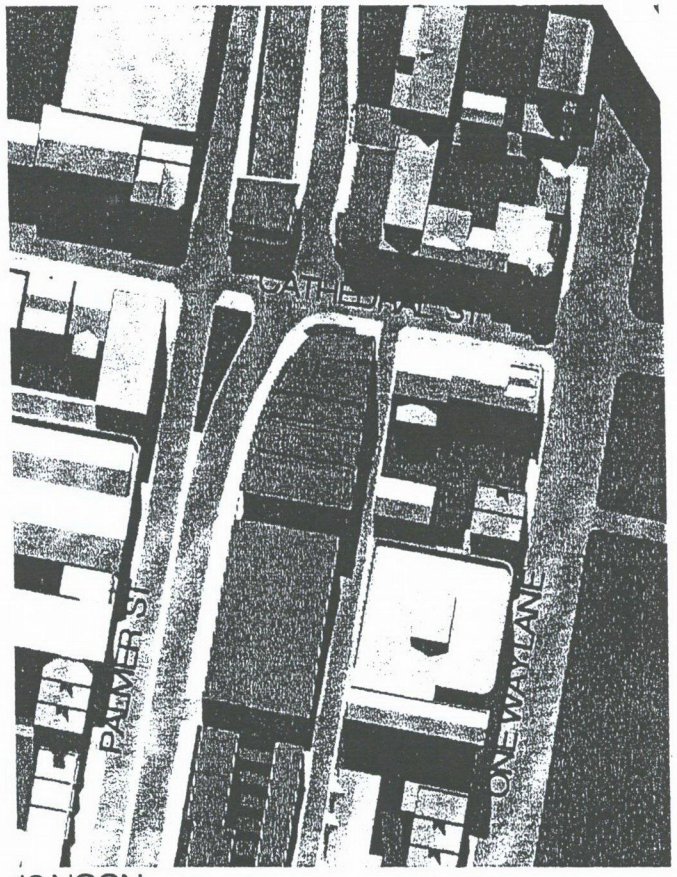

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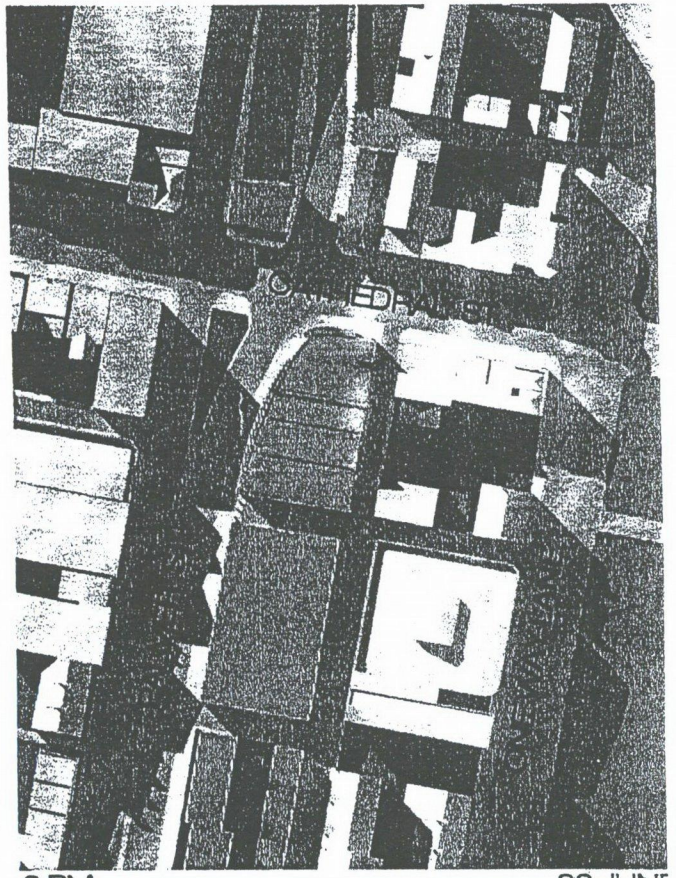

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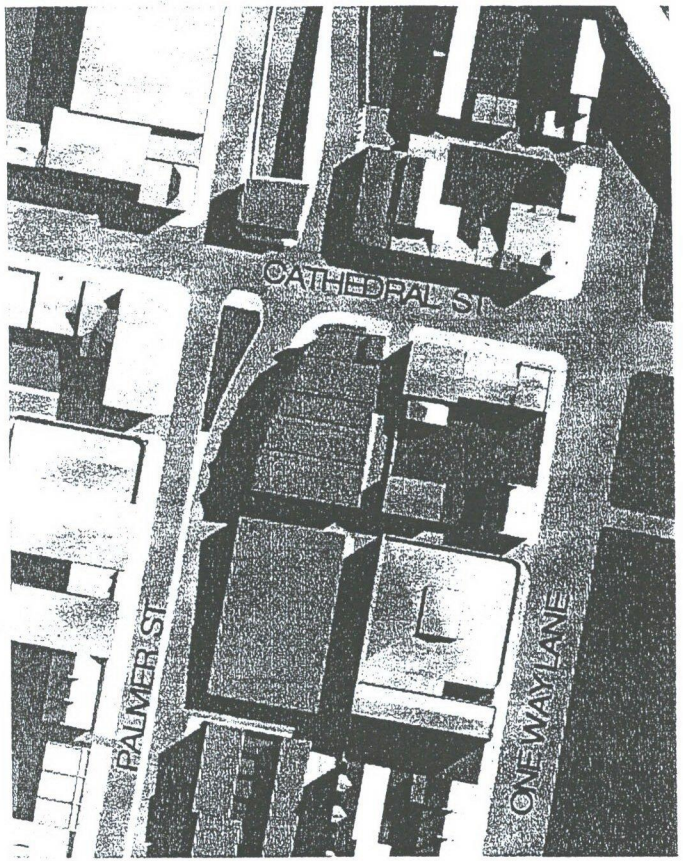
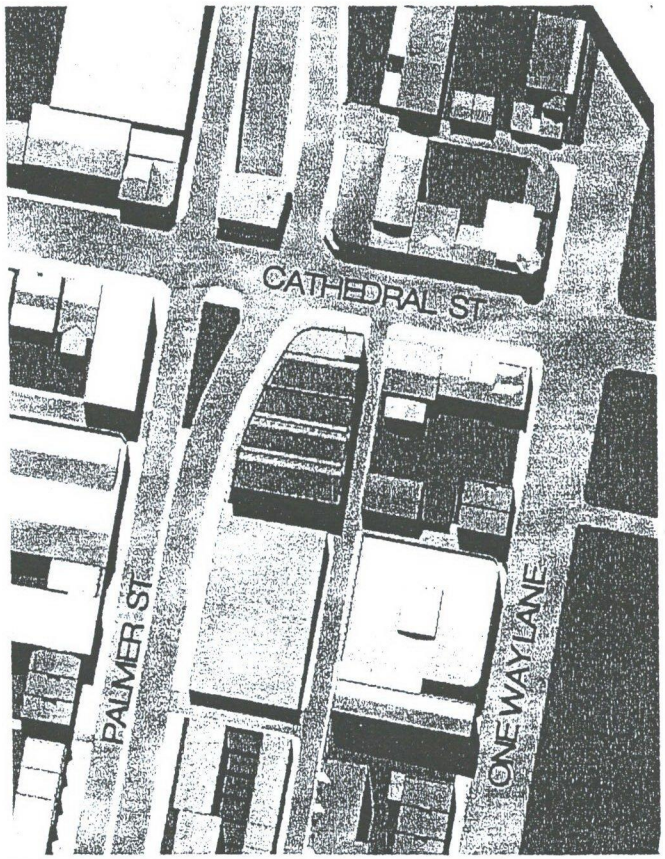


9 AM



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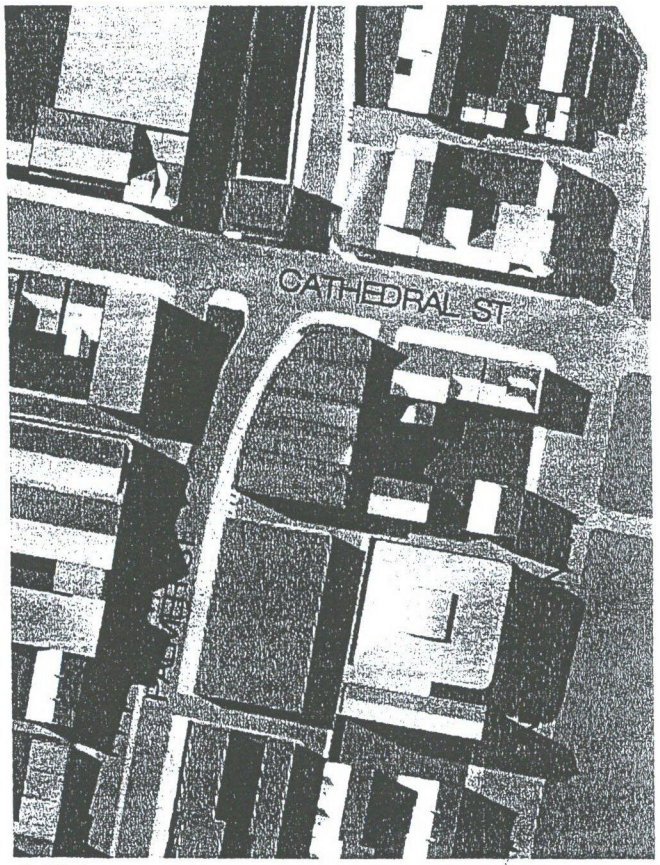

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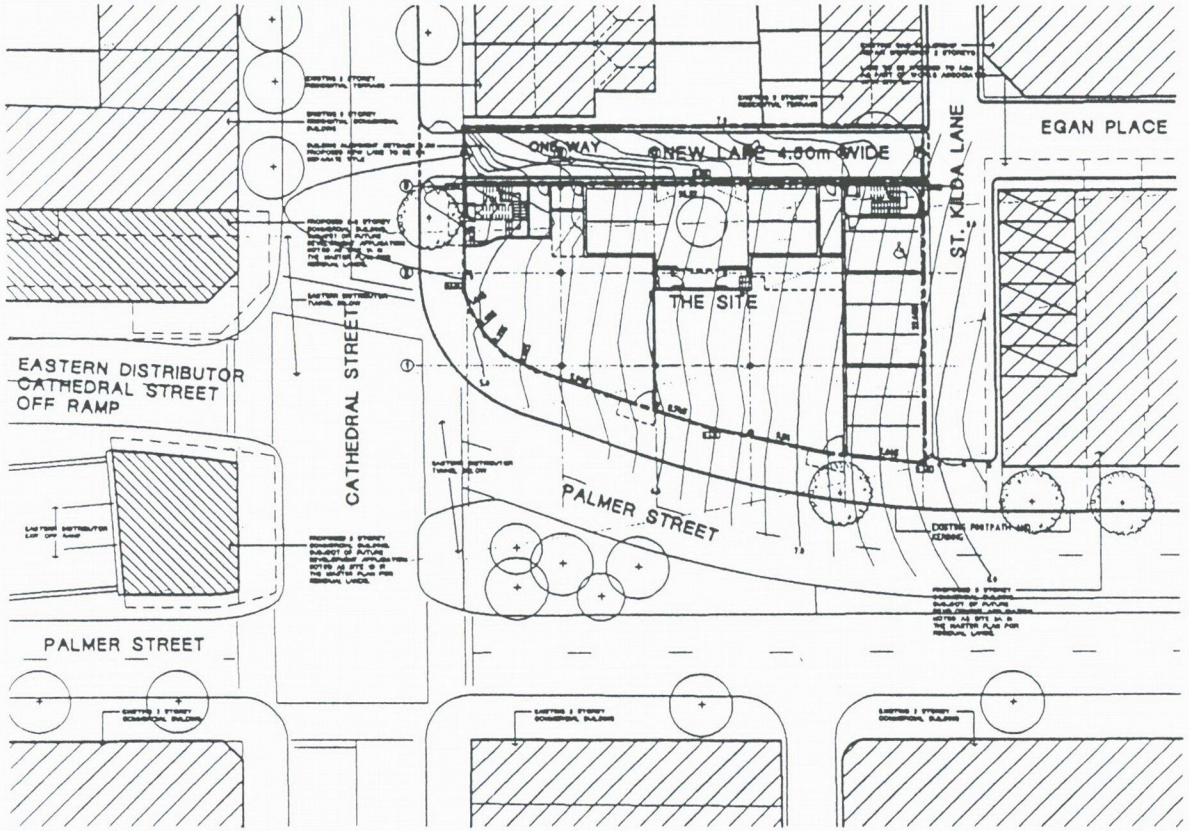
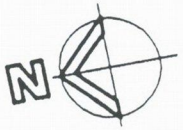
22 SEP.





FSR CALCULATION
AREAS APPROXIMATE

SITE AREA (EXCLUDING PROPOSED LANEWAY)	=683m²
PERMITTED FSR	=2:1
PERMITTED GFA	=1366m²
PROPOSED	
GROUND FL GFA	=431m²
FIRST FL GFA	=683m²
SECOND FL GFA	=683m²
TOTAL GFA	=1797m²
PROPOSED FSR	=2.6:1

NOTE:
LEVELS / BOUNDARY INFORMATION TAKEN FROM RTA SURVEY TITLED

KEY
- EXISTING RL TO AHD
- EXISTING STREET TREE
- NEW STREET TREE SPECIES, SIZE AND FOOTPATH TREATMENT TO COUNCIL SPECIFICATION INSTALLATION BY COUNCIL

Rev. No.	Revision Description	Approved	Date
A	DEVELOPMENT APPLICATION		03.11.00

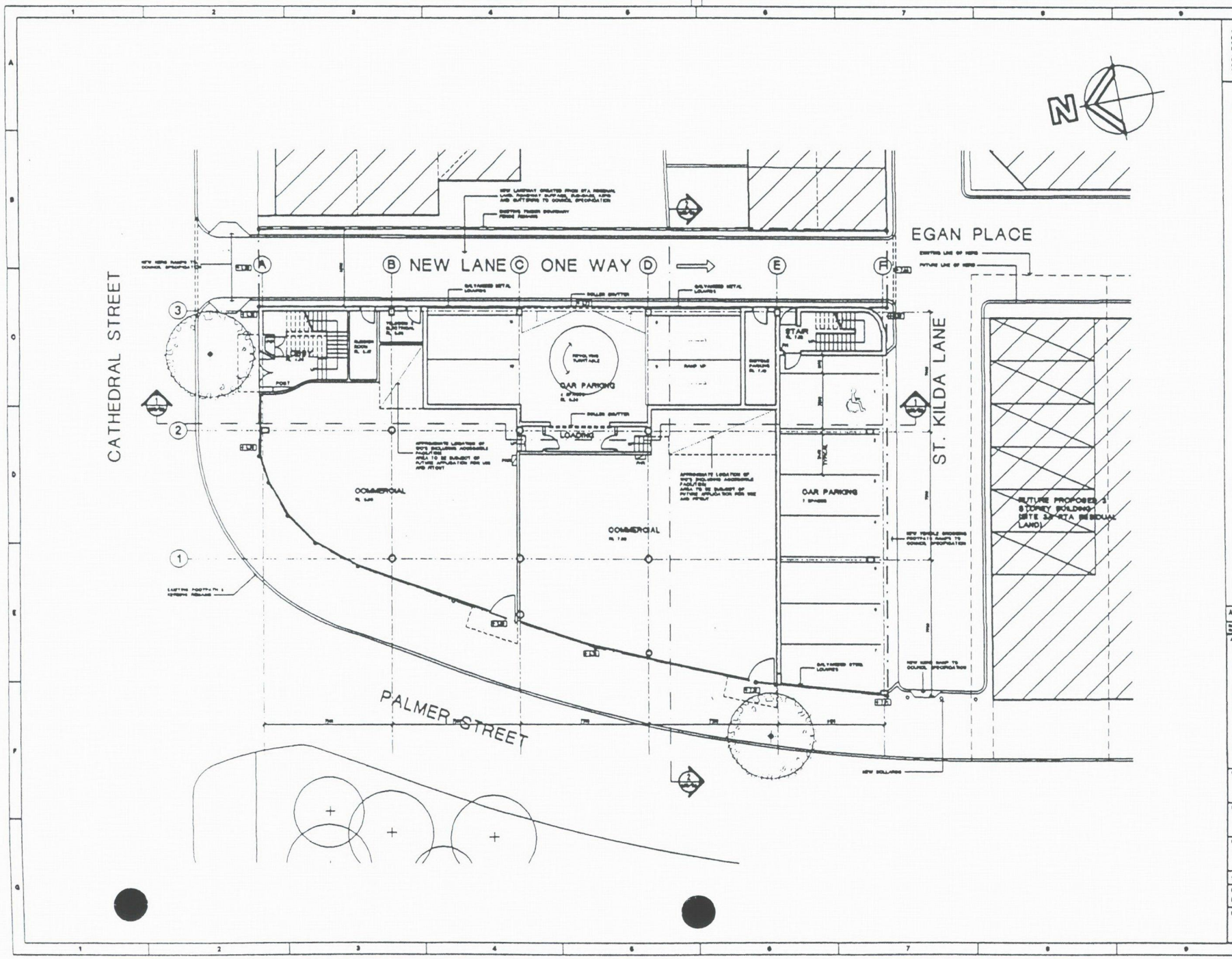
Architects
JACKSON TEECE CHESTERMAN WILLIS A.C.N. 053 837 200
PTY LTD

Client
The Roads and Traffic Authority of New South Wales

Project
Commercial Development
191 Cathedral Street, WOOLLOOMOOLOO
Corner of Palmer & Cathedral Streets

Drawing Title
SITE PLAN

Scale 1:100
Drawn SM
Date NOV 2000
Project Number 99.020RTA
Drawing Number A.01 / DA
Revision A



KEY

-EXISTING RL TO AHD

-EXISTING STREET TREE

-NEW STREET TREE SPECIES, SIZE AND FOOTPATH TREATMENT TO COUNCIL SPECIFICATION INSTALLATION BY COUNCIL

Rev. No.	Description	Approved	Date
A	DEVELOPMENT APPLICATION		10.11.00

Architects

JACKSON TEECE CHESTERMAN WILLIS A.C.N. 053 637 290 PTY LTD

Client

The Roads and Traffic Authority of New South Wales

Project

Commercial Development
191 Cathedral Street, WOOLLOOMOOLOO
Corner of Palmer & Cathedral Streets

Drawing Title

GROUND FLOOR PLAN
RL 5.00 & RL 7.20

Scale 1:100

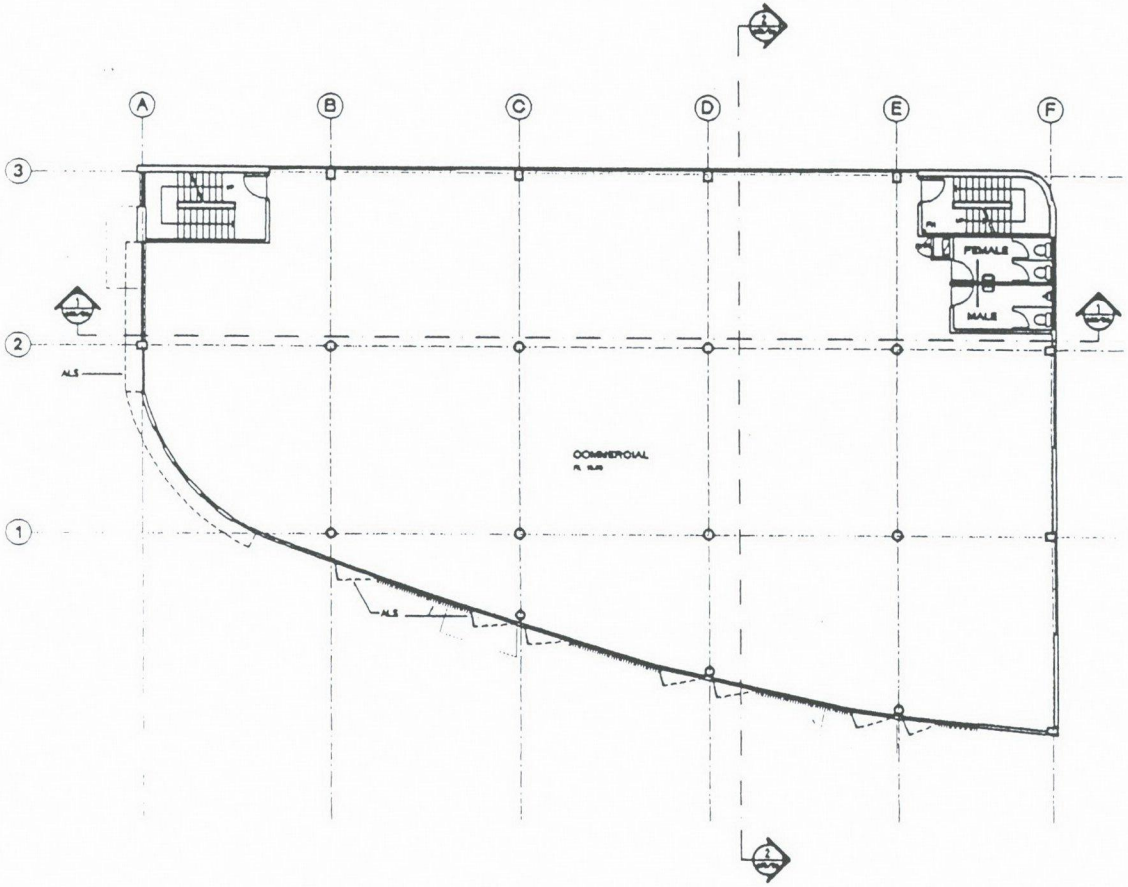
Project Number 99026 (2)

Drawn PK

Date OCT 2000

Drawing Number A02/DA

Revision A



N

KEY

ALS - ANODISED ALUMINIUM SUNSHADING

A	DEVELOPMENT APPLICATION	30.11.99

JACKSON TEECE CHESTERMAN WILLIS A.C.N. 083 837 290 PTY LTD

Client: The Roads and Traffic Authority of New South Wales

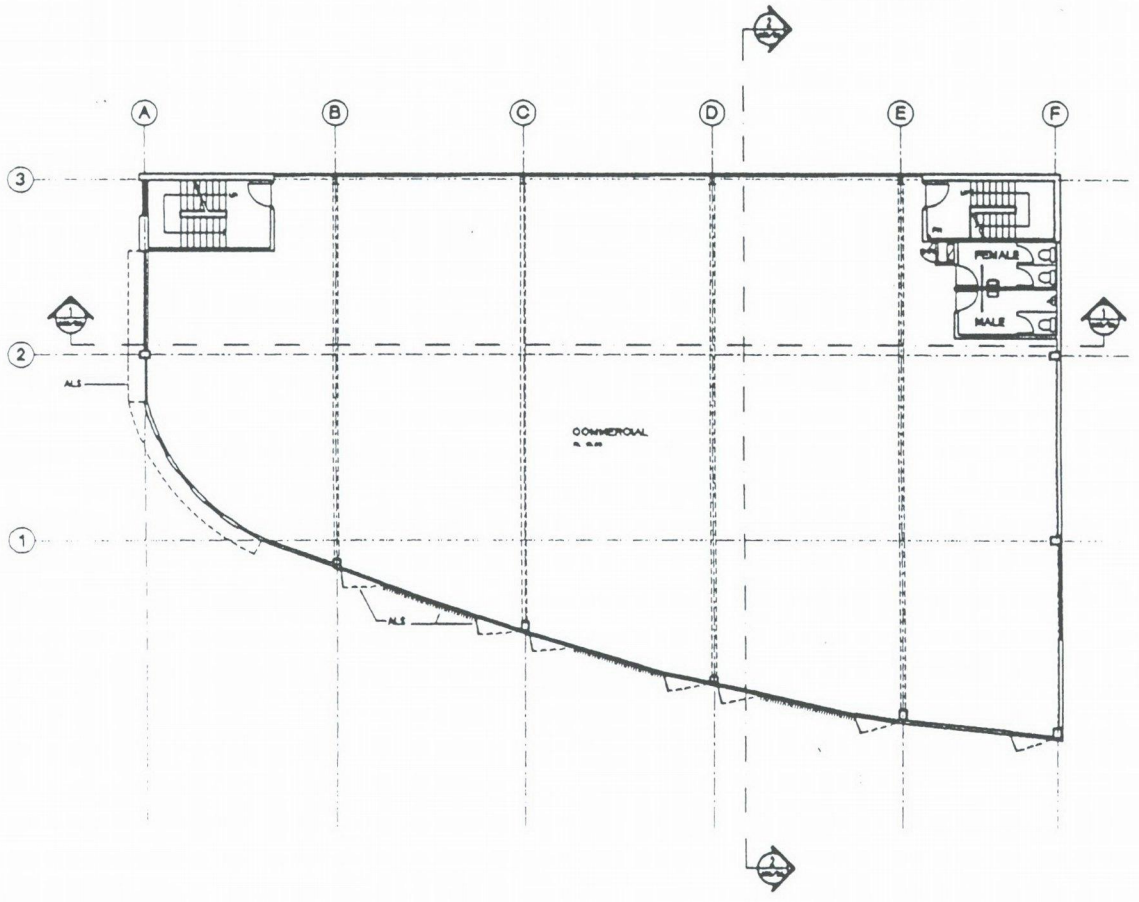
Project: Commercial Development
191 Cumberland Street, WOOLLOOMOOLOO
Corner of Palmer & Cumberland Streets

Drawing Title: FIRST FLOOR PLAN
RL 18.59

Scale: 1:100 | Project Number: 990218 (2)

Drawn: PC | Date: OCT 1999

Drawing Number: A03/DA | Revision: A



KEY

ALS - ANODISED ALUMINIUM SUNSHADING

A	DEVELOPMENT APPLICATION	13.11.98

JACKSON TEECE CHESTERMAN WILLIS A.C.N. 003 637 300 PTY LTD

Client: The Roads and Traffic Authority of New South Wales

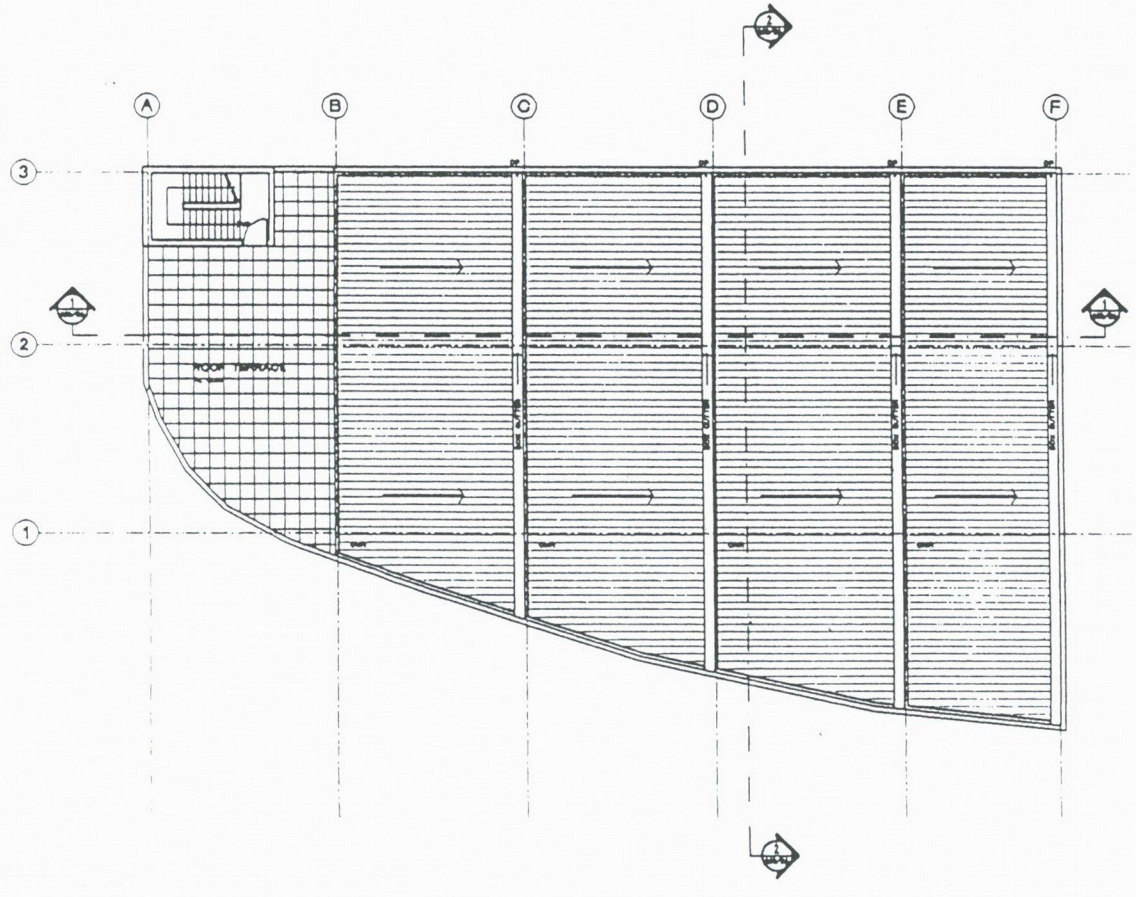
Project: Commercial Development
191 Cathedral Street, WOOLLOOMOOLOO
Corner of Palmer & Cathedral Streets

Drawing Title: SECOND FLOOR PLAN
RL 13.50

Scale: 1:100 | Project Number: 99026 (2)

Drawn: PE | Date: OCT 1998

Drawing No: A04A | Revision: A


A
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ROOF TERRACE
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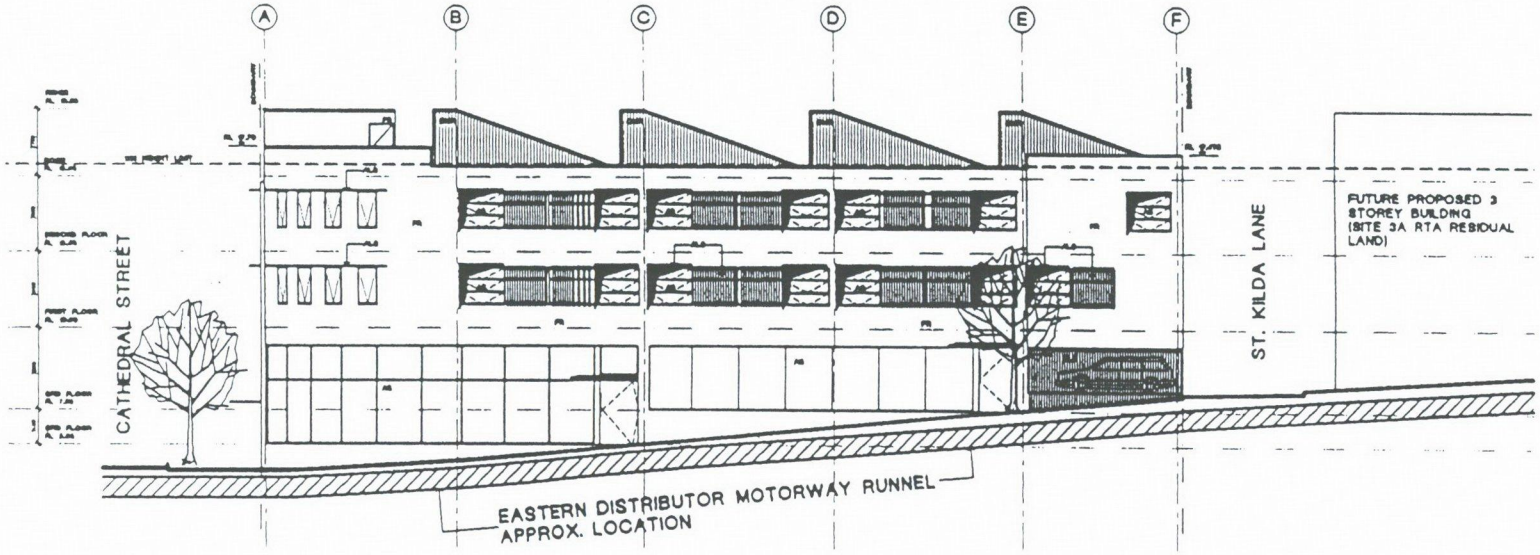
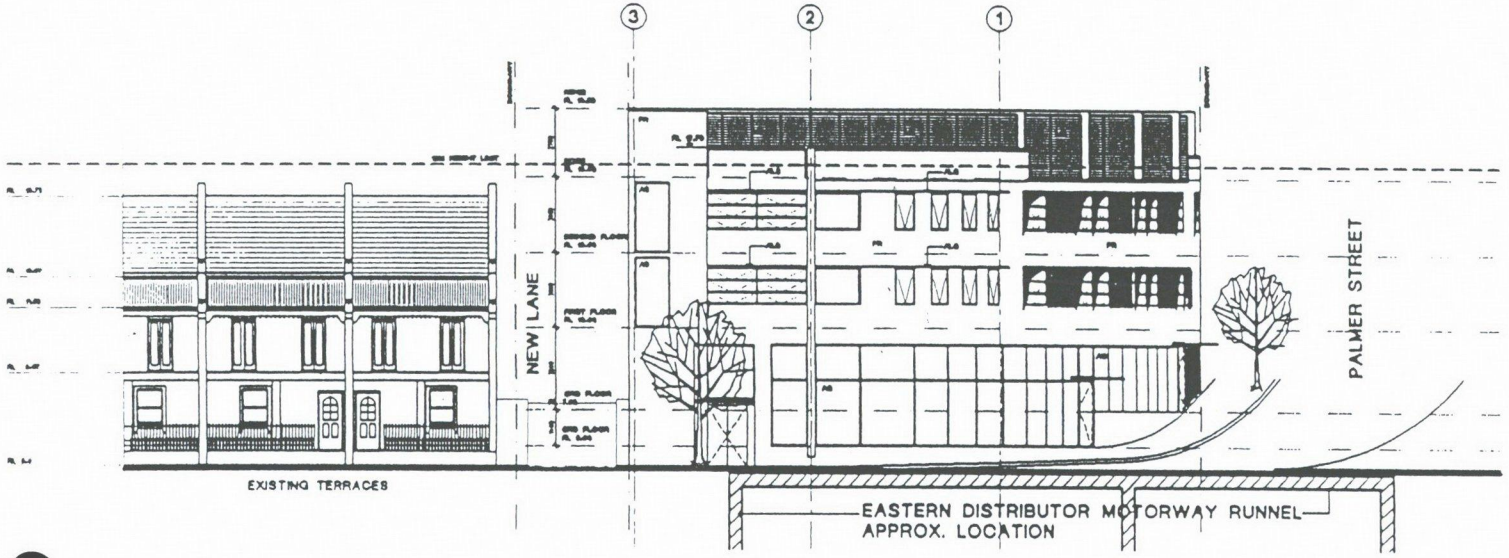
DP
DP



1 ELEVATION
PALMER STREET



2 ELEVATION
CATHEDRAL STREET

KEY

CMR -COLOURBOND FINISHED METAL ROOFING
ALS -ANODISED ALUMINIUM SUNSHADING
BLS -ANODISED METAL LOUVRES SCREEN
LG -LOUVRES GLASS WINDOWS
AS -ALUMINIUM WINDOW CLEAR GLAZING
PR -PAINTED RENDER

Rev. No.	Description	Approved	Date
A	DEVELOPMENT APPLICATION		10.11.99

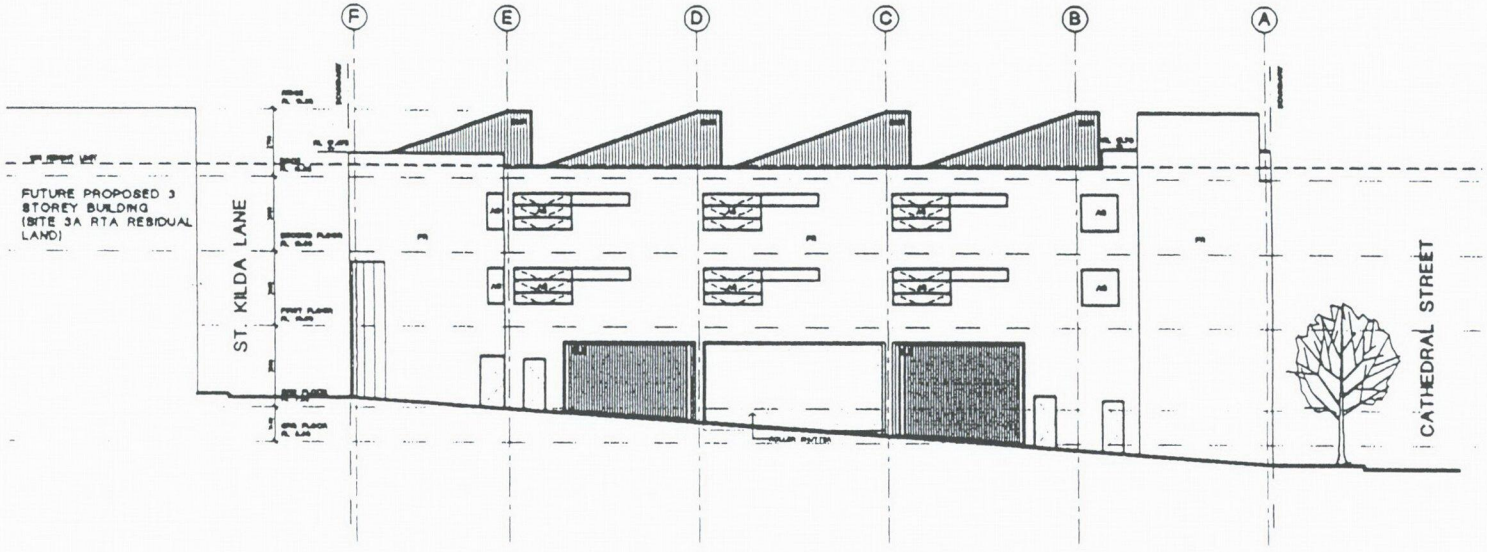
Architects
JACKSON TEECE CHESTERMAN WILLIS A.C.N. 083 837 290
PTY LTD

Client
The Roads and Traffic Authority of New South Wales

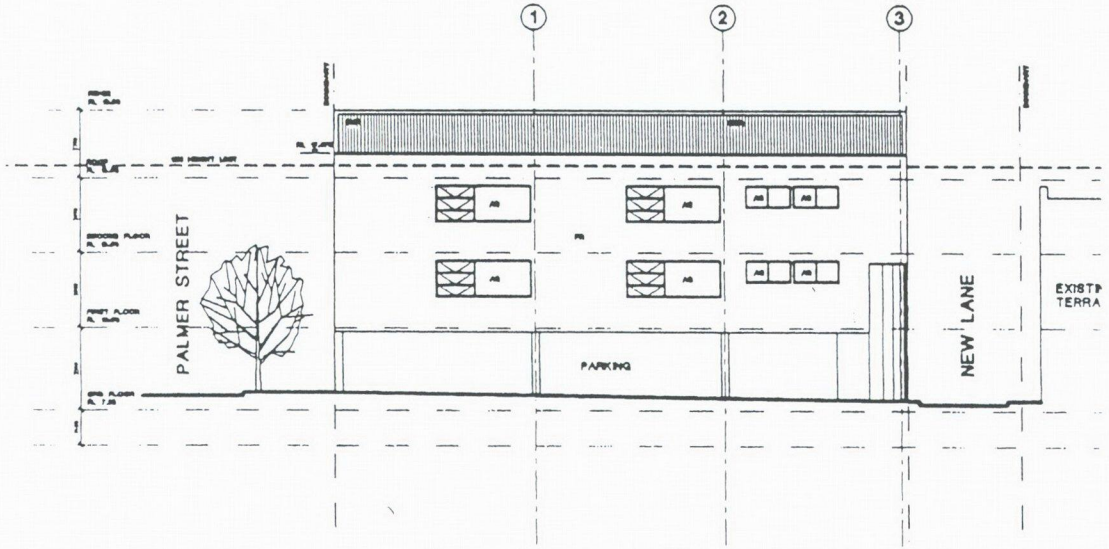
Project
Commercial Development
Corner of Palmer & Cathedral Streets

Drawing Title
ELEVATIONS

Scale 1:100
Drawn PK
Date OCT 2000
Project Number 99026 (2)
Drawing No. ACS/DA
Revision A



1 ELEVATION
NEW LANE



2 ELEVATION
ST. KILDA LANE

KEY

CWR -COLOURBOND FINISHED METAL ROOFING

ALS -ANODISED ALUMINIUM SUNSHADING

BLS -ANODISED METAL LOUVRES SCREEN

LG -LOUVRES GLASS WINDOWS

AS -ALUMINIUM WINDOW CLEAR GLAZING

PR -PAINTED RENDER

A	DEVELOPMENT APPLICATION		

JACKSON TEECE CHESTERMAN WILLIS A.C.N. 053 637 290 PTY LTD

Client: The Roads and Traffic Authority of New South Wales

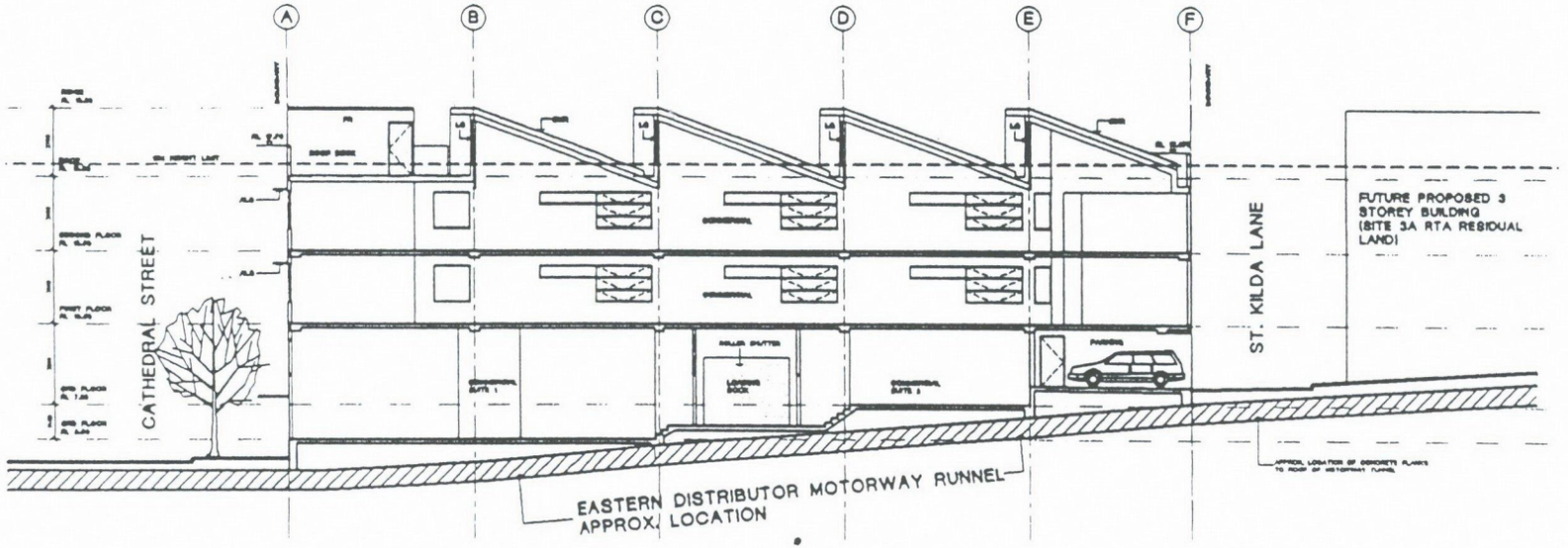
Project: Commercial Development
59 Cathedral Street, WOOLLOOMOOLOO
Corner of Palmer & Cathedral Streets

Drawing Title: ELEVATIONS

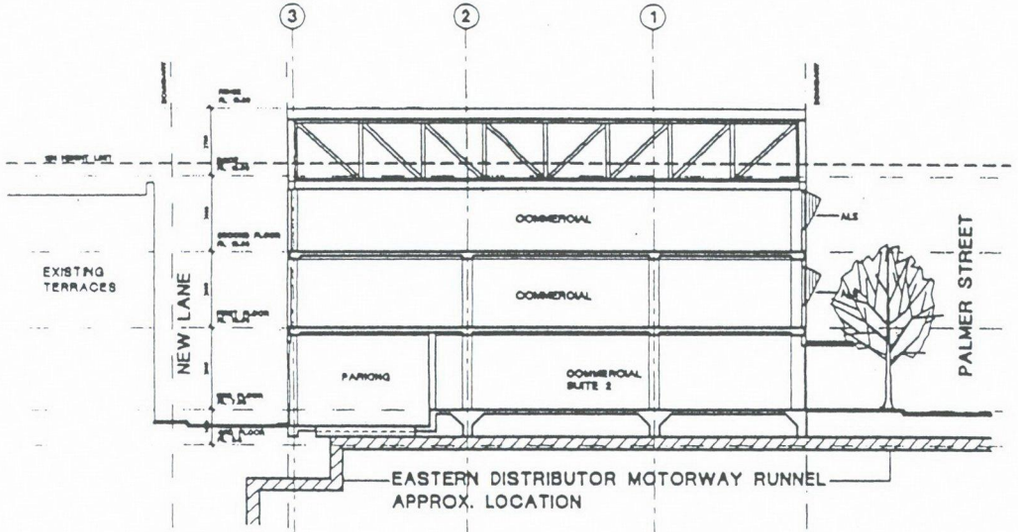
Scale: 1:100 | Project Number: 99026 (2)

Drawn: PR | Date: OCT 2000

Drawing Number: A07/DA | Revision: A



1 SECTION



2 SECTION

KEY

CYR -COLOURBOND FINISHED METAL ROOFING

ALS -ANODISED ALUMINIUM SUNSHADING

BLS -ANODISED METAL LOUVRES SCREEN

LG -LOUVRES GLASS WINDOWS

AG -ALUMINIUM WINDOW CLEAR GLAZING

PR -PAINTED RENDER

A	DEVELOPMENT APPLICATION	23.FEB.E

JACKSON TEECE CHESTERMAN WILLIS PTY LTD

Client: The Roads and Traffic Authority of New South Wales

Project: Commercial Development
191 Cathedral Street, WOOLLOOMOOLOO
Corner of Palmer & Cathedral Streets

Drawing Title: SECTIONS

Drawn: PE	Date: OCT 2000
Project Number: 99026 (2)	
Drawing Number: /DA	Revision: A

N:\99026rta\Site2\Plot\RTA_2_AUG.DWG Tue Dec 05 14:30:31 2000

Appendix D

Consideration of Matters of National Environmental Significance

Checklist of Matters of National Environmental Significance

Under the Environment Protection and Biodiversity Conservation Act 1999 (the EPBC Act), any action which:

- has, would have or is likely to have a significant impact on matters of national environmental significance; and/or
- has, would have or is likely to have a significant impact on Commonwealth land,

triggers this act and therefore requires Commonwealth assessment and approval.

Matters of national environmental significance as identified in the Act are considered within the checklist in the table below.

Checklist of *EPBC Act* Matters

	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* Factors	**Impact**	
a	**Any Environmental Impact on a World Heritage Property?**	-ve	☐
	Comments: There are no World Heritage properties within the vicinity of the proposed works.	Nil	☒
	Mitigation Measures: N/A	+ve	☐
b	**Any Environmental Impact on Wetlands of International Importance?**	-ve	☐
	Comments: There are no Wetlands of International Importance within the vicinity of the proposed works.	Nil	☒
	Mitigation Measures: N/A	+ve	☐
c	**Any Environmental Impact on Commonwealth Listed Threatened Species and Ecological Communities?**	-ve	☐
		Nil	☒
	Comments: There are no Commonwealth Listed Threatened Species or Ecological Communities at the site of the proposed works.	+ve	☐
	Mitigation Measures: N/A		
d	**Any Environmental Impact on Commonwealth Listed Migratory Species?**	-ve	☐
	Comments: The works have no impact on Commonwealth listed migratory species.	Nil	☒
	Mitigation Measures: N/A	+ve	☐
e	**Does Any Part of the Proposal Involve a Nuclear Action?**	-ve	☐
	Comments: No nuclear actions are proposed.	Nil	☒
	Mitigation Measures: N/A	+ve	☐
f	**Any Environmental Impact on a Commonwealth Marine Area?**	-ve	☐
	Comments: The works are not in the vicinity of any Commonwealth Marine Area.	Nil	☒
	Mitigation Measures: N/A	+ve	☐
g	**Any Impact on Commonwealth Land?**	-ve	☐
	Comments: The works do not affect any Commonwealth Land.	Nil	☒
	Mitigation Measures: N/A	+ve	☐

Appendix E

Checklist of Clause 228 Factors

Checklist of Clause 228 Factors

(Environmental Planning and Assessment Regulation 2000)

	Clause 228 Factors	Impact	
a	**Any Environmental Impact On A Community** *Comments:* Benefits both positive long term and negative in the short term would result from the proposed modifications described in *Section 3.2* of this REF.. Short term negative impacts would result from construction noise and vibration, social amenity and visual issues and potential dust impacts while long term positive outcomes would be achieved with respect to the urban renewal of the area and improved vehicular and pedestrian access to the area. *Mitigation Measures:* Refer to *Section 3.3* of this REF.	-ve Nil +ve	☒ ☐ ☒
b	**Any Transformation Of A Locality** *Comments:* An improvement to the streetscape in the vicinity of Site 2 would be achieved by adoption of the proposed modifications earlier than would otherwise be the case as it is transformed from vacant land and integrated back into the existing area. Visual effects are discussed in Section 3.2 of this REF. *Mitigation Measures:* Refer to *Section 3.3* of this REF.	-ve Nil +ve	☐ ☐ ☒
c	**Any Environmental Impact On the Ecosystems of the Locality** *Comments:* Similar to the Approved Activity, there would be no impact on the ecosystems of the locality resulting from the proposed modifications as the site is clear of vegetation and the area highly urbanised. *Mitigation Measures:* None.	-ve Nil +ve	☐ ☒ ☐
d	**Any Reduction of the Aesthetic, Recreational, Scientific or Other Environmental Quality or Value of a Locality** *Comments:* The visual effects of the works are considered in *Section 3.2* of this REF. No change in visual effects would result during the construction stage and a positive visual outcome would be achieved following construction through the early redevelopment of Site 2. *Mitigation Measures:* Refer to *Section 3.3* of this REF.	-ve Nil +ve	☐ ☒ ☒
e	**Any Effect on A Locality, Place or Building Having Aesthetic, Anthropological, Archaeological, Architectural, Cultural, Historical, Scientific Or Social Significance Or Other Special Value For Present Or Future Generations** *Comments:* Effects on heritage values resulting from the proposed modifications are described in *Section 3.2* of this REF. The urban design of the proposed building would be generally in compliance with the Master Plan. There would be no archaeological impacts as the site was fully excavated during the construction of the Eastern Distributor. *Mitigation Measures:* Refer to *Section 3.3* of this REF.	-ve Nil +ve	☐ ☒ ☐
f	**Any Impact On The Habitat Of Protected Fauna (Within The Meaning Of The *National Parks and Wildlife Act 1974*)** *Comments:* Similar to the Approved Activity, there would be no impact on habitat resulting from the proposed modifications. *Mitigation Measures:* None	-ve Nil +ve	☐ ☒ ☐
g	**Any Endangering Of Any Species Of Animal, Plant Or Other Form Of Life Whether Living On Land, In Water Or In The Air** *Comments:* Similar to the Approved Activity, there would be no impact on any species of animal or plant or other form of life resulting from the proposed modifications. *Mitigation Measures:* None.	-ve Nil +ve	☐ ☒ ☐
h	**Any Long Term Effects On The Environment** *Comments:* Operational noise issues have been addressed in *Section 3.2* of this REF and there would be no long term adverse effects on the environment resulting from the proposed modifications. *Mitigation Measures:* Refer to *Section 3.3* of this REF.	-ve Nil +ve	☐ ☒ ☐

	Clause 228 Factors	Impact	
l	**Any Degradation Of The Quality Of The Environment** *Comments:* During construction there would be temporary adverse effects related to noise, general amenity and air quality resulting from the proposed modifications. (Refer to *Section 3.2* of this REF). *Mitigation Measures:* Refer to *Section 3.3* of this REF.	-ve Nil +ve	☒ ☐ ☐
j	**Any Risk To The Safety Of The Environment** *Comments:* There would no change in risk or safety resulting from the proposed modifications. *Mitigation Measures:* Refer to *Section 3.3* of this REF.	-ve Nil +ve	☐ ☒ ☐
k	**Any Reduction In The Range Of Beneficial Uses Of The Environment** *Comments:* There would be no reduction in the beneficial use of the environment as works would be wholly located within the existing site. *Mitigation Measures:* No mitigation is considered necessary.	-ve Nil +ve	☐ ☒ ☐
l	**Any Pollution of the Environment** *Comments:* Unmitigated activities associated with the proposed modifications would cause pollution to air, noise, water quality during construction and is considered in *Sections 3.2* of this REF. *Mitigation Measures:* Refer to *Section 3.3* of this REF.	-ve Nil +ve	☒ ☐ ☐
m	**Any Environmental Problems Associated with the Disposal of Waste** *Comments:* The disposal of an additional 200 cubic metres of waste would result from the proposed modifications which is negligible in the context of the overall project. An appropriate disposal site has been identified and therefore there would be no problems associated with its disposal. *Mitigation Measures:* Refer to *Section 3.3* of this REF.	-ve Nil +ve	☐ ☒ ☐
n	**Any Increased Demands on Resources (Natural or Otherwise) that are or are Likely to Become in Short Supply** *Comments:* The proposed modification would result in no significant change to the demands on resources of the overall project as described in *Section 3.2* of this REF. *Mitigation Measures:* Refer to *Section 3.3* of this REF.	-ve Nil +ve	☐ ☒ ☐
o	**Any Cumulative Environmental Effect with Other Existing or Likely Future Activities** *Comments:* Cumulative effects are described in *Section 3.2* of this REF. The scale of the proposed modifications would not result in significant cumulative environmental effects. *Mitigation Measures:* Refer to *Section 3.3* of this REF.	-ve Nil +ve	☐ ☒ ☐

F

Appendix F

Preliminary Construction Method and Related Environmental Management

Appendix F

Proposed Modifications to the Cross City Tunnel Project Tunnel Control Centre

Preliminary Construction Method and Related Environmental Management

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1 PRELIMINARY DESCRIPTION OF CONSTRUCTION METHOD

1.1 General

This document provides a preliminary outline of the work involved for the construction of the Tunnel Control Centre (Control Centre) for the Cross City Tunnel (CCT) and is intended to support the Review of Environmental Factors for the proposed modifications to the Control Centre. The Control Centre will be used during operation of the CCT.

The Control Centre will be located wholly within the previously established Palmer Street work site (Compound H) and will be located in two distinct areas as per **Figure 1**. The northern site (Site 2) will comprise a three storey building which will house the tunnel control rooms, communications room, offices, tolling, administration, and amenities. It will include a lift, stairs and car parking facilities. The southern site (Site 3A) will comprise a one storey building and will include workshops and change areas as well as car parking and truck parking facilities.
Detailed design of the Control Centre will be undertaken if the proposed modifications are approved. The design would take into account relevant matters contained in assessment documents and the conditions of approval. The details of the construction method will also be subject of the requirement to prepare a construction method statement in accordance with Condition 18 of the approval of the Minister for Infrastructure and Planning. Consequently it is possible that the details of the final construction method may vary from the description provided in this document.

1.2 Location

The Control Centre will be located between Palmer Street and Egan Place. Two sites will be utilised for the Control Centre buildings – one on the northern side of St Kilda Lane and one on the southern side of St Kilda Lane as shown in **Figure 1**. The site is located above the cut and cover tunnel which forms a section of the Eastern Distributor, hence is a previously excavated and disturbed site.

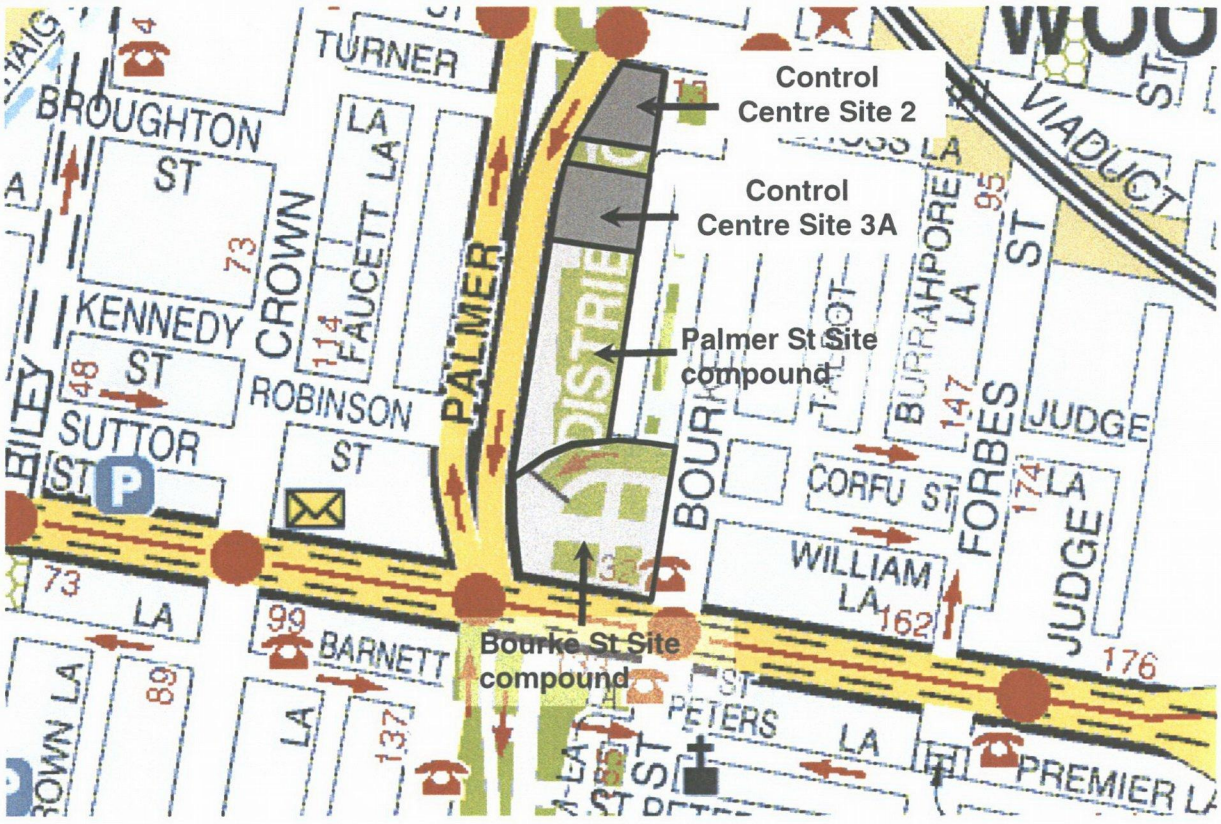

Figure 1: Location of Control Centre

1.3 Construction Activities

1.3.1 Removal of Temporary Display Centre and Pavement Removal

The temporary Community Display Centre, which has been established in demountables at the corner of Palmer and Cathedral Streets will need to be removed in order to construct the Control Centre. This will involve craning the demountables off site. The existing pavement across the sites will then be removed to allow construction of the Control Centre buildings. The removal of pavement will require the use of a road pavement saw and excavator equipped with bucket and rock hammer attachment. Removed pavement material will be loaded directly into a small truck ($9m^3$) and disposed of as per **Section 2.4**. These works will be undertaken during normal working hours.

1.3.2 Excavation

After the pavement is removed from the surface, spoil will be excavated to a depth of approximately 500mm to enable the footings of the Control Centre buildings to be placed. Given the site has been previously excavated for construction of the Eastern Distributor cut and cover, it is expected that only spoil will be located within the excavation area, thus no rockhammering will be required.

It is anticipated that approximately $1000m^3$ of spoil, concrete and rubble will be excavated and will require the use of an excavator and bucket. Levelling of the site will also be undertaken if required.

Excavation will be undertaken during normal working hours using an excavator with bucket. Spoil will be loaded directly onto trucks and removed off-site for disposal as per **Section 2.4**.

1.3.3 Installation of Services

The following services will require installation and connection to the Control Centre buildings:

- Sewage;
- Potable water;
- Electricity;
- Telecommunications
- Fire protection communications to main tunnel.

Sewage and potable water will be connected to the site from the existing mains within Palmer Street. Two connections from the existing main will be made (one for each site).

Electricity and telecommunication services will be installed from and connected to the Bourke Street site (Compound I). At this stage the preferred service route will be from Compound I to the site along Egan Place. Due to programming restrictions however, the route may need to be from Compound I along Bourke or Palmer Street to connect with the Control Centre site. The selection of the most feasible route will be determined by the Zone Manager in consultation with the Tunnel Zone Manager. Route selection will be based on construction programming, access restrictions and impacts to sensitive receivers

The following works will be undertaken to install the services:

- Sawcutting and removal of concrete pavement along the length of the service route (from Bourke Street compound to the Control Centre sites; and from Palmer Street to the Control Centre sites), using a road saw and hydraulic hammers or jackhammers;

- Excavation of trenches along the length of the service route, using an excavator and bucket. Excavation is most likely to be less than 1.5m in depth. However if excavation extends deeper than this level, shoring may be required for the trench walls. In addition, concrete encasement of the services may be required (depending on service provider requirements). A continuous trench will be excavated if possible, with spoil being loaded directly onto trucks for removal off-site.

  It is anticipated that minimal excavated spoil will be able to be reused for backfilling, thus spoil will be loaded directly onto trucks for removal off-site. Any spoil that is suitable for reuse as backfilling will be temporarily stockpiled on-site, these stockpiles will be minor and temporary. On completion of each days work the trench will be covered with road plates.

- Installation of conduits/pipes in the excavated trenches. Conduits will be installed manually or using a small crane and excavator. Conduits will be stored in the Palmer Street compound and transported to the construction area when required.

- Backfilling and reinstatement. The trenches will be backfilled with excavated material where practicable. Sand, gravel and/or other material will be imported to the site if the excavated material is inadequate or unusable. Compaction of fill will be carried out in layers up to the existing footpath or road using an excavator and compactor. Concrete and/or asphalt will be poured to reinstate the road/footpath.

Access to residential properties on Egan Place will remain open at all times. Residents may however be required to move their vehicles prior to each days work commencing to enable access to the trench site.

All works (including delivery of conduits/pipes) will be undertaken during normal working hours except for the connection of services. Service providers may require connections to be undertaken outside normal working hours to minimise impacts to local residents.

1.3.4 Site Boundary Fence

The existing Palmer Street site boundary fence may need to be relocated prior to construction of the Control Centre building. An assessment will be undertaken to determine whether there is sufficient space to install the building foundation without relocating the existing fence. However if there is insufficient space, the fence will be relocated slightly to the west of its existing position.

1.3.5 Concreting, Blockwork and Steelwork

Concrete will be poured for the base of the sites, footings, walls of the buildings, fire stairs, lift and carparking and driveway areas. Concreting works will be undertaken during normal working hours.

Blockwork walls will commence on completion of the concrete works for the floor of the buildings. Bricks may be stored on-site prior to being used for the blockwork. In conjunction with the blockwork walls, any steel members will be installed.

Steel frames may be oversized and may require a crane for their delivery and installation. A lane will be closed on Palmer Street adjacent to the work site, to enable the delivery truck to park whilst a crane lifts the steel work off the truck and into place for the Control Centre building. The delivery and installation of the steel work will require out of hours work due to their oversized nature and the requirement for a lane closure on Palmer Street.

The blockwork walls will be fire rated, and any waterproofing required for the concrete floors will be completed. The lift structure will also be installed which will involve formwork and reinforcing installation and concreting works. The foundation of the stairs will include a combination of steel and concrete structures.

These works will require the use of concrete delivery trucks, grout/concrete pump, cement mixer, concrete vibrator, trowelling machine, forklift, materials lift and other minor plant and equipment located within the site compound.

It is expected that these works will take 3 months to complete. Concreting will occur in conjunction with the blockwork and steel work installation however will only be carried out for approximately 5 days over the 3 month period.

1.3.6 External Finishes and Internal Fit Out

On completion of the concreting, blockwork and steel work, the external finishes will be installed and will include:

- Prefinished pressed metal cladding on steel sub-frame;
- Commercial cladding;
- Garage doors - commercial panel lift door;
- Paint rendered brickwork;
- colourbond sheeting;
- roof - prefinished pressed metal sheeting;
- windows - commercial aluminium frame system;
- steps - concrete

- glazing;
- paving;
- Balustrade glass with stainless steel handrail
- Fixed ventilation louvres

The internal fit out will include installation of:

- Mechanical equipment such as air conditioning units, ventilation fans, air ducting and associated pipework;
- Electrical equipment such as transformers, switchboards, uninterrupted power supply units, power cables, lighting and wiring;
- Communication equipment such as PABX, radio rebroadcast units, antennae, data and telephone lines;
- Hydraulic equipment such as domestic water, fire mains and sewage pipes;
- Furnishings such as doors, carpet, tiles and ceilings;
- Lift and stairs including the lift structure, lift motor, lift car and handrails; and
- Specialist tunnel equipment including:
    - operator console;
    - control desk;
    - computer equipment;
    - CCTV system; and
    - Fire protection systems.

External finishes and internal equipment will be installed using a combination of cherry pickers, small cranes, ladders etc. Some equipment may be oversized and may need to be delivered outside normal working hours. It is anticipated that approximately 2 weekends may be required for these deliveries.

1.3.7 Testing and Commissioning

Equipment will be tested and commissioned throughout the installation of the internal fit out. Testing and commissioning will continue after construction of the Control Centre buildings are complete and through to opening of the CCT in 2005.

Testing and commissioning will be undertaken during normal working hours and outside normal working hours to ensure the CCT is fit and safe for operation.

1.3.8 St Kilda Lane Extension and Truck Exit Driveway

The existing St Kilda Lane will be extended to join Palmer Street in order to provide access to car parking facilities for the Control Centre.

A truck exit driveway onto Palmer Street will also be constructed. This work will require a lane to be closed on Palmer Street and will therefore be undertaken over 2 weekends.

Works will include paving with asphalt using an asphalt laying truck and rollers.

1.4 Urban Design

A Tunnel Control Centre Urban Design Plan will be prepared as required by Condition 166.

Construction of the Control Centre on either site must not commence until the specific Urban Design Plan has been approved by the Director-General under Condition 166.

1.5 Timing of Works & Construction Staging

Works for the Control Centre will extend for approximately 9 months. Testing and commissioning will extend until opening of the CCT. It is anticipated that that the works will be carried out in the following general sequence:

Activity	Month									
	1	2	3	4	5	6	7	8	9	→
Pavement removal and excavation										
Concreting, Blockwork and Steelwork										
External/Internal Building Fit out										
Testing and Commissioning of building										
Internal Fit out of tunnel control equipment										
Commissioning of tunnel control equipment										

1.6 Hours of Operation

Hours for construction work currently permitted under Condition 122 of the planning approval are:

Monday – Friday	7am to 6pm
Saturday	8am to 1pm
Sunday & Public Holidays	No work

Condition 122 also provides for work outside of these hours in certain circumstances.

Where possible these hours of work will be adhered to however in some circumstances work may be required outside the normal construction hours due to restrictions placed on activities by external bodies. Out of hours works will be required for the following:

Activity	Reason for Out of Hours work	Timing of Works
Delivery and installation of steel work	Steel work oversized requiring lane closure on Palmer Street	3 weekends
Truck exit driveway construction	Palmer Street lane closure required	2 weekends
Delivery of oversized equipment (air condition units, mechanical items)	Oversized	2 weekends
Service connections	Minimise disruption to residents/ Service provider requirement	3 nights

In addition, once construction of the external building for the control centre is complete, internal fittings of the building may be undertaken outside normal working hours. In accordance with MPA Condition 122 (a), these activities will be inaudible to the closest residential property.

The exact details of works undertaken outside normal working hours will be determined after:

- TTLG (Traffic and Transport Liaison Group) provide approval of traffic related construction activities;
- Consultation with the Central CLG (Central Community Liaison Group); and
- EPA (Environmental Protection Authority NSW) licensing approval.

Any unforeseen works outside normal hours that may be required will be communicated to the CLG members, community notification distributed and an EPA licence obtained prior to works taking place, if appropriate.

1.7 Site Offices and Ablutions

The existing site office and ablution facilities within the Palmer Street Compound will be utilised during the construction of the Control Centre.

The existing Display Centre located in the Palmer Street Compound will be relocated to a site that is approved by the EMR to enable the construction of the Control Centre. There will be no construction issues or related environmental impacts from the reinstatement of the centre, as it will be re-established in an existing building.

1.8 Truck, Plant and Material Storage

Work vehicles will park within the Palmer Street site, Compound H. Where possible, large cranes and semi-trailers will park within designated work areas.

Traffic management plans will be in place in accordance with RTA road occupancy permits if work areas cannot accommodate large sized vehicles delivering materials or carrying out work.

Materials that will be stored on site such as timber, steel, precast concrete members, plastic pipes and shipping containers will be stored in a manner that will be safe and allow for easy house keeping to be maintained regularly.

A small quantity of hazardous materials (such as paints, oils, lubricants, rodent baits etc) or fuel will be stored in the pre-established Palmer Street compound (refer ECMS 2). These materials will be stored in a bunded area and used to fuel machinery, generators, petrol power hand tools and other equipment. The transfer of these fuels will be undertaken in accordance with the Environmental Emergency Response Sub Plan.

1.9 Equipment Used on Site

The following is a list of equipment proposed to be used on site to undertake works outlined within this ECMS:

Working Plant:

- Backhoe excavator
- Rock Hammers for excavators (various sizes)
- Road profiling equipment
- Cranes (18t to 100t)
- Concrete/grout pumps
- Road Saw
- Wacker Packer Compaction plate
- Diesel/Petrol Generators (up to 5kVA)
- Cherry Pickers (various sizes)
- Air Compressors (various sizes)
- Asphalt paving machine
- Various Excavators (sizes 6t to 30t)
- Hiab Truck
- Quick Cut Demolition Saw
- Bobcat Sweeper
- Manitou Forklift (or similar)
- Compaction Roller (up to 20t)
- Concrete Compaction Vibrators
- Asphalt line grinder
- Bucket Trucks (various sizes)
- Road Sweeper

Deliveries/Removals

- Concrete Trucks
- Bogie and Dog Trucks
- Semi Trailer Trucks
- Small Delivery Trucks

Other:

- Site vehicles
- Oxy Acetylene Burners
- Concrete Scabblers
- Various Saws
- Jack Hammers
- Lighting Towers
- Power Actuated Concrete Nail Guns
- Traffic Control Vehicles
- White Line Burners
- Various Drills
- Various Pumps (electric and diesel)
- Rock Drills
- Nail Guns
- High pressure water jet

Noise emission levels of major equipment will be assessed (L_{Amax}) prior to use on site. These noise levels will be assessed against maximum levels used in sound level predictions by Wilkinson Murray (acoustic consultant). If equipment is found to exceed these maximum noise levels it will be:

- Treated to ensure compliance; or
- Prevented from operating onsite.

1.10 Location of Sensitive Receivers

Both residential and commercial properties are located in the area of the control centre. **Figure 2** shows the zone of sensitive receivers. In particular, the following properties have been identified as sensitive receivers to environmental impacts:

- 113-93 Palmer Street residents and businesses
- St Kilda Lane residents
- 129-177 Bourke Street residents and businesses
- 129-146 Cathedral Street residents and businesses
- Faucett Lane residents and businesses
- Turner Lane residents and businesses
- Ferrari Dealership, 134 William Street
- Department of Housing residential development on Bourke Street.
- The Diplomat apartment building located on the western side of Palmer St

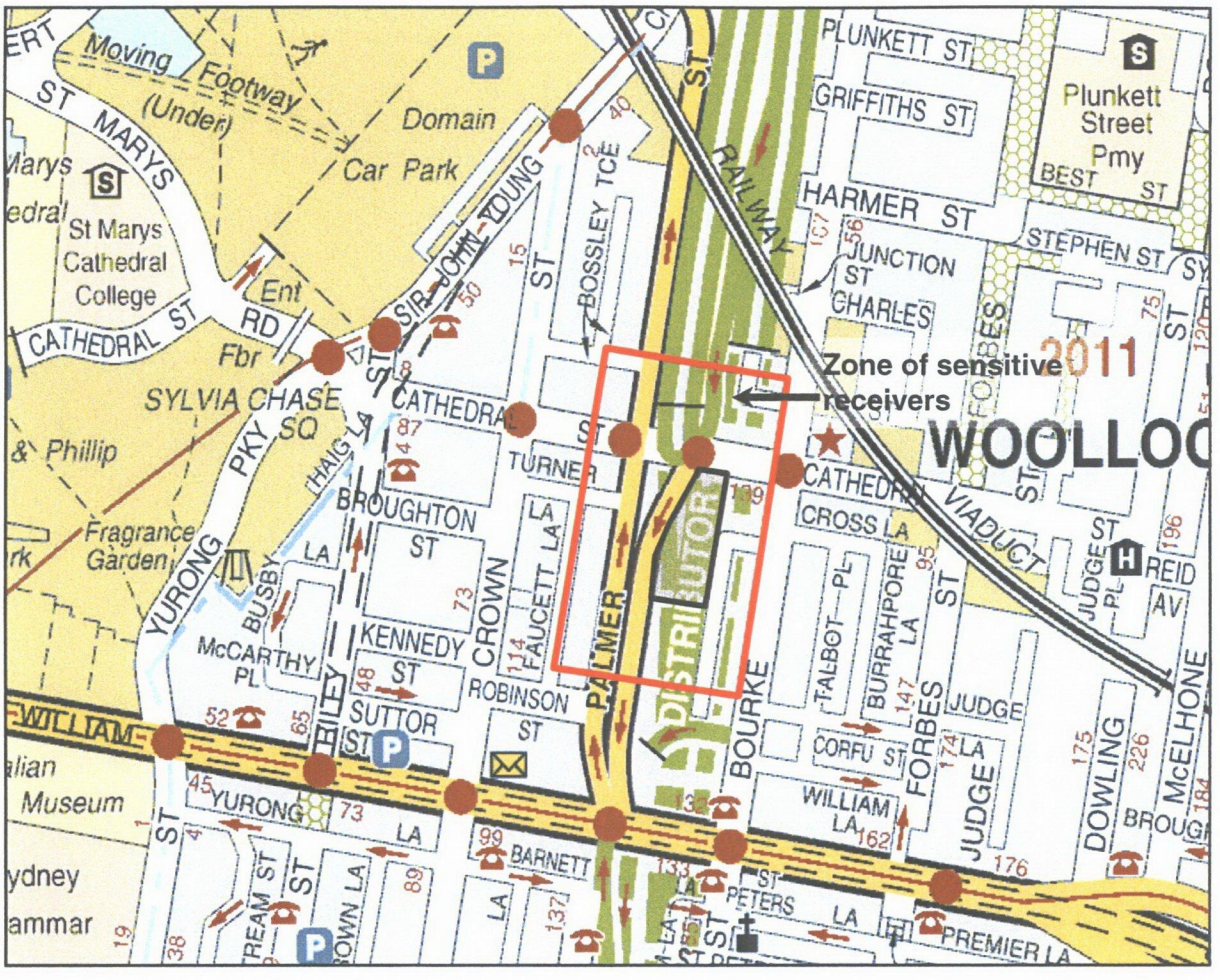

Figure 2 **Zone of sensitive receivers**

2 KEY ENVIRONMENTAL ISSUES, OBJECTIVES, MITIGATION AND CONTROL STRATEGIES.

This section outlines the main environmental system elements that will be associated with the construction of the Control Centre. Each subsection includes a:

- Description of the impacts and associated level of environmental risk; and
- Objectives and mitigation and control measures proportional to the level of environmental risk.

Environmental control measures will include:

- Measures to avoid and/or control the occurrence of environmental impacts;
- Measures (where practicable and cost effective) to provide positive environmental offsets to unavoidable environmental impacts;
- Site specific environmental management techniques and processes for all construction processes which are important for the quality of the environment in respect of permanent and /or temporary works; and
- Environmental management instructions/procedures for all complex environmental control processes which do not follow common practice or where the absence of such instruction could be potentially detrimental to the environment.

2.1 Noise and Vibration

The following activities are likely to result in potential noise impacts:

- Excavating using road saw, backhoes, excavators, and possibly hydraulic hammers;
- Paving works using an asphalt paver and roller;
- Blockwork and steel work requiring cranage and use of forklift, materials lift and cement mixer;
- Concreting works using a concrete pump, vibrator and trowelling machine;
- Spoil loading and handling, truck movements and crane operations; and
- Potential for night time deliveries of oversize materials where required by RTA for safety reasons.

The following noise goals were set as a result of monitoring conducted by acoustical consultants Wilkinson and Murray (refer Appendix K). The noise goal for this project is background levels plus 5dBA and documented in Table 2.1.

Table 2.1: Noise Goals

Representative Residential Receiver Location	Representative Background Level (dBA)			L_{A10} Noise Goal (dBA)		
	Day[1]	Evening[1]	Night[1]	Day[1]	Evening[1]	Night[1]
Dept of Housing block	60	59	53	65	64	58
Diplomat	62	59	52	67	64	57

Note 1 : Day: 7am – 6pm, Evening 6pm – 10pm, Night: 10pm – 7am

Noise levels from the site have been predicted in the surrounding area using the Environmental Noise Model, ENM. This model allows for the noise generation of each item of equipment, the attenuation with distance, including ground effects and air absorption and any intervening noise shielding and noise mitigation measures.

2.1.1 Airborne Noise

Modelling undertaken by Wilkinson Murray (refer Appendix K) outlined the following:

- excavation undertaken over 3 days is likely to exceed day time noise goals in St Kilda Lane, Cathedral Street, west side of Palmer Street and at the Department of Housing block;
- concreting works undertaken for approximately 5 days over a 3 month period may exceed day time noise goals;
- intermittent use of a crane and cherry picker during installation of external finishes may result in day time noise goals being exceeded on occasion; and
- paving of the extension of St Kilda Lane undertaken over 1 week, may result in day time noise goals being exceeded.

The background noise levels are based on L_{A90} levels. L_{A90} measures noise that exceeds the required limit for 90% of the sampling time period. High noise levels which are short, such as a passing truck may produce significantly higher noise levels than the background levels. Also the noise model predicts only construction related noise impacts and does not incorporate background noise characteristics. Hence when construction related noise is combined with the background it is expected that the background traffic noise will dominate during the daytime. This will greatly reduce the perceived impact of construction noise on surrounding sensitive receivers.

All feasible and practicable on-site mitigation measures (described in the following table) will be implemented in order to achieve the predicted noise levels. A strategy of community notifications and consultation with the Central CLG and pro-active complaints management will be used to further manage the impacts on the surrounding community.

Plant and equipment will operate within the construction zone which is bounded by site fencing and hoardings / screening material. The hoardings will act as a barrier, reducing the noise projecting to the surrounding sensitive receivers. Plant will also be orientated so that the body of the machine is between the works and the sensitive receiver wherever available working areas allow it. Works will also be staged to avoid the coincidence of noisy plant working at the same time close together and adjacent to sensitive receivers.

2.1.2 Works Outside Normal Working Hours

Construction works includes the need for work outside normal hours, as outlined in **Sections 1.3** and **1.6**. Night works have a greater potential to impact on surrounding sensitive receivers than day works and therefore have been minimised to greatest extent possible. The following specific noise mitigation measures will be implemented for works outside normal working hours:

- weekend works will be undertaken in preference to weeknights;
- consecutive surface night works will be minimised with respite periods being provided; and
- consultation with the Central CLG will be undertaken on works outside normal working hours.

2.1.3 Vibration

There is potential for vibration to be generated during excavation works using hydraulic hammers. As stated in Section 1.3.2, it is not expected that hammers will be required for the excavation on the Palmer Street site as this area has been previously excavated for the cut and cover for the Eastern Distributor.

Pavement throughout the worksite will require removal and will be initially broken and lifted or scooped up in large sections to avoid the need for hammering. Vibration impacts from these works are expected to be minimal.

Building condition surveys have been undertaken of surroundings buildings which may be affected by vibration due to other excavation works for the CCT.

2.1.4 Environmental Management

A summary of environmental management measures in relation to noise and vibration is contained in Table 2.2.

Table 2.2: Management of Noise and Vibration Impacts

Objective	Mitigation and Control Strategy

To carry out construction activities in a manner that minimises noise and vibration.	• Large cranes and semi trailers may park on site prior to off loading at approved times to suit RTA road restrictions.
	• Undertake works on site in accordance with work hours specified in MPA Condition 122 except where approved by the EPA.
	• **Any activities that occur at or near ground level which result in impulsive or tonal noise generation will only occur (Condition 128):**
	  • **Between 8.00 am and 12.00 pm (Monday to Saturday)**
	  • **Between 2.00 pm and 5.00 pm (Monday to Friday)**
	  • **Where these activities are undertaken for a continuous 3 hour period, a minimum respite period of 1 hour will be scheduled before activities recommence.**
	• Restrict entry and departure of delivery vehicles to and from the site compounds to the normal working hours except where RTA or other authority requirements (eg oversize loads) dictate for safety reasons that delivery times be outside standard hours (MPA Condition 122).
	• For all out of hours deliveries, the transporters must be given strict instructions regarding minimising noise, as follows:
	  • The transporter will arrive on site at the agreed time,
	  • The transporter unloads the delivery on site at the agreed location on arrival. Otherwise the delivery is to be left on the transporter to be unloaded during normal working hours.
	  • Quiet methods of unloading are to be adopted at the agreed location. Efforts are to be employed to minimise noise generating activities associated with unloading.
	  • During unloading, the operator is to adopt professional conduct and quiet behaviour.
	  • The delivery is to be unloaded as far as possible from any sensitive receivers.
	  • Engines are not to be left running while unloading.
	• The Environmental Manager and Community Relation Manager must be advised by site personnel 24hrs prior to a proposed out of hours delivery.

	• Monitor major equipment noise levels when key items of equipment are first brought onto site to establish base line noise levels, and to ensure equipment meets predicted maximum noise levels. If levels exceed maximum levels, noise suppression equipment is to be fitted to the equipment, or alternative plant is to be sourced. • Monitor major equipment periodically (spot checks) and as required, to minimise identified noise exceedances. Where the noise level of an item has increased relative to its baseline noise level, then the item must either go maintenance to reduce its noise level, or alternative plant is to be sourced. • Ensure as far as practicable that vehicles do not "queue". • Install 'smart' reversing alarms on all permanent and dedicated CCT plant and equipment such as bulldozers, cranes, graders, excavators, trucks, etc where practicable; [Condition 137, SWTC 8.19 (b)]. • Use damped rockhammers or so-called "city" rockhammers [Condition 135]. • No truck associated with the work will be left standing with its engine operating in any street. • Carry out loading and unloading away from noise sensitive areas, where possible [Condition 126 (2e)]. • Train staff to ensure awareness of noise goals and issues with the project. • Prior to commencement on site all mechanical plant will be silenced by the best practical means using current technology. • Noise suppression devices will be maintained to the manufacturer's specifications. • Internal combustion engines are to be fitted with a suitable muffler in good repair, were practicable. • All plant would be maintained in good working order. • Keep unnecessary noise such as shouting to a minimum. • Radios will be used over whistles during night craning works.
To carry out construction activities in a manner that minimises vibration	• **Rock breaking, rock hammering, sheet piling and other activities at or near ground level which result in impulsive or tonal noise generation will only occur:** o **Between 8.00 am and 12.00 pm (Monday to Saturday)** o **Between 2.30 pm and 5.00 pm (Monday to Friday)** o **Where these activities are undertaken for a continuous 3 hour period, a minimum respite period of 1 hour will be scheduled before activities recommence (Condition 128).** • **No excavation using rock hammers will be undertaken below ground during the night time (10pm to 7am) (Condition 136).** • Undertake Building Condition Surveys of surroundings buildings which may be affected by vibration due to excavation works. • Monitor vibration levels during the use of the vibratory roller during paving near heritage or sensitive buildings. • During significant rock breaking or vibratory rolling potentially affected residents will be informed at least 24 hours in advance and vibration monitoring will be carried out near the building foundations.
To comply with prediction outlined in the Noise Impact statement.	• Conduct monthly noise assessment to ensure compliance with the noise impact assessment • Conduct spot checks during noisy activities to compare against noise impact statement predictions

2.2 Air Quality (incl. dust)

Dust generation issues during construction of the Control Centre may include:

- Excavation operations,
- Loading and trucking of spoil from site, and
- Open areas of natural ground during construction.

In general the dust issues at this site are mitigated by the following:

- Minimising spoil stockpiling by loading spoil directly into covered trucks for removal;
- General dust mitigation measures (watering down) for open excavations will be used in the area that is producing dust; and
- Ensuring no significant stockpiles are maintained on site.

A dust deposition gauge has been installed in the vicinity of the Palmer Street and Bourke Street compounds. The dust gauge will be utilised during the construction of the Control Centre to monitor dust levels generated from these works to ensure dust is managed appropriately.

When conditions are excessively dusty due to circumstances such as high temperatures, dry soils etc. the dust generating activity will cease until dust suppression methods (such as watering) are carried out. The Foreman will visually inspect the site to determine if mitigation is required and adequate. If there is visible dust noted during the visual inspection then the reactive management measures identified in the Dust Management Sub-Plan will be initiated. These management options identify how and when operations can be modified to reduce dust generated from works. The process for determining which management option will be implemented is also outlined in the Dust Management Sub-Plan.

Emissions from site vehicles are not expected to be of concern as each vehicle will be regularly inspected, the area is well ventilated and the need for vehicle queuing is minimal. All onsite vehicles will be inspected for emissions prior to use on site.

A summary of environmental management measures in relation to air quality is contained in Table 2.3.

Table 2.3: Management of Air Quality Impacts

Objective	Mitigation and Control Strategy
To carry out construction activities in a manner that minimises or prevents the emission of dust.	• Load excavated spoil directly onto trucks for removal off-site. • Ensure all spoil trucks are covered before leaving the site. • Use a water cart to wet down earthworks area, if required. • Clean off mud and/or soil spilt on the roadway or any sealed pavement using mechanical road vacuum sweeper. • Work from existing pavement hardstand areas at all times when practical. • Ensure as far as practicable hoarding and/or mesh on fencing erected around the worksites are adequate to prevent dust blowing onto roadways and pedestrians. • Undertake dust monitoring to monitor against goals, to determine if management techniques should be altered to reflect resulting measurements. • Spray stockpiles with water when required to prevent dust emissions.
To minimise the impact of vehicle and plant emissions	• Visually inspect vehicle and plant emission prior to use on site; • Visually monitor emissions during unloading and loading of trucks; • Ensure engines are turned off when vehicles or machinery is not in use.

To manage dust emissions if they exceed criteria	• Modify construction methods being used, by reducing the area of earthworks being worked on at any one time; • Use alternative construction equipment that causes less dust; • Provide a spotter to ensure that trucks are covering loads and being effectively cleaned prior to leaving the site, and public roads are being adequately swept; • Alter the time that certain dust-generating activities are undertaken to avoid where practicable meteorological conditions that contribute to dust generation; • Introduce record keeping of when and where water carts are in use.

2.3 Water Quality (incl. erosion and sedimentation, flooding and stormwater control)

The main water issues at the Control Centre site include:

- excavation works;
- minor spoil stockpile;
- concreting works;
- connections for permanent ablutions; and
- storage of any chemicals/oils etc.

All works undertaken for the Control Centre will be undertaken wholly within the previously established Palmer Street site (Compound H). Erosion and sedimentation controls were installed during site establishment works for this compound and will be monitored during the construction of the Control Centre to ensure their effectiveness (using the Sediment and Erosion Control Checklist on weekly basis or after 10mm of rain). If mitigation measures are found to be inadequate, further controls will be implemented.

The duration of excavation is expected to be short (< 1 week) and the majority of excavated spoil will be loaded directly onto trucks for removal off-site in covered loads. Any temporary on-site stockpiles will be protected from erosion by installing erosion and sedimentation controls such as sandbags, silt fences and/or sediment socks. In addition, any stockpiles in place overnight will be protected by plastic sheeting or similar.

The existing water management structure on the Palmer Street site will be relocated further to the north. The site drains to the north (Cathedral Street) and site runoff will be directed through sediment devices placed at the northern end of the site prior to draining off-site.

Given the short nature of the excavation works, it is expected that there will be minimal risk of transfer of sediment offsite. Therefore it is not expected that a rumble grid or other truck cleaning devices will be required. The exit roadway will be monitored on a daily basis and a vacuum street sweeper or other appropriate plant will be used to remove sediment as required.

The Palmer Street site is not expected to impact on the existing flood regime in the surrounding area due to the minor nature of the works and minimal change to existing topography. Road guttering around the site is expected to be sufficient to direct 'clean' stormwater around the site.

Concrete truck wash out will not be permitted on site and must be undertaken at the depot on return.

A summary of environmental management measures in relation to water quality is contained in Table 2.4.

Table 2.4: Management of Water Quality Impacts

Objective	Mitigation and Control Strategy
To carry out construction activities in a manner that minimises water pollution.	• Ensure site fencing has appropriate erosion and sedimentation control structures in place to prevent 'dirty' water exiting the site. • Ensure 'clean' runoff is diverted around the work site. • Install sediment devices at the northern end of the site. • Ensure all 'dirty' runoff from the construction site flows through the sediment device at the northern end of the site prior to draining. • Protect any stockpiles in place overnight by covering with plastic sheeting or similar. • Place inlet filters around stormwater drains located within the site boundaries and downslope of the site. • Maintain erosion and sediment controls to prevent build up of sediment. • Monitor the exit roadway on a daily basis for silt tracked from site and remove any sediment as required. • Ensure appropriate disposal of waste from temporary portable toilets by a licensed contractor. • Ensure chemicals are stored in the bunded area in Compound H. • Ensure spill kits are provided at site compounds where material/ plant is stored. • Cover the sites with hardstand as soon as practicable. • Ensure any wastewater from washing of concrete chutes and other concreting equipment is contained in wash out bin and recycled. • Ensure concrete agitators are returned to their depots for washing. • Maintain vehicles and equipment to minimise fluid drips through plant inspection checklists and log books. • Keep sufficient quantities of hay bales, star pickets and filter fabric to provide emergency stormwater controls.

2.4 Spoil Stockpiling and Disposal

This section details the management of spoil excavated from the construction works. Management of waste including concrete, asphalt, PVC piping, chain and barbed wire, electrical cables, plywood and timber is addressed in **Section 2.6.**

It is estimated that approximately 800m^3 of spoil will be generated during excavation works. Given the site has been previously excavated for the Eastern Distributor cut and cover, spoil will be classified as inert. Due to the limited space available on-site for stockpiling, excavated spoil will be loaded directly onto trucks for removal off-site to Kurnell Landfill. Bricks may be stockpiled temporarily on-site prior to being used in the blockwork for the construction of the buildings.

The Spoil Management Sub-Plan identifies alternative disposal facilities that may be used for generated spoil. **Section 2.8** details the proposed destination and disposal routes for spoil generated during these works.

Any spoil or waste transported from site will be recorded in the Spoil and Waste Management Register

A summary of environmental management measures in relation to spoil is contained in Table 2.5.

Table 2.5: Management of Spoil

Objective	Mitigation and Control Strategy
To appropriately manage the disposal of excess spoil.	• During excavation works load excavated spoil directly onto trucks f removal off-site. • During services excavation, temporarily stockpile spoil that is to be reused for backfilling • During services excavation, any spoil that is not to be reused will be loaded directly onto trucks for removal off-site. • Send spoil that is not suitable for re-use to appropriate EPA approved landfill. • Complete Spoil and Waste Management Register for all spoil removed from site.
Prevent water pollution from stockpile run-off	• Ensure any on-site stockpiles are small and temporary; • If stockpiles are located on-site overnight ensure they are covered with suitable material or otherwise protected to ensure no erosion.

2.5 Heritage and Archaeology

The area that encompasses the Bourke and Palmer Street compounds cuts through the former location of John Palmer's Estate. The Control Centre will be located to the north of this area and the site is located on an area that was previously excavated for the Eastern Distributor. Therefore no artefacts from John Palmer's Estate will be unearthed during excavation works for the Control Centre.

Site 2 is located within a Heritage Conservation Area. Nearby heritage items include:

- Terrace houses at 108-118 Cathedral Street
- Terrace houses at 168-174 Cathedral Street.

A summary of environmental management measures in relation to heritage and archaeological issues is contained in Table 2.6.

Table 2.6: Management of Heritage and Archaeological Resources

Objective	Mitigation and Control Strategy
Minimise the impact to heritage items and archaeological resources	• Ensure building condition surveys are undertaken of identified heritage buildings prior to works taking place. • If excavators with hydraulic hammers are used for excavation works, ensure the vibration limit of 3mm/s is not exceeded at the heritage buildings. • Change method of excavation if heritage vibration limit is exceeded at heritage buildings

2.6 Waste & Resource Management (incl. energy)

Wastes will include building and demolition waste as defined in the Waste Management Sub-Plan. Commercial Skip Bins will be used in general to store waste material resulting from construction activities and these will be taken off site for recycling or disposal to approved waste facilities.

Building and demolition waste expected on this site would include quantities of:

- Green Waste
- Concrete
- PVC piping
- Chain and barbed wire
- Electrical cables
- Plywood

- Asphalt
- Steel
- Sewage
- Timber

Excavated spoil waste management is addressed in **Section 2.4.** It is expected that approximately 200m^3 of concrete/asphalt will be excavated and disposed of at Concrete Recyclers in Camellia.

General waste including paper/cardboard, cans, glass, plastic and food refuse will be placed in segregated bins and will be emptied as required by an appropriately licensed contractor where possible for future recycling.

PVC piping and electrical cables will be assessed for potential for recycling. If recycling is not possible, it will be classified as inert and removed to landfill. All other non-liquid waste will be assessed as per the following, and disposed of as per **Section 2.4**.

- **Inert** - waste that is unlikely to release significant quantities of greenhouse gasses or leachates contaminated with nutrients an/or chemicals;
- **Solid** - likely to release higher quantities of contaminants than inert waste and therefore need to be handled with greater care;
- **Industrial** - contain higher (four times) levels of contaminants than solid waste and needs to be managed with more stringent environmental controls than solid waste; and
- **Hazardous** - this type of waste contains contaminants at levels high enough to require treatment to render them safe before disposal.

It is envisaged that the only liquid waste that will potentially be generated from these works will be limited to waste oils/fuels/chemicals. Any waste oils, fuels or chemicals will be held in a bunded area in Compound H until it is disposed of to a licenced treatment facility, or returned to the supplier for reuse.

The mitigation measures that will be implemented on-site for waste management are provided in Table 2.7. These mitigation measures should be read in conjunction with **Section 2.4**.

Table 2.7: Management of Wastes

Objective	Mitigation and Control Strategy
To minimise resource use and waste generation by adopting the waste management hierarchy of reduce, re-use, recycle, and disposal.	• Order and use appropriate quantities of construction materials to avoid over supply of materials and to minimise waste generation; • Purchase products with the highest recycled content that is cost and performance effective (eg recycled paper). • Use recycled building materials (eg crushed concrete) in the base layer of pavements where practicable. • Use recycled material in new asphalt where practicable. • Use fly ash and slag in concrete where practicable. • Return any over supply of construction materials to supplier. • Where practicable reuse excavated material for backfilling (see spoil management). • Use a segregated bin system to separate any paper/cardboard, cans, glass, plastics, food waste and steel, etc for recycling. • Use the commercial skip bin at Compound H to dispose of small quantities of unsegregated waste to landfill; • Return empty fuel and oil drums to the supplier; • Return excess oil to the supplier for reuse. • Reuse any waste wood and other formwork where practicable. • Undertake any required testing under the EPA licensing conditions to

	identify waste types. • Complete Spoil and Waste Management Register for all waste removed from site.
Ensure that waste is disposed of appropriately	• Ensure only licensed waste contractors are used. • Ensure waste is classified appropriately before leaving site. • Ensure waste transmittal notices are filled in. • Ensure appropriate disposal of waste from temporary portable toilets by licensed contractor.
To minimise energy consumption	• Induction of all site personnel to include an awareness program to encourage energy conservation (Condition of Approval No. 223); • Ensure that all plant and equipment is properly maintained to minimise the consumption of fuel. • Ensure that no rainforest timber is used in construction activities. • Selection of plant and equipment relative to the size and scope of the works, via supplier contract specifications. • Ensure all engines of equipment and vehicles are turned off when not in use; • Ensure trucks are loaded to capacity prior to leaving site.
To maintain records	• Fill out the Spoil and Waste Management Register weekly as per Waste Management Sub-Plan; • Undertake regular periodic audits of the waste management activities.

2.7 Hazards and Risks

The risk of an environmental emergency or incident occurring during construction of the Control Centre is very low. Risks include contamination of the surrounding environment due to spills during re-fuelling activities, and/or the use of hazardous substances including quantities of oils, greases, fuel and chemicals. Other environmental risks are associated with service connections and could include contamination of waterways due to sewage spills and risk of fire associated with electricity connections.

All large plant and equipment will be refuelled from a mobile bowser. Smaller plant will be refuelled from "jerry can" type storage containers. Diesel will be stored in a bunded area within Compound H (establishment addressed in ECMS 2) in accordance with Planning NSW approval. A maximum of 15 jerry cans will be stored within a bunded location. Refuelling will be undertaken away from down gradient site boundaries and stormwater drains and in accordance with the Environmental Emergency Management Sub Plan.

Hazardous materials or chemicals will only be used in small amounts, away from drains. Compound H will be utilised to store small quantities of hazardous chemicals including paints, oils, lubricants, rodent baits etc. Quantities of dangerous goods on-site will not exceed quantities that require licensing as specified in the *NSW Dangerous Goods Regulation 1999*. Refer to ECMS 2 for specific storage requirements of these substances.

Spill kits will be located in the Palmer Street site (Compound H) and utilised in the event of a spill. They will be clearly marked and all personnel will be made aware of their location and trained in their use. Any spill will be cleaned up and disposed of in accordance with EPA waste classification requirements. The requirements of the Environmental Emergency Sub Plan will be implemented for any environmental emergencies.

A summary of environmental management measures in relation to hazards and risks contained in Table 2.8.

Table 2.8: Management of Hazards and Risks

Objective	Mitigation and Control Strategy
To ensure that all dangerous goods are properly handled and stored on-site	• All personnel will receive training on how to prepare and respond to an environmental emergency. • Fuel and diesel will be stored according to the requirements in the Material Safety Data Sheets (MSDS). • Fuel, diesel and chemicals located on-site will be stored away from drains, within a bund and in a well ventilated area. • Spill kits will be provided. • Ensure compliance with service providers for services connections.

2.8 Access and Traffic (incl. loss of parking)

A Traffic Management Plan as defined by Condition 46 of the approval of the Minister for Infrastructure and Planning, will be produced for the site and will outline the impacts on existing traffic including pedestrians, vehicles, cyclists and disabled persons. The Traffic Management Plan will be approved by the Traffic and Transport Liaison Group prior to the RTA granting a Road Occupancy Licence.

The majority of construction work for the Control Centre will be undertaken within the site boundaries requiring minimal day to day impact on the passing traffic. Access to residential properties on Egan Place will remain open at all times. Residents may however be required to move their vehicles prior to each days work commencing to enable access to the trench site for service installation. Specific consultation with residents will carried out prior to works being undertaken on Egan Place to ensure residents are aware of the service installation works and any requirements to move vehicles to enable access to the trench site. Consultation is addressed in Section 8 and the TMP will provide further details on impacts to these residents and management measures to be implemented.

Access to the construction site will be via Palmer Street, St Kilda Lane and Egan Place. These entry/exit points will be given a gate number and be clearly identified to suppliers to prevent problems with incorrect deliveries. In general access will be restricted to left in and left out and the access points will be provided with an approved traffic controller to guide vehicles.

The proposed works will be constantly monitored by site inspections, responding to inquiries and complaints received through communication with the Traffic Management Centre. All work affecting traffic, as outlined in the TMP, will be forwarded to the Traffic and Transport Liaison Group for comment.

2.8.1 Waste and Spoil Transport

Spoil during the site excavation works will be removed over approximately 3 days during the construction of the Control Centre. Approximately 100 trucks (4 trucks/hr) will remove spoil and waste off-site over this period.

Spoil trucks will enter the site from Palmer Street and will exit the site onto either Palmer Street or Cathedral Street. These trucks will then proceed left onto William Street, left into Bourke Street, left into Cathedral Street, right into Palmer Street and proceed up to the Shakespeare Place U turn facility and then enter the Eastern Distributor

Concrete/asphalt/mixed rubble will be sent to Metropolitan Demolition, St Peters or Kurnell Landfill. Inert waste will be sent to Kurnell Landfill. Truck haulage routes are defined in the Spoil Management Sub-Plan.

Spoil haulage will only be undertaken during normal working hours.

2.8.2 Deliveries

The majority of deliveries to the site will be made via Palmer Street or Egan Place/St Kilda Lane. Material will then be moved on site using forklift vehicles to small trucks, cranes or a Hiab truck. All compound gates will be adequately signposted to direct delivery vehicles.

2.8.3 Other Traffic Impacts

Some plant and equipment are oversized, and may require lane closures. These will be subject to RTA road restrictions resulting in the need for night time deliveries. Some activities will also require a lane closure on Palmer Street. These are detailed in **Section 1.6**.

2.8.4 Environmental Management

Access to adjoining properties will be maintained for the duration of the works. The Traffic Management Plan addresses any further impacts on the traffic, including emergency services access, bus and taxi operations, pedestrian amenity, bicycle users and parking facilities.

A summary of environmental management measures in relation to access and traffic is contained in Table 2.9.

Table 2.9: Management of Access and Traffic

Objective	Mitigation and Control Strategy
To minimise traffic disruption in the surrounding local area	• Letter drop to residents / businesses before construction when required; • Maintain access to existing side streets, laneways, adjoining properties. Consult with property owners where special access is to be provided; • Consult with property owners regarding moving vehicles in Egan Place for the service installation works; • Ensure all deliveries and truck movements are co-ordinated with specific date, time and site entry/exit points nominated. Where ever possible entry to be left turn in and left turn out; • Ensure safety fences/site barricades are in place prior to works commencing on-site; • Ensure truck haulage routes are via designated roads; • Reduce speed restrictions in the work zone from 50 kph to 40 kph; • Utilise traffic controllers where necessary; • Ensure Road Occupancy Licence is obtained prior to works; • Regular road safety audits and inspections of traffic control measures to ensure that they function correctly and traffic impacts are kept to a minimum.

2.9 Visual Impacts (incl. screening)

The construction site is located in a public area which is highly visible to all parties. Site boundary fencing and hoarding has previously been erected during site establishment of the Palmer Street Compound H.

Occupants of the buildings adjacent to the construction zone in Palmer Street will be able view the work from an elevated position. Items such as security lighting will be positioned where ever possible to have the minimal effect outside the construction zone whilst still providing adequate lighting for safe operation of equipment and security purposes. Regular

inspections will be undertaken to ensure the site is kept as neat and tidy as practically possible. All hoardings, walls and fences will be painted in a consistent colour and design.

A summary of environmental management measures in relation to visual impacts is contained in Table 2.10.

Table 2.10: Management of Visual Impacts

Objective	Mitigation and Control Strategy
To minimise the visual impact of the work sites on the surrounding community.	• Direct site lighting inward to minimise light spilling into the surrounding area. • Ensure site hoarding and fences are erected to minimise the visual impact of construction activities. • Ensure all hoardings, walls and fences are painted in a consistent colour scheme (Condition 169). • Keep work area tidy at all times. • Undertake regular inspections to ensure site is kept as tidy as practically possible. • Undertake regular inspection of site hoarding to identify and remove any graffiti and/or bill posters.

2.10 Utilities

Utilities installations form a part of the works for the Control Centre site. The concept design of the Control Centre has endeavoured to retain services in their current location and design the works around it to minimise disruption. The contractor will ensure:

- Consultation with service/utility providers is undertaken;
- Relevant desktop information of existing services is reviewed;
- On-site 'potholing' inspections are undertaken where required to verify/supplement the existing survey in formation;
- Determining the works required for service relocation/connection and ensuring these are integrated into the construction planning; and
- Minimising the disruption to services and environmental impacts of these works on the surrounding area.

The risk of disruption to the surrounding community due to service connection, installation or unexpected breakages is minimised and managed via this process.

The following utilities will be installed (refer **Section 1.3.3**):

- Water main;
- Sewer/Stormwater;
- Electricity; and
- Telecommunications.

Some night works will be required for decommissioning and recommissioning of these services as detailed in **Section 1.6**. The management of night works is detailed in **Section 2.1**.

Design and construction methods employed on the CCT adequately mitigate the risks associated with potential loss of electricity supply due to road collapse or other possible construction-related damage to Electricity Australia infrastructure.

All on-site structures will be commissioned to ensure all services are working correctly. This will be repeated on a quarterly basis for electrical services as required by WorkCover Code of Practice 'Electrical Practises for Construction Work'.

A Permit to Commence work system will be used and all tasks will be completed by qualified tradesmen to WorkCover Codes of Practice, Australian Standards, and in consultation with the service provider.

A summary of the management of utility impacts is contained in Table 2.11.

Table 2.11: Management of Utility Impacts

Objective	Mitigation and Control Strategy
Minimise any disruption to utility services in the local area.	• Liaise with service providers prior to undertaking installation works.
Ensure that utilities are connected to minimise potential for environmental impacts.	• Undertake site inspections prior to use of utilities on site to ensure they are connected correctly.
Ensure relevant licences/approvals are obtained prior to connection to trade waste and stormwater	• Zone Manager to ensure that relevant licences are obtained prior to connection to services.

Appendix G

Urban Design Statement

HASSELL

Appendix G

Modifications to the Cross City Tunnel Tunnel Control Centre

Urban Design Assessment

Prepared for BHBB CCT JV
October 2003

HASSELL Pty Ltd 007 711 435
Level 2, 88 Cumberland Street Sydney NSW 2000 Australia
Telephone 61 2 9273 2300 Facsimile 61 2 9273 2345
Email sydney@hassell.com.au
Contact: Ross de la Motte
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HASSELL

ARCHITECTURE INTERIOR DESIGN LANDSCAPE ARCHITECTURE PLANNING URBAN DESIGN

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01 INTRODUCTION

01.1 General

This report has been prepared as an assessment of urban design issues to accompany a Review of Environmental Factors (REF) by the Roads and Traffic Authority (RTA) to in relation to the proposed modifications to the Tunnel Control Centre for the Cross City Tunnel. The following urban design assessment contains a general outline of the urban design approach for the project, descriptions of the various urban design elements, a review of urban design issues and detailed plans that describe the works specifically associated with the relocated Tunnel Control Centre.

If approved, final urban design proposals for the modified Tunnel Control Centre would be contained in an urban design plan prepared in response to Condition 166 of the approval of the Minister for Infrastructure and Planning.

01.2 Scope

HASSELL have been engaged by BHBB CCT JV to provide urban design and architectural services for the Cross City Tunnel including the Tunnel Control Centre. Maunsell Australia has been engaged by BHBB JV to provide civil and structural engineering services for the project. Meinhardt Pty Ltd has been engaged by BHBB JV to provide building services engineering. The RTA has engaged Parsons Brinkerhoff to prepare the REF submission.

The scope of this report is limited to the modified Tunnel Control Centre Buildings and does not include any associated soft landscape, hard landscape, furniture and fixtures and road structures and elements. Where applicable to this precinct, these items would be covered in a separate Condition 166 submission for the remainder of the project.

HASSELL has been involved in the design development of the modified Tunnel Control Centre and the preparation of drawings for the RTA's REF submission DIPNR. This input has been provided with regard to and consideration of the following:

- The Cross City Tunnel Environmental Impact Statement (EIS) and associated representations and approved activity reports;
- The Cross City Tunnel Supplementary Impact Statement (SEIS) and associated representations and approved activity reports;
- Relevant MUAP Conditions particularly No.s 63, 166, 170, 178;
- Scope of Work and Technical Criteria - Cross City Tunnel Project Deed including Appendix 22;
- Structural and civil engineering design input;
- Stakeholder input, where received;
- Relevant Australian Standards and the Building Code of Australia; and
- The Eastern Distributor in Woollomooloo and East Sydney surface works and redevelopment of Residual Lands and Air Rights Masterplan.

Please note that the above list is not exhaustive. The concept design of the Tunnel Control Centre project has been balanced with and influenced by numerous items including existing structures, services, road

geometry, road safety requirements, geotechnical data, structural requirements and selected construction systems. The urban design aspects of the Tunnel Control Centre design must also be seen as building upon the urban design developed prior to and during the Environmental Impact Statement process by the RTA's urban designer, Jackson Teece Chesterman and Willis (JTCW). The JTCW design formed the basis for the agreement between RTA and CCM/BHBB JV.

01.3 Background

The Cross City Tunnel is a project with several aims and objectives, two of which are to provide motorists with a new and improved route across the city and to reconnect the city in the traditional sense though 'people' spaces. The project creates urban and landscape design opportunities that allow us to achieve this and to enhance the experience of the city. A series of principles have been followed to ensure that the design approach is focussed on these aims. These design principles then inform the parts that make up the Cross City Tunnel project.

The design principles are as follows:

- To improve and promote accessibility by improving the street environment
- To provide improved pedestrian connections by promoting street edge activity and reinforcing preferred built form
- To provide a new road system that contributes and enhances the visual quality of the city's environment by addressing the form and appearance of the portals
- To provide a circulation system that is logical and legible for users
- To improve safety for drivers and pedestrians through better visibility

The urban and landscape design addresses these principles in an integrated manner over the whole site, and also by considering the local context and issues. The nature of the project means that there is both a public element created by reconnecting the streetscape and a hidden element of the tunnel itself. As a result the design can be divided into two distinct parts:

Tunnel:

The tunnel is considered as a single entity that only emerges at the entry and exit points which become new elements in the city environment. A consistent design approach has been followed for the design of the portals and selection of finishes for the visible pieces, which allows the Cross City Tunnel to become identifiable as a unique transport system. Simple materials and detailing are used for the visible structures, and the vertical lining panels create a rhythm to the driving experience. The black tunnel roof creates a void above the suspended tunnel lighting which gives a sense of space within the tunnel.

Public Domain:

The public domain is considered as a series of distinct spaces within the city, which are each informed by their surroundings. The Cross City Tunnel provides the opportunity to improve public spaces, where the real benefits of the project will occur. The reduction of traffic on ground level will enable the revitalisation of these areas, where the design proposals respond to the local context and enhance the existing environment. This is done by improvements to the public areas in the form of new finishes and furnishings, street tree planting and improved pedestrian connections, all of which are described in the appended detail drawings.

02 URBAN DESIGN ELEMENTS:

02.1 Structures – Buildings

The modified Tunnel Control Centre consists of two buildings each located on sites created as a result of the construction of the Eastern Distributor. Both sites are situated above the Eastern Distributor cut and cover tunnel structure. The sites are nominated in the "Surface works and redevelopment of residual lands and air rights master plan" as Site 3A and Site 2. This masterplan was prepared for the RTA by Jackson Teece Chesterman and Willis Pty Ltd (JTCW) in August 2000. It addresses the development of surplus land created as a result of the construction of the Eastern Distributor and specifically deals with developments with a frontage to Palmer, Cathedral, William and Stanley Streets in East Sydney.

Site 3A (88 Palmer St)

Appendix 5 of the Cross City Tunnel Representations Report proposed a scheme for a three storey building on this site. The approved building incorporated a publicly accessible ground floor reception area for the issuing of "E tags" for toll motorway purposes and an area of car and truck parking on the ground floor with access form the rear and side lanes, a usage pattern typical of the area. The two upper levels were articulated in a manner which denoted their usage as commercial, a use typical of the area.

This scheme formed the basis of the approval to develop the CCT Tunnel Control Centre on this site. After the commencement of design work, however, it was found that the Eastern Distributor cut and cover structure in this location did not have the required bearing capacity to support the approved building. Consequently, the proposal is for a single storey building which retains the enclosed truck parking area, workshop/storage and maintenance staff amenities of the existing approval. Under the proposal the public reception area for the issue of "E Tags" and commercial office space functions are transferred to Site 2. It is proposed that the boundary between Sites 3A and 3B be modified northwards by 7m such that more area will be provided to Site 3B which is zoned residential.

Site 2 (141 Cathedral St)

This site was the subject of a Development Application to South Sydney Council prepared by JTCW for the RTA in October 2000. The proposal for a three storey building on this site was approved by South Sydney Council. The South Sydney Council Delegated Report (October 2001) noted that the approved development of the site wholly as a commercial building is appropriate. The DA proposal was referred to South Sydney Council's Urban Design coordinator for comment without objection and was noted as being a reflection of the Masterplan. The proposed design consolidates the ground floor reception area (E tag), first and second floor commercial office space into the three storey building on Site2 while utilizing the general building form established by the approved DA scheme.

03 REVIEW OF URBAN DESIGN ISSUES:

The August 2000 Masterplan prepared by JTCW adheres to the relevant urban design principles of South the "South Sydney Plan" including:

- Setting;
- Building and Heritage;
- Public space and pedestrian networks; and
- Design for sustainable, healthy environments.

Both Site2 and 3A are located within the precinct identified in the Masterplan as:

- Palmer Street North.

The Masterplan identifies the reinstatement of the eastern edge of Palmer Street as a significant urban design opportunity for this precinct. The proposed buildings will make an important contribution to this outcome. The following is a summary of the urban design issues identified specifically for Site 2 and Site 3A in the Masterplan and a commentary of the responses provided for in the proposed scheme.

03.1 Site 2

ISSUE
Site boundary setback from Palmer Street to allow for a footpath of similar width to that on the west of Palmer Street (approximately 3.6m)
COMMENT
This is adopted in the proposed design.

ISSUE
The building alignment is to be set back from adjacent building by 4.5m to allow for south flowing vehicular access to Egan Place.
COMMENT
The existing proposal incorporates the laneway as a pedestrian/bicycle thoroughfare. It also mediates between the change in scale from the heritage terrace houses on Cathedral St to the mixed scale character of Palmer St.

ISSUE
The building is to continue façade alignment of Cathedral St
COMMENT
This is adopted in the proposed design.

ISSUE
The building is to Provide urban edge of Palmer St
COMMENT
This is adopted in the proposed design. The scale of development balances with that on the corresponding western side of Palmer Street.

ISSUE
The building is to comply with South Sydney Council requirements for corner sites.
COMMENT
The relationship of the building to the corner is consistent with the approved DA.

ISSUE
The building is to incorporate many openings on north, west and east facades so as to increase security of lanes.
COMMENT
South Sydney Council's Delegated Report for the Site 2 Development Application noted that the application was consistent with the safety and security provisions of Part D of DCP 1997 in regard to the Palmer and Cathedral Street frontages. These provisions are adopted in the proposed design which distributes activity to the main frontages. Large areas of glass are provided on these frontages to promote passive surveillance.

ISSUE
The building façade is to be articulated to create visual interest using techniques such as expressing structure or climate control devices. Fully glazed or highly reflective black glass facades are to be avoided.
COMMENT
This is adopted in the proposed design. The proposal incorporates sun control louvers to the western façade and an operable blind on the north. The ground floor street front wall is set back to articulate the façade. The entry area is also set within a first floor cantilever which marks the entrance to the building form the street; particularly from the southern approach which is seen as the main pedestrian route to the building. The disposition of solid areas of wall to glass and the affect of shadow has been considered in the composition of the façade.

The building presents an "active street frontage" to both the Cathedral and Palmer Street frontages in the form of a publicly accessible ground floor reception area for the issuing of "E tags " electronic tolling purposes. This is consistent with the aims of the Masterplan and the existing Site 2 and 3A approvals. Glass areas on the ground floor are intended as an active street front by offering a degree of transparency to the interior of the building which may include a public front of house or point of sale activity.

ISSUE
Loading dock to east or southern sides
COMMENT
There is no requirement for a loading dock although undercover car parking is located on the southern side.

ISSUE
No vehicular access from Palmer Street
COMMENT
This is adopted in the proposed design.

ISSUE
The building is to have Mezzanine floors to northern side where height and engineering constraints allow.
COMMENT
Height and functional constraints do not permit the inclusion of a mezzanine floor.

03.2 Site 3A

ISSUE
Site boundary setback from Palmer Street to allow for a footpath of similar width to that on the west of Palmer Street.
COMMENT
This is adopted in the proposed design.

ISSUE
The building façade is to be articulated to create visual interest using techniques such as expressing structure or climate control devices. Fully glazed or highly reflective black glass facades are to be avoided
COMMENT
This is adopted in the proposed design. The proposed design reflects the warehouse character of a number of buildings in the area. Deep recessed windows provide articulation and an active street front. A neatly finished parapeted extends above the roofline to provide a large building mass to the street. The Site 3A building is visually different to the Site 2 building thus providing a varied streetscape which reinforces the existing character of the area.

ISSUE
Site boundary setback from Egan Place by 3m to allow for a footpath and/or vehicular access on the western side of Egan Place.
COMMENT
A widening of Egan Place was proposed in the original Site 3A approval to enable truck access to that building. The proposal seeks to retain this arrangement.

ISSUE
The building is to take advantage of the gradient of the site
COMMENT
A single floor level has been used in order to accommodate the functional requirements of truck parking and workshop/storage areas. The floor level has been determined by the levels at the higher end of the site. The design incorporates a horizontal parapet as a stronger and more unified urban design response than a raking or stepped profile.

ISSUE
The building is to Provide urban edge of Palmer St
COMMENT
This is adopted in the proposed design. The scale of development balances with that on the corresponding western side of Palmer Street.

ISSUE
The building is to incorporate many openings on all facades so as to increase security of lanes.
COMMENT
This is adopted where possible. The functional nature of this building as a truck parking/ workshop building does not permit large areas of glazing because of noise and visual amenity issues. However, windows have been provided on the north, west and east walls to activate facades and maintain a degree of surveillance.

ISSUE
The building is to provide pedestrian entries from Palmer Street.
COMMENT
The building provides a single pedestrian entry on the corner adjacent to Palmer Street. Public access to the building is not proposed.

ISSUE
The building is to have a maximum height of 10m at the southern end. This is to ensure maximum sunlight access to the private open space of the adjoining proposed terrace to the south.
COMMENT
The proposed building is 6.4m in height at the southern end, which is less than the indicated maximum.

Appendix A
Urban Design Elements - Built Elements & Finishes Schedule

CROSS CITY TUNNEL - TUNNEL CONTROL CENTRE
SITE 2 and 3A PALMER ST, WOOLLOOMOOLOO
SCHEDULE OF EXTERNAL BUILT ELEMENTS AND FINISHES

OCTOBER 2003

Location	Space	Item	Material/Description	Finish	Remarks/Comments
Site 3A	External	Walls	Prefinished pressed metal cladding on steel sub-frame	Colorbond	Colours - to be selected
		Walls (base)	Commercial cladding system on steel sub-frame	Prefinished paint system	Colour - to be selected
		Garage doors	Commercial panel lift door	Colorbond	Colour - to be selected
		Roof	Prefinished pressed metal sheeting	Colorbond	Colour - to be selected
		Rainwater goods	Prefinished pressed metal profile	Colorbond	Colour - to be selected
		Windows	Commercial aluminium frame system	Natural anodised	Clear finish
		Glazing	Performance Glass	Selected tint	min thickness to AS 1288 & BCA
		Fixed ventilation louvres	Extruded louvres on steel sub-frame	Powdercoated aluminium	Colour - to be selected
		Carpark	Asphalt	Road surface	line markings and other symbols as required
		Soffit	Compressed fibre cement on steel sub-frame	Prefinished paint system	equal to "Vitrepanel", Colour - to be selected
Site 2	External	Walls (base)	Face Brickwork	Glazed blue- black brick	
		Walls (office levels)	Commercial cladding system on steel sub-frame	Factory applied paint system	Colour: White (with feature colour over entry)
		Walls (high level /plant room)	Commercial cladding system on steel sub-frame	Metallic finish	Colour: zinc
		Walls (base under glazing)	Painted Rendered Brickwork	Exterior grade paint: matt finish	Colour - to be selected
		Garage doors	Commercial panel lift door	Perforated prefinished metal screen	Colour - to be selected
		Balustrade	glass with stainless steel handrail	Selected tint	min thickness to AS 1288 &BCA
		Roof	Prefinished pressed metal sheeting	Colorbond	Colour - to be selected
		Rainwater goods	Prefinished pressed metal profile	Colorbond	Colour - to be selected
		Windows	Commercial aluminium frame system	Natural anodised	Clear finish
		Entry steps	Concrete/unit paving on concrete/rendered painted brickwork	Vertical faces: painted render Horizontal surfaces: unit paving/concrete	Colour - to be selected Colour - dark colour to match adjacent asphalt paving
		Glazing	Performance Glass	Selected tint	min thickness to AS 1288 &BCA
		Fixed louvres: plant	Extruded louvres on steel sub-frame	Powdercoated aluminium	Colour - to be selected
		Fixed louvres: suncontrol	Extruded louvres on steel sub-frame	Natural anodised	Clear finish
		Operable exterior blind (to level 2 north façade)	Proprietary operable woven fabric sun control blind	Woven Glass Fibre	Colour - to be selected
		Soffits	Compressed fibre cement on steel sub-frame	Prefinished paint system	equal to "Vitrepanel", Colour to be selected

Appendix H

Appendix 5 of Original Representations Report - Details of Approved Tunnel Control Centre

APPENDIX TO THE REPRESENTATIONS REPORT
Supplementary Environmental Impact Assessment

CROSS CITY TUNNEL CONTROL BUILDING

at

88 PALMER STREET, WOOLLOOMOOLOO

(Noted as Site 3A in the Master Plan)

JANUARY 2001

Prepared by:

jackson teece chesterman willis pty ltd
ACN 083 837 290
101 Sussex Street
SYDNEY NSW 2000
Telephone: 9290 2722
Facsimile: 9290 1150
Email: jtcwhome@jtcw.com.au
Web site: www.jtcw.com.au

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1.0 EXECUTIVE SUMMARY

This Supplementary Environmental Impact Assessment report for the proposed Cross City Tunnel (CCT) Control Centre, forms an Appendix to the Representations Report being lodged with the Department of Urban Affairs and Planning.

The new Control Centre is proposed to be located on what has been called Site 3A in the recently DUAP approved Master plan for the Disposal of Residual Lands prepared by Jackson Teece Chesterman Willis[1]. Site 3A is located at 88 Palmer Street, Woolloomooloo and is bounded by St Kilda Lane, Egan Place and an un-named lane to the south. The proposed development presents as a 3 storey building fully covering the site. The site area is approximately 800m^2, (excluding area set aside for laneways).

The site is vacant and overlies for the most part a section of cut and cover tunnel which forms a section of the recently completed Eastern Distributor motorway.

The site's "mid block" location presents an opportunity to create a building which contributes to the edge definition of the eastern side of Palmer Street from Cathedral to William Street. The process of re-establishing this long-lost streetscape has already commenced with recent proposals to South Sydney Council for new buildings to Sites 1A and 1B.

The impact of the site's major constraint, the presence of the tunnel structure below, limits the size of the development to 3 storeys. This level of development is similar to the surrounding area, and is of the order permitted by Council's planning controls.

Recently an over-arching master plan for this and other residual sites being made available by the Roads and Traffic Authority of New South Wales (RTA), was lodged with Council. This master plan was the result of discussions with Council, UDAS (consultants to Council and representing the Department of Urban Affairs and Planning) and affected residents. This site-specific application follows the direction set in the master plan and refines the proposal to a level appropriate to a development submission.

The development is contemporary in expression and engages with current concerns regarding issues of context to surrounding buildings, solar access, cross ventilation and ecologically sustainable design (ESD). Its semi-commercial nature continues a theme found in the area and would contribute to the cultural diversity that characterises this part of Woolloomooloo. Its construction will form an important element in an area which has experienced, and appears will continue to experience, rapid change and improvement.

[1] The title of the master plan is "Eastern Distributor in Woolloomooloo and East Sydney. Surface Works and the Redevelopment of Residual lands and Air Rights Master Plan. August 2000". The document was commissioned for the Roads and Traffic Authority of NSW.

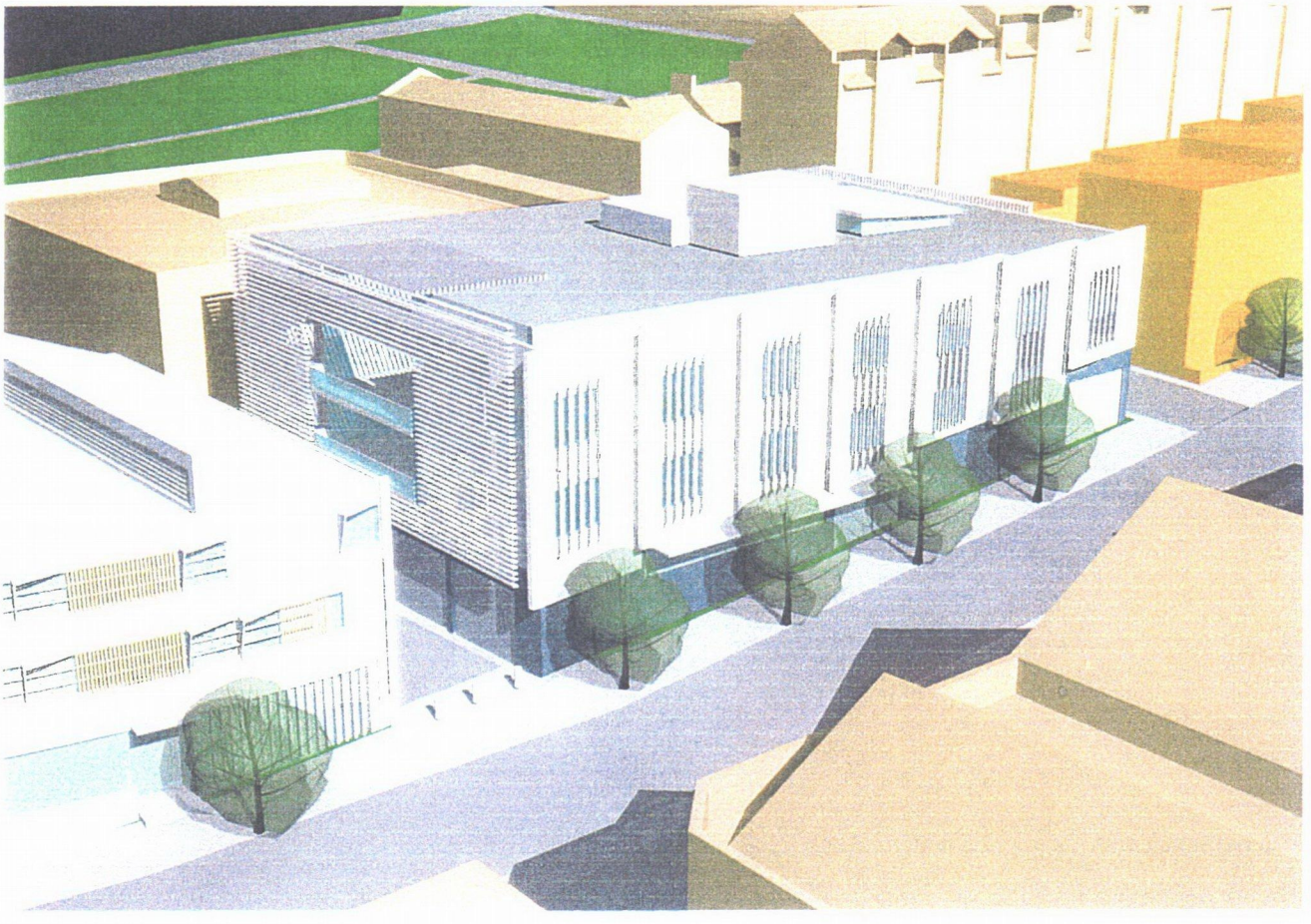


Figure 1: Aerial View of Proposed Control Centre

2.0 OVERVIEW

2.1 INTRODUCTION

A planning map from the mid 1970s shows Palmer Street in a much different configuration than that which currently exists (refer Appendix 7.2). The now removed William Street underpass access road and cutting from Cathedral Street south to William Street effectively removed any eastern edge definition that Palmer Street had prior to construction of the underpass in the mid 1970s.

With completion of the Eastern Distributor this area has been generally returned to its pre 1970s state, albeit without any buildings. The lower, more northerly sites on Palmer Street noted as Sites 1A and 1B are the subject of recent Development Applications lodged with South Sydney Council (Refer to "Eastern Distributor in Woolloomooloo and East Sydney. Surface works and the Redevelopment of Residual Lands and Air Rights Master Plan" for further detail). The proposed site described in this document has been designated by the RTA as the location of the Control Building for the Cross City Tunnel project. As such the RTA wish to include its construction and operation as part of the Cross City Tunnel proposal, for which approval is now being sought.

The Department of Urban Affairs and Planning (DUAP) required, as part of their conditions of approval for the Eastern Distributor, that the RTA prepare an Urban Design Guideline Master Plan prior to the disposal of any surplus sites such as this site. The master plan has recently been lodged with Council and DUAP and its stated intention is to propose development controls specific to the various sites within the framework of the existing Council Planning Controls as set out in the South Sydney Plan.

While the proposed development will not be assessed by South Sydney Council the proposal generally conforms with the requirements of Council and follows the direction set in the Masterplan.

The building presents an "active" presence to Palmer Street in the form of a publicly accessible ground floor reception area for the issuing of "E tags" for toll motorway purposes. An area of car parking on ground is accessed from the rear and side lanes, a usage pattern typical of the area. The two upper levels are articulated in a fashion which denotes their use as commercial, a use typical of the area. An active and visually interesting roof form is proposed in order to aid operational efficiencies and acknowledge that the roof area is overlooked by many adjacent buildings.

Located in an important area the proposed building would fill in the gap in the streetscape and continue the urban renewal process characteristic to the area with the completion of the Eastern Distributor.

Issues of ESD, cross ventilation, solar access, and visual security to the laneways to the east and south to all levels have guided the location of windows. Open plan layouts have been designed with future partitioning of the spaces as required.

2.2 THE PROPOSED CROSS CITY TUNNEL CONTROL CENTRE

This document describes the construction of a three storey commercial building fronting Palmer Street, with rear lane access via Egan Place, and side lane access via a yet to be named lane to the south, and St Kilda Lane to the north.

SCHEDULE OF ACCOMMODATION

Ground Floor Level

- 10 car spaces (including 1 accessible car space) accessed from St Kilda Lane and Egan Place.
- Truck parking area accessed from Egan Place and discharging to Palmer Street.
- Lift lobby / fire stair discharge.
- Reception Area.
- Miscellaneous change/locker/workshop spaces.
- Rubbish store area
- Switch/meter rooms.

First Floor Level

- Commercial office space and northern balcony.
- WCs, fire stair, lift.
- Internal stair access to Second Floor Level.
- Accessible toilets.
- Shower for employees.

Second Floor Level

- Commercial office space and northern balcony.
- WCs, fire stair, lift.
- Internal stair access to First Floor Level.

Roof Level

- Roof area.
- Plant platform.
- Roof access stair and enclosure.

The proposal is outlined in the following drawings and figures which accompany the documents in this Supplementary Environmental Impact Assessment:

Drawing Number	Revision	Title
A.01	A	Ground Floor Plan
A.02	A	First Floor Plan
A.03	A	Second Floor Plan
A.04	A	Roof Plan
A.05	A	North and West Elevations
A.06	A	South and East Elevations
A.07	A	Section 1
A.08	A	Section 2

3.0 THE CONTEXT

3.1 LOCAL

The subject area of South Sydney, namely Woolloomooloo, has, since the 1970s, been the focus of major infrastructure improvement projects, namely:

- The Eastern Suburbs Railway
- The now removed William Street underpass
- The Eastern Distributor Motorway

It is understood that no further projects are planned for the area around the site, as the proposed Cross City Tunnel is generally under William Street.

With the completion of the Eastern Distributor and the consequent reduction of surface traffic, it is anticipated that the positive aspects of the area, namely its close proximity to the CBD, public transport and green space, will drive a transformation of the area with residential, small scale commercial and showrooms creating a village atmosphere.

Numerous small refurbishments have occurred or are occurring in the surrounding area of a commercial, retail, and/or residential nature, all of which contribute to a general renewal of the area. Development Applications have been submitted for a number of the local, similar RTA residual sites.

3.2 IMMEDIATE

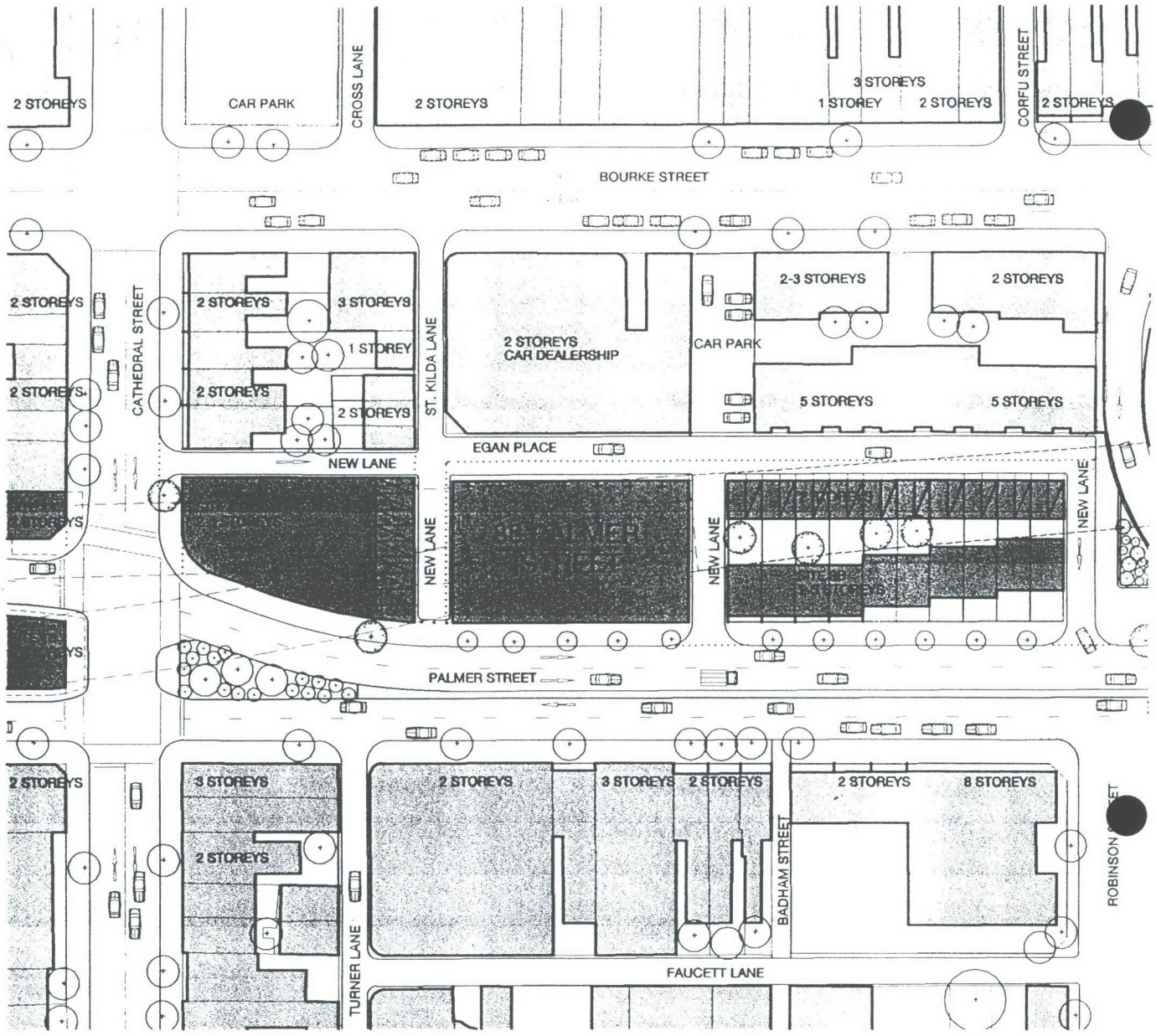
East side of Palmer Street
This side of Palmer Street is currently vacant, however its future urban character has been outlined in the Masterplan and elaborated to some degree in the DA lodged recently with Council for Site 2 (this application is included in Appendix 7.1.)

Generally the street would regain edge definition with buildings of 2-3 storey massing which mirror that which exists across Palmer Street on the west.

West side of Palmer Street
The area of Palmer Street immediately fronting the site can be defined by Badham Street to the south and Turner Lane to the north (refer Figure 2 for area map.) This section of street is characterised by 2-3 storey buildings displaying varying front setbacks and no side setbacks. These buildings accommodate a range of functions such as:

- residential;
- commercial;
- backpacker type accommodation;

and vary in age from mid 18th century to late 1980s.



KEY:

PROPOSED CROSS CITY TUNNEL CONTROL CENTRE BUILDING

EXISTING BUILDING

PROPOSED BUILDINGS
(REFER TO EAST. DIST. IN WOOLLOOMOOLOO AND EAST SYDNEY. SURFACE WORKS AND THE REDEVELOPMENT OF RESIDUAL LANDS AND AIR RIGHTS. AUGUST 2000.)

EXISTING TREE

PROPOSED TREE
(REFER TO EAST. DIST. IN WOOLLOOMOOLOO AND EAST SYDNEY. SURFACE WORKS AND THE REDEVELOPMENT OF RESIDUAL LANDS AND AIR RIGHTS. AUGUST 2000.)

SCALE 1:1000 AT A4

0 10 20 40 60 metres

Location / Context Map **FIGURE 2**

jtcw

3.4 POSSIBLE FUTURE CHARACTER OF LOCAL CONTEXT

It is anticipated that, as the major infrastructure works in the area are now complete, the immediate area will return to a more low intensity development environment. Nevertheless the area's obvious advantages, i.e. closeness to the CBD, major open spaces and entertainment precincts, will continue to encourage mostly new building and refurbishment of existing building stock.

4.0 THE SITE

4.1 REAL ESTATE / SURVEY DESCRIPTION

The RTA is currently preparing new boundary data for inclusion on title details prior to lodgement with the Land Titles Office. Included in Appendix 7.3 is the current survey drawing.

Current street address is: 88 Palmer Street.

The site is now vacant and free of buildings and trees. The surrounding footpath/kerbs and guttering to Palmer Street are fully formed up.

Site area (approx.):

Total site area	:	1220 m^2	(includes laneways)
St Kilda Lane	:	130 m^2	
Egan Place	:	160 m^2	
Southern unnamed lane	:	130 m^2	

4.2 SITE ANALYSIS

A summary of factors which influence he possible development of the site is listed below in terms of the opportunities and constraints:

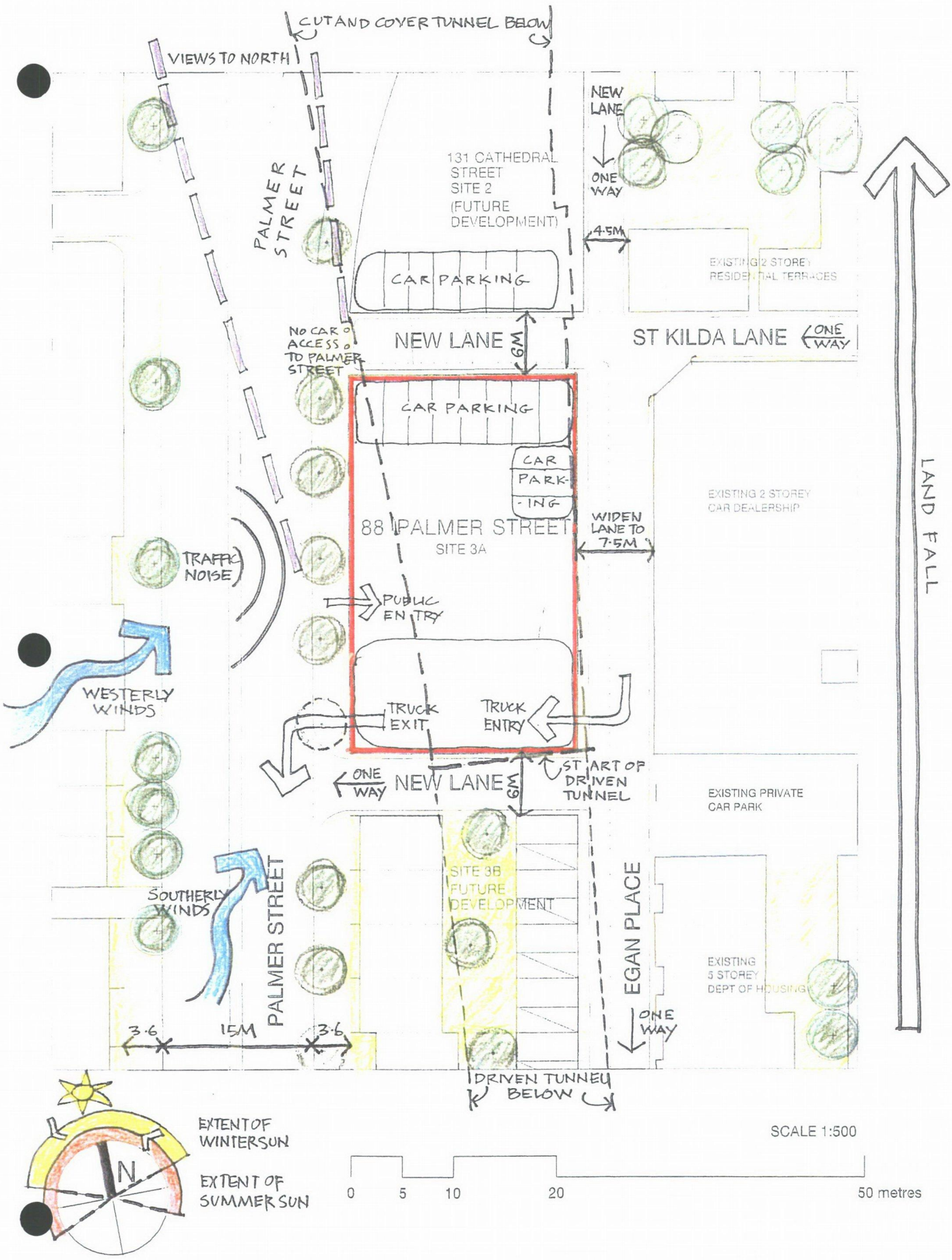
Opportunities include:

- The opportunity to repair the gap in the streetscape.
- Site displays well to road network and enjoys excellent exposure.
- Existing zoning permits use.
- Creation of new (unnamed) laneway to the south and extension of St Kilda Lane to the north and the widening of Egan Place provide and improve rear access for service and car parking.
- Close proximity to CBD, major public green spaces and entertainment precincts.
- Convenient access to public transport.

Constraints include:

- The site is mostly over the pre-cast concrete planks that form the top of the cut and cover Eastern Distributor Tunnel underneath which imposes structural limitations.

The following diagram outlines graphically the site analysis undertaken.



SITE ANALYSIS DIAGRAM

jtcw

4.3 TOPOGRAPHY

The site when traversed in a southerly direction rises from St Kilda Lane to the unnamed southern lane, with an approximate overall change in level of 3.5 metres. It is located in the Woolloomooloo basin and has northerly views across to the Sydney Harbour and westerly views along Cathedral Street to the CBD.

4.4 VISUAL CHARACTER

The surrounding buildings are 2 to 3 storey in scale with a mix of residential and commercial uses being accommodated. The Council has defined the "thematic character" (Part C: Public Domain 5, Eastern Districts Public Domain Plan). The visual character of the development proposed is consistent with Council description.

4.5 HERITAGE

The site is not located within a Heritage Conservation Area.

4.6 STORMWATER

Council's Public Works Department has advised that on-site stormwater detention systems are required for sites over 1,800 sq.m. The proposed development site area is 1220m^2 approx. (excluding proposed new laneways), therefore stormwater detention is not required.

There are no known stormwater disposal problems associated with the site. The proposed development would dispose of its stormwater directly to existing underground stormwater lines.

4.7 VEGETATION

Currently the site is bare of vegetation.

4.8 GEO-TECHNICAL

The proposed development site partially overlies the primary northern entry tunnel of the Eastern Distributor (southbound). The subject section of tunnel was formed by cut and cover methods.

As part of the preparation of the master plan Hyder Consulting have drafted a structural assessment report of the sites (refer Appendix 7.4).

The structural assessment report findings for Site 3A are summarised below:

- The additional allowable live load capacity of the tunnel roof structure is estimated to be in the range of 15kPa to 20kPa for load factors of 2.0 and 1.5 respectively. This assumes removal of all overburden material.
- The cut and cover tunnel section could support either a two storey development of conventional construction or a three storey development with timber/steel upper floors.

The structural assessment report was preliminary only. Further input from engineers will be required as the design proceeds.

4.9 URBAN SERVICES

A full range of standard urban utility services (water, sewerage, drainage, communications and energy) is available to the site.

4.10 WASTE MANAGEMENT

It is anticipated that a private contractor would be engaged to remove waste generated in the development. A rubbish enclosure is provided with direct access from Egan Place. Its design, finishes, etc, would be in accordance with Council guidelines.

4.11 ACOUSTIC (TRAFFIC)

As there is no residential component to the development no specific acoustic report has been commissioned.

4.12 VEHICLE ACCESS

The site possesses frontages to Palmer Street and three laneways. It is proposed to access the site via either the northern extension of Egan Place to Cathedral Street or via St Kilda Lane from Bourke Street. It is proposed that trucks associated with the maintenance of the Cross City Tunnel would access Palmer Street from the site via a dedicated footpath crossing and passenger vehicles would access Palmer Street via either the unnamed southern lane on the site or via the proposed lane located at the southern end of Egan Place.

4.13 SOIL CONTAMINATION

The known past use of the site was residential. This use is not noted as "High Risk" in Council's High Risk Land Use table.

The point should also be made that the site has been fully excavated to a depth of 12m approx. below natural ground level as part of construction of the Eastern Distributor, effectively sanitising the area.

5.0 THE PROPOSED CROSS CITY TUNNEL CONTROL CENTRE

5.1 URBAN PLANNING OBJECTIVES

(Page numbers in item 5.1 refer to "The South Sydney Plan" by South Sydney Council.)

An area of concern related to the construction of the Eastern Distributor (ED), which generated the subject site, has been management of the disposal of residual RTA sites in a manner that results in successful urban outcomes. The outcome should benefit both the ultimate owner of the site and the broader community. This objective is consistent with the scale of the ED and its impact on inner Sydney as a whole.

The Department of Urban Affairs and Planning (DUAP) acknowledged this goal by making approval of the ED conditional on the adoption by Council of a master plan for development of the respective sites. This master plan is currently with Council for their consideration. Its objectives are based on applying Council's overarching planning requirements set out in the South Sydney Plan and are summarised below.

PART B: URBAN DESIGN PRINCIPLES

Setting (pp.8-9)

Buildings are to:

- Reinforce the urban character;
- be generally residential or mixed use;
- incorporate "fine grain" textures that enhance the historic character;
- create places and streetscapes that are defined and have a sense of enclosure.
- emphasise neighbourhood identity, community life and street living.

Development is to:

- Protect and enhance significant topographical elements, existing skylines and areas of high visibility that highlight the city's distinctive form.
- reinforce existing block and street patterns;
- address and define streets and public spaces;
- reinforce the predominant scale of the streetscape;
- use appropriate tree planting to reinforce the street hierarchy.

Buildings and Heritage (p. 16)

Ensure development:

- is sympathetic to the prevailing height, bulk, scale, design and external appearance of adjacent buildings;
- incorporates predominantly masonry facades with vertical and horizontal proportions and harmonious fenestration patterns;
- adopts richly articulated profiles and roof forms designed to create varied and visually interesting facades;
- is consistent with the alignment of neighbouring buildings;
- creates spaces with a sense of enclosure; and
- creatively responds to important internal vistas of the city.

Development relating to heritage places, buildings or relics, is to observe conservation principles and uses are to be compatible to ensure the preservation of the place, building or relic.

Public Spaces and Pedestrian Networks (p.18)
Buildings are to maintain the visual cohesion of the streetscape taking into account:

- the site's position in relation to the streetscape;
- the continuity and character of the street in terms of use, scale and architectural entity;
- the intrinsic scale or the atmosphere of the place;
- local patterns and linkages;
- community values and expectations.

Enhance public spaces by contributing to and creating:

- landmarks and buildings of civic importance;
- public art;
- thematic tree planting;
- urban spaces that enhance the Public Domain, such as plazas and squares and publicly accessible pedestrian forecourts to buildings;
- promenades, pedestrian links, etc;
- outdoor activity and street life.

Incorporate street design and traffic management measures that restrict through traffic and improve pedestrian networks, safety and amenity for local precincts.

Design for a Sustainable, Healthy Environment (p. 21)
Energy Efficiency

- Ensure new development does not unreasonably reduce the energy efficiency of adjoining buildings.
- Use passive and active solar design methods to increase the comfort level of buildings and minimise energy consumption from non-renewable energy sources.
- Use ecologically sound building materials that are renewable, energy efficient and can reduce fossil-based energy consumption.

Environmental Amenity

- Ensure non-residential buildings are designed and specified to reduce their operational impact on adjacent residential areas.
- Provide adequate separation or noise attenuation measures between land uses and activities to minimise noise transmission.

Stormwater

- Reduce stormwater runoff by on-site detention.

Transport

- Enhance local pedestrian routes and cycleways.
- Restrict the number of on-site parking spaces having regard to the site's proximity to public transport.

PART C: PUBLIC DOMAIN

Security and the Public Domain (p. 26)

- Provide communal open space that facilitates social interaction and a sense of community, however, the design of communal and private space must ensure safety and security for residents.

Implementation (p.27)

- A bonus floor space incentive of up to 0.25:1 of the total site area, may be applicable to sites requiring the provision of:
  - Dedication of public open space... in addition to section 94 requirements
  - Public through site links in large development sites
  - Public art

PART D: SOCIAL PLANNING CRITERIA

Access (p. 56)

- Ensure buildings and associated spaces are accessible to all people in the community.
- Developments provide active street frontages which are friendly to the streetscape and create linkages with the broader community.

Social and Housing Mix (p.57)

- Social mix requirements for new developments to reflect existing mix pattern for that area.

Cumulative impacts and trade-offs (p. 59)

- Development takes into account cumulative impacts of past development activity and does not exacerbate existing negative social impacts or issues.
- Development identifies and responds to opportunities to benefit the local community and provides measures to mitigate against negative impacts.

PART E: ENVIRONMENTAL DESIGN CRITERIA

Landscaping (p.70)

- Ensure landscaping enhances the setting of the buildings...
- Maximise landscaped areas available for on-site infiltration of stormwater.
- Encourage native landscaping that requires minimal maintenance and irrigation.
- Retain existing large trees where possible.

Parking, access and servicing (pp.72-74)

- Traffic calming measures and restricted numbers of on-site parking spaces available are encouraged
- Car parking is to be underground where possible. Above ground parking is to be screened and or integrated with the building and complement the streetscape
- All servicing operations occur wholly within the site
- Bicycle lockers and inverted U stands are to be provided
- Corner sites include splay setbacks to improve visibility of pedestrians and motorists and improve pedestrian amenity.

- Providing the building with a fenestration design which articulates its "semi-commercial" nature in a manner which is contemporary in expression and acknowledges issues such as sun control (especially with respect to the west façade.)
- Articulation of the "cut and cover" section of the Eastern Distributor Tunnel which runs under most of the site.

These issues have been addressed in the following ways:

- The three storey scale proposed reflects that present in the context.
- The western façade of the building has been divided into 5m wide "bays" which project proud of the general building line. This introduces a visual counterpoint to the predominantly horizontal expression proposed for Site 2 and at the same time introduces the anticipated articulation of the residential terraces to be located on Site 3B which have individual frontages of approximately 5 metres.
- Windows to the rear and side lanes are generously proportioned.
- The palette of materials proposed include rendered and painted masonry and solid lightweight cladding.
- The proposed fenestration pattern is clearly commercial in nature yet devices such as solar screening obscure the "hard edged" commercial look which is at odds with the concept of the building bridging between the commercial and residential developments.
- The presence of the cut and cover tunnel is articulated in the elevational treatment by the seemingly random placement of screening devices. They locate accurately the plan footprint of the tunnels under. In terms of the roof, the orientation of the roof mo[illegible]rs matches both the direction of the tunnel and north.

Building Form and Appearance (pp. 80-89)

Building Envelope

- A sympathetic scale relationship between new and existing buildings can be achieved through appropriate design, including careful massing and site arrangement.

Height and scale

- Buildings should maximise solar access in the Public Domain and areas of private open space.
- Buildings should achieve high environmental amenity.

Setbacks

- Setbacks should:
  - protect adjoining buildings from overlooking, overshadowing and general loss of amenity;
  - protect sunlight and daylight to habitable rooms;
  - protect and optimise useable semi-private and public open space; and
  - provide a landscaped visual setting for the building.
- Corner sites include splay setbacks of ... 2.5m where one or both the streets are less than 15m wide.

Signage

- Signage should not compromise the dominant character of surrounding buildings and areas.

5.2 OVERALL BUILDING PLANNING STRATEGIES AND OUTCOMES

Displaying zero setbacks to all street frontages, the building footprint reflects the existing street pattern and reinforces it by its application to this "gap" in the streetscape.

The building is given a parapet of various heights around the perimeter of the building to maintain the established scale and non-cohesive nature of the surrounding street parapet relationship. The roof form proposed has been designed to allow natural lighting and ventilation to the development as well as to articulate and break up the bulk of the roof, as the building would be overlooked by numerous other buildings in the area.

A number of issues have been considered in the development of the façade treatment. They include:

- Establishing a scale and massing which links the proposed "run" of new development up the eastern side of Palmer Street as an entity in itself and with respect to the existing streetscape on the western side of Palmer Street.
- Articulation of the change in usage type either side of the development site, namely Site 2 to the north being commercial and Site 3B being residential. In a sense this proposed development could be seen as both a "link" and a separating device to buffer the different usages.
- Provision of windows to near and side lanes which maximise the potential for "casual surveillance" by building users.
- Employing materials which already exist in the context so as to contribute and reinforce the streetscape.

5.3 PROPOSED CONTROL CENTRE DESCRIPTION

The development comprises the following:

Ground Floor Level

- Truck parking area accessed from Egan Place and discharging to Palmer Street.
- Car parking for 10 cars: 3 spaces for emergency / maintenance vehicles, 6 general spaces and 1 space accessible for people with disabilities.
- 1 space for motorcycle parking
- 6 spaces for bicycle parking.
- Reception area (E tag).
- Lift lobby/fire stairs.
- Miscellaneous change/locker areas.
- Maintenance workshop.
- Rubbish/store area.
- Electrical/meter rooms

First Floor Level

- Commercial space of 325m^2 (Net Floor Area approx.). The internal layout to be determined by the ultimate user of the building.

Second Floor Level

- Commercial space of 630m^2 (Net Floor Area approx.). The internal layout to be determined by the ultimate user of the building.

Roof Level

- Roof plant platform accessed from fire stair extension.

External works include:

- kerb and services amendments at the corner of Bourke Street and St. Kilda Lane
- widening of Egan Place;
- creating western extension to St Kilda Lane;
- creating new lane to south of proposed building.

Note: These new and/or modified roadways would be dedicated for public use and ownership of the subject lane would be transferred to South Sydney Council.

5.4 MATERIALS

External material selection is depicted on the drawings that accompany this application. In general, walls are proposed to be masonry, rendered and painted, and lightweight cladding.

Solar control louvres would be in anodised aluminium to match the window framing. Glazing is to be clear.

5.5 VEGETATION AND LANDSCAPING

There is no existing vegetation on the site as the site partly overlies the roof structure of the Eastern Distributor and is completely paved.

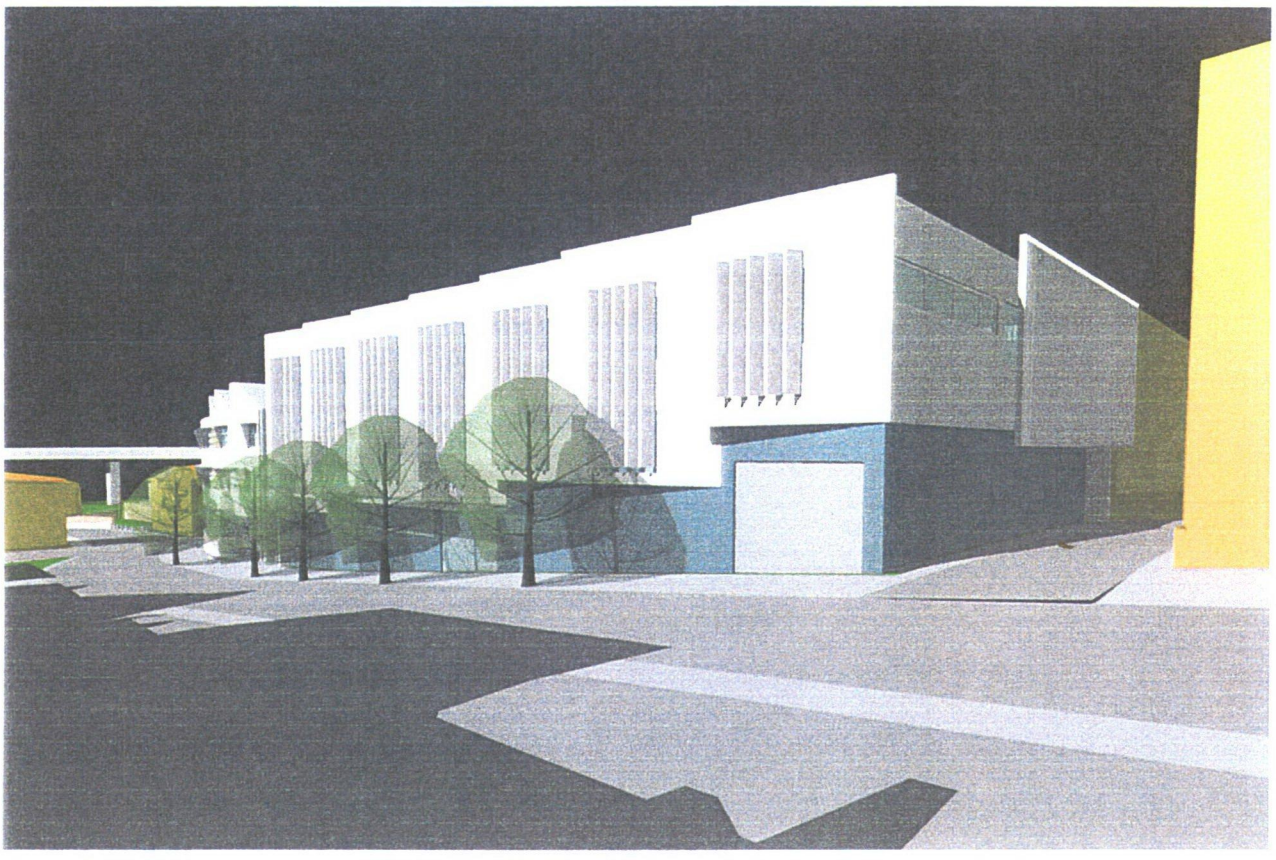


Figure 4: Street Level View of Proposed Control Centre

5.6 ACCESS AND TRAFFIC / PUBLIC TRANSPORT

Vehicular Access
Access to the development is via either St Kilda Lane, which connects to Bourke Street, or Egan Place which would be connected to Cathedral Street.

It is anticipated that cars would use either means to access the site depending on their approach direction. Trucks, due to their larger turning circle, can only access the site from Bourke Street via St Kilda Lane and, in order for this manoeuvre to be carried out, some widening of the entry is proposed at the beginning of St Kilda Lane.

Due to the negligible pedestrian load in the laneway system, it is anticipated that the proposed arrangement would not create a safety problem to foot traffic in the area.

The configuration of the access is such that the headlights of vehicles entering/exiting the proposed development would not cause a nuisance to nearby residential properties.

Pedestrian Access
The significant north-south fall in ground level has necessitated that the ground floor is broken into three main levels which terrace up the slope towards William Street. The main entry from Palmer Street is set to approximate the street level at that point in order to provide level access, thereby avoiding steps and permitting level access for disabled members of the public.

The location of the main public entry point at mid-building and on the Palmer Street frontage is seen as logical and appropriate for this development.

Public Transport
The site's close proximity to William Street ensures easy access to buses that operate along that roadway. Kings Cross railway station is located within 15 minutes walk thereby providing reasonable level of access.

5.7 STORMWATER

The proposed stormwater disposal system would consist of a fully piped system with collection points to roof drainage sumps. Downpipes would be located in columns. Discharge would be direct to Council stormwater lines in accordance with the relevant Australian Standards and Council Codes.

Drainage Management Plan
Due to the site area being 1220 m^2 (including the proposed laneways), which is less than Council's threshold of 1,800 m^2, no Drainage Management Plan has been prepared.

5.8 URBAN SERVICES AND WASTE MANAGEMENT

The detailed resolution of service requirements for the proposed development would be resolved as part of the detailed design process in discussion with the relevant utility providers.

WASTE MANAGEMENT

Commercial waste would be stored in the rubbish enclosure accessed from Egan Place. An authorised contractor engaged by the building owner would remove any waste from the rubbish enclosure. The rubbish enclosure would comply with Council specification.

The applicant proposes that building management would develop a Waste Management Plan for the building that would identify responsibilities for the collection of recyclables, the operation of the garbage storage area, the containment of unwanted odour, and maintaining a liaison with the rubbish collector.

5.9 TRAFFIC NOISE

As explained in Section 4.11 of this report, the noise generated by local traffic is not extraordinary when compared to the surroundings.

This context, together with the proposed use - i.e. commercial, which is less sensitive than residential - results in a development that, it is anticipated, would not require any special sound reduction measures.

5.10 ECOLOGICALLY SUSTAINABLE DESIGN

This proposal recognises the value of consideration of energy efficiency in the design of the building, the construction energy required to build it, the operational energy needed to ensure its proper functioning and, within the constraints of the site, seeks to address these concerns in the following fashion:

- Where good solar access is possible, i.e. to the north and west, appropriate sun shading is proposed to limit the heat load imposed on the building.
- The nature of the open plan, and column configuration of the first and second levels are designed to ensure that natural ventilation is encouraged.

5.11 SECURITY

Access to the various individual portions of the development will be achieved via standard electronic means that would be discrete but effective. These measures are summarised below:

- Security card access to car park via motorised roller shutter.
- Security video/voice intercom at the main door to allow the users to screen and remotely permit access to the entry lobby after hours.
- Visual security to the east and south is achieved by windows to the first and second level, which directly overlook the lane ways.

5.12 DEVELOPMENT STATISTICS

Refer Drawing A.01 for area calculations.

6.0 ENVIRONMENTAL EFFECTS ASSESSMENT WITHIN REQUIREMENTS OF PLANNING INSTRUMENTS

This section will discuss issues and aspects raised for consideration/addressing within the constraints imposed by the various Council Planning Policies that apply to the site. The relevant instruments consist of:

- The South Sydney Plan made up of:
  - South Sydney Local Environmental Plan 1998 (LEP)
  - South Sydney Development Control Plan 1997: Urban Design (DCP)
- South Sydney Council Development Control Plan No. 11 "Transport Guidelines for Development 1996".

In addition to these instruments the report will incorporate reference to the Master Plan for disposal of sites associated with the Eastern Distributor.

6.1 SOUTH SYDNEY LEP

PART 3 – GENERAL RESTRICTIONS ON DEVELOPMENT

Item 18 – Zoning 9a – Arterial Road Reservation

Comment: With the completion of the Eastern Distributor, it is expected that land now shown to be surplus to this project will revert to the nearest adjacent zoning, which in this case is Zone No. 10 – Mixed Use. The proposal is consistent with the objectives stated.

PART 4 – SPECIAL PROVISIONS

Item 22 – Heritage aims

Comment: The proposed development is not located within a heritage conservation area. Therefore the requirements of this provision do not apply.

Item 23 – Protection of heritage items, heritage conservation areas and relics

Comment: Refer Item 22.

Item 27 – Development of known or potential archaeological sites

Comment: Excavation for the cut and cover tunnel under the site is assumed to have eliminated any potential for archaeological deposits.

Item 28 – Built environment design principles and master plans

Comment: The proposal is consistent with the issues identified. Refer additional, more detailed comments in the discussion of the DCP.

Item 29 – Sub-division of land

Comment: For that portion of the site shown as roadway either new or modified, a separate lot in the DP has been created in order to ease the transfer of that section of the site to public ownership, i.e. Council upon completion of the works. In one sense this could be seen as a "de facto" Section 94 contribution by the ultimate developer of the site.

Item 32 – Tree Preservation Orders

Comment: There are no existing trees on the proposed development site.

Item 37 – Non-residential development in Zone No. 10 – Mixed Use

Comment: The known past use of the currently vacant site was roadway – the removed William Street underpass. It is argued that the proposed development would not be appropriate for partial residential uses for the following reasons:

- *The area required for Cross City Tunnel operations would render the area available for partial residential use uneconomical.*
- *The site's location over the tunnel exposes any residential development to vibration generated by the traffic below. It is not economically viable to reduce this vibration to within the limits set by the EPA.*

Item 38 – Flood liable land

Comment: The proposed development is not located in an area known to be flood liable. The presence of a drainage easement is incorporated into the design.

Item 39 – Contaminated land

Comment: The site is not known to have had a previous industrial use, and for the most part has been excavated and filled as part of the cut and cover tunnel.

Item 49 – Eastern Distributor Tunnel

Comment: As the RTA is the site owner and proponent of the application it can be assumed that this proposal has the consent of the RTA.

6.2 SOUTH SYDNEY DCP 1997

6.2.1 PART B: URBAN DESIGN PRINCIPLES

Reinforce and protect the city's urban form settings.

Comment: The proposal is located in the 'north sector' which character is described as:

- *Residential/Mixed use.*
- *"Fine Grain" texture to relate to historical context.*
- *Place and streetscape are well defined with a sense of enclosure.*
- *Neighbourhood, community and street life.*

The proposal is consistent with these basic principles.

6.2.2 PART C: PUBLIC DOMAIN

Development supports and implements initiatives and improvements to the Public Domain.

The site is located with the Eastern Districts Public Domain Plan and it is noted as having the following opportunities:

- Urban village locality with defined thematic character.

Comment: The proposal addresses these opportunities to improve the public domain as follows:

- *Stated thematic character is reinforced in the building's design.*
- *The construction will cement the return of this section of Palmer Street to the local community after nearly 40 years of alienation from the public domain by the now removed William Street underpass.*
- *The construction of new laneways and the modification of existing will create and reinforce the local laneway network.*

6.2.3 PART D: SOCIAL PLANNING DESIGN CRITERIA

Ensure that appropriate facilities and services are provided for current and future needs of the community and that the quality of life of the community is maintained and improved.

Comment: The proposal is non-residential and there is no formal requirement to compile a social impact study.

Access
That area of the building which public access is proposed, i.e. the ground floor reception area, has level access from the street thereby providing access for wheelchair users.

The building would be equipped with a lift and would therefore be accessible for users of the building.

6.2.4 ENVIRONMENTAL DESIGN CRITERIA

Site Planning – Site Analysis
To ensure proper consideration of the characteristics of a site and its context to achieve compatible development that is well designed and makes a positive contribution to its surroundings.

Comment: Refer Site Analysis drawings in Section 4.2. Points considered include:
- *Site orientation with regard to climatic factors.*
- *Scale of surrounding buildings and type.*
- *Overshadowing, acoustics.*
- *Heritage.*
- *Street and block patterns.*
- *Public Domain opportunities.*

Site Planning – Site Layout
To achieve a site layout that considers the opportunities and constraints of the site, to provide a safe, convenient and attractive environment.

Comment: Refer Site Analysis drawings in Section 4.2.

Site Planning – Public Open Space
To ensure urban consolidation provides material public benefit.

Comment: Within the constraints and opportunities of the site the establishment of a two new laneways and the widening of Egan Place is considered as an appropriate material benefit to the local traffic circulation and community.

Site Planning – Private Open Space
The design of private open space should focus on the quality of the space in terms of outlook, orientation, relationship with buildings size and shape, level of enclosure and landscape treatment.

Comment: The site constraints are such that the only opportunities for open space enhancements are in the form of balconies to the north. It is anticipated that the users will occasionally inhabit this space and introduce a pleasant semi-domestic quality to the street.

Site Planning – Landscaping
Landscaping incorporates vegetation and existing features such as rock features, external paving, outdoor structures and furniture.

Comment: The site is clear of all existing vegetation, features and trees.

Site Planning – Parking, Access and Servicing
Accommodate cars and service vehicles with a view to reducing their potentially negative impact on the surroundings.

Comment: Separate section will discuss Council's DCP 11 – Transport Guidelines.

Splays to Corners of Site
Comment: This requirement is has been incorporated into the design of the proposal.

Site Planning – Stormwater Drainage
The stormwater drainage system is designed to ensure existing downstream systems are not adversely affected by new developments.

Comment: Council requires sites over 1,800m^2 to lodge with a DA a Local Drainage Management Plan. The proposed development is located on a site of 1220m^2 in area thereby not triggering the requirement.

Site Planning – Site Contamination
For sites that are contaminated or potentially contaminated, an Environmental Site Assessment (ESA) is required.

Comment: The site is not known to have had a previous industrial use, and for the most part has been excavated and filled as part of the cut and cover tunnel.

Site Planning – Site Facilities
To ensure site facilities are designed for easy access, to be visually attractive, and well integrated into the overall design of the development.

Comment: The various facilities associated with the site would be accommodated in the following manner within the proposed development:

- *Garbage: Central collection room located in the ground floor for commercial waste to be constructed to Council's specification.*
- *Mail boxes: To be integrated into an internally accessible location adjacent to the entry lobby on the ground floor.*
- *External storage areas: Not applicable.*
- *Recyclable materials: Rubbish room at ground floor would house recyclable waste containers prior to pickup by rubbish pickup company.*
- *Access to compost facilities: Not applicable.*
- *Satellite dishes, telecommunications, antennae: If required would be roof mounted outside the line of vision of pedestrians and all units would be connected to a single antennae.*

6.2.5 BUILDING FORM AND APPEARANCE

Building Envelope
Of primary significance in the successful integration of new development within existing precincts is the appropriateness of the scale of the new building to its immediate context.

Comment: Careful consideration has been given to the massing of the proposal. The primary parapet height, whilst not matching its immediate neighbours, conforms to other more commercial developments in the immediate vicinity, and establishes a precedent for the continuation of the streetscape for future development on Palmer Street.

Floor Space Ratio
This ratio is used to indicate intensity of development.

Comment: The site is noted as being located in an area with a floor space ratio of 2:1. The FSR currently proposed (based on a site which excludes area for new laneways) is 1.67:1 which is less than the maximum stated.

Height and Scale
To ensure buildings are an appropriate scale, compatible and complementary with areas of townscape significance.

Comment: The site is noted on Council planning documents as being in a location with a 12m-height limit. The development complies at the southern end of the proposal where it is 2.7m below the height limit. At the northern end of the proposal the building breaches the height limit. The highest point of the roof is 3m above the height limit.

The higher envelope on the northern end is justified for the following reasons:

The proposed building adopts the predominant height and scale of many surrounding buildings. There are several 6 to 8 storey residential buildings and many 3 storey buildings

in the immediate vicinity the majority of which exceed the height limit. The proposal is in keeping with these buildings.

There is no significant loss of amenity to adjacent buildings and public streets as the proposed building will predominantly shadow its own roof.

The proposal maximises solar access to the public domain and private open space through lowering the roof line at the southern end to below the height limit so that sunlight is retained for 2 hours on June 22 to the proposed private open space for residential terraces on site 3B. Solar access to the public domain is maximised by concentrating the higher form to the north where it will mainly throw shadow onto its own roof.

The slope of the natural ground is significant in the north south direction. The Eastern Distributor cut and cover tunnel is located below the site very close to the natural ground line rendering basements impossible. The slope and height limit are also prohibitive to practical design where the allowable floor space ratio is to be maximised. The height limit has thus been slightly breached while still maintaining favourable conditions in the public domain.

Setbacks

The relationship and proximity of buildings to each other and to the street significantly influences the form of development and how it relates to the neighbourhood. Provide setbacks to protect adjacent buildings from overlooking and overshadowing.

Comment: Setbacks would be introduced into the proposal in the following ways:

- *To the north – 6m wide extension of St Kilda Lane.*
- *To the south – 6m wide new lane.*
- *To the east – 3.2m wide addition to width of Egan Place, making it 7.5m wide.*
- *Corner splays 2.5 x 2.5 to the corners of building at laneway intersections.*

Shadow diagrams are included for mid-winter. Refer Figures 5, 6 and 7.

Façade Treatment

Building facades reinforce the character and continuity of the streetscape by recognising contextual clues. The façade, roof and materials of buildings should contribute to harmonious and robust streetscapes. Façade treatment should respond to environmental conditions.

Comment: The western façade has been broken up into 5m wide bays which have been articulated as projecting bay window elements. This creates a robust elevation which will be enlivened by the play of shadow created, in addition the vertical bays are intended to introduce the vertical division anticipated in the southern neighbouring residential terraces (Site 3B). Each bay is further enlivened by having vertical sun control louvres which are appropriate for the façade's orientation. Anchoring the building is a contrasting base with the entry area "eroded" within. The other facades are treated in a simple fashion with rendered masonry with strip windows which are screened in part with aluminium slats as a demarcation of the cut and cover tunnel below and also in an attempt to break up the mass of the building.

The roof is treated as a fifth façade with projecting roof monitors providing a foil to a simple roof form.

Signage
Signage should act as a unifying element in the streetscape.

Comment: Signage appropriate to the use of the building would be required. All signage would comply with South Sydney Council signage guidelines.

6.2.6 HERITAGE AND CONSERVATION

Comment: The site is not located within a Heritage Conservation Area.

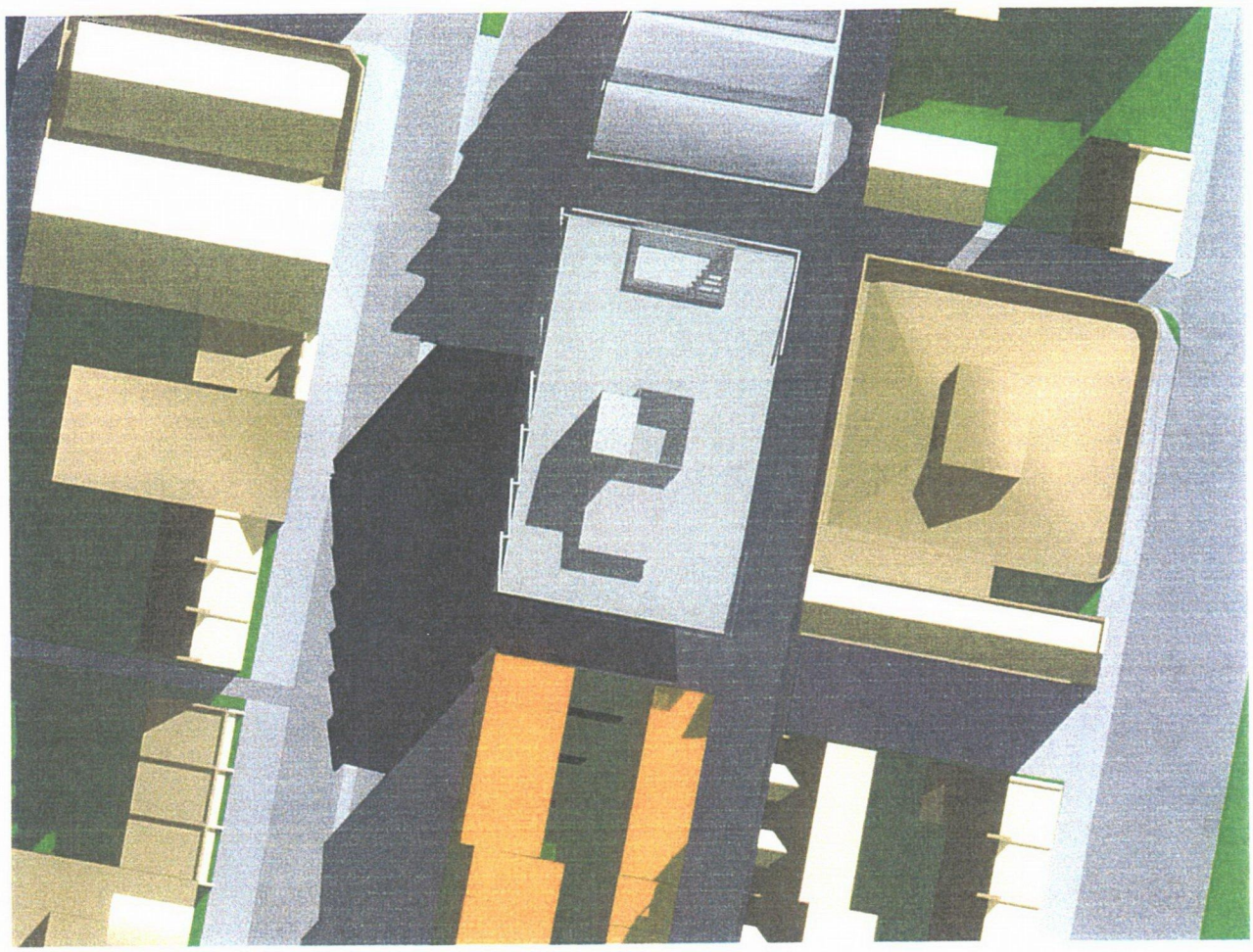


Figure 5: Sun Shading Diagram 22 June 9am

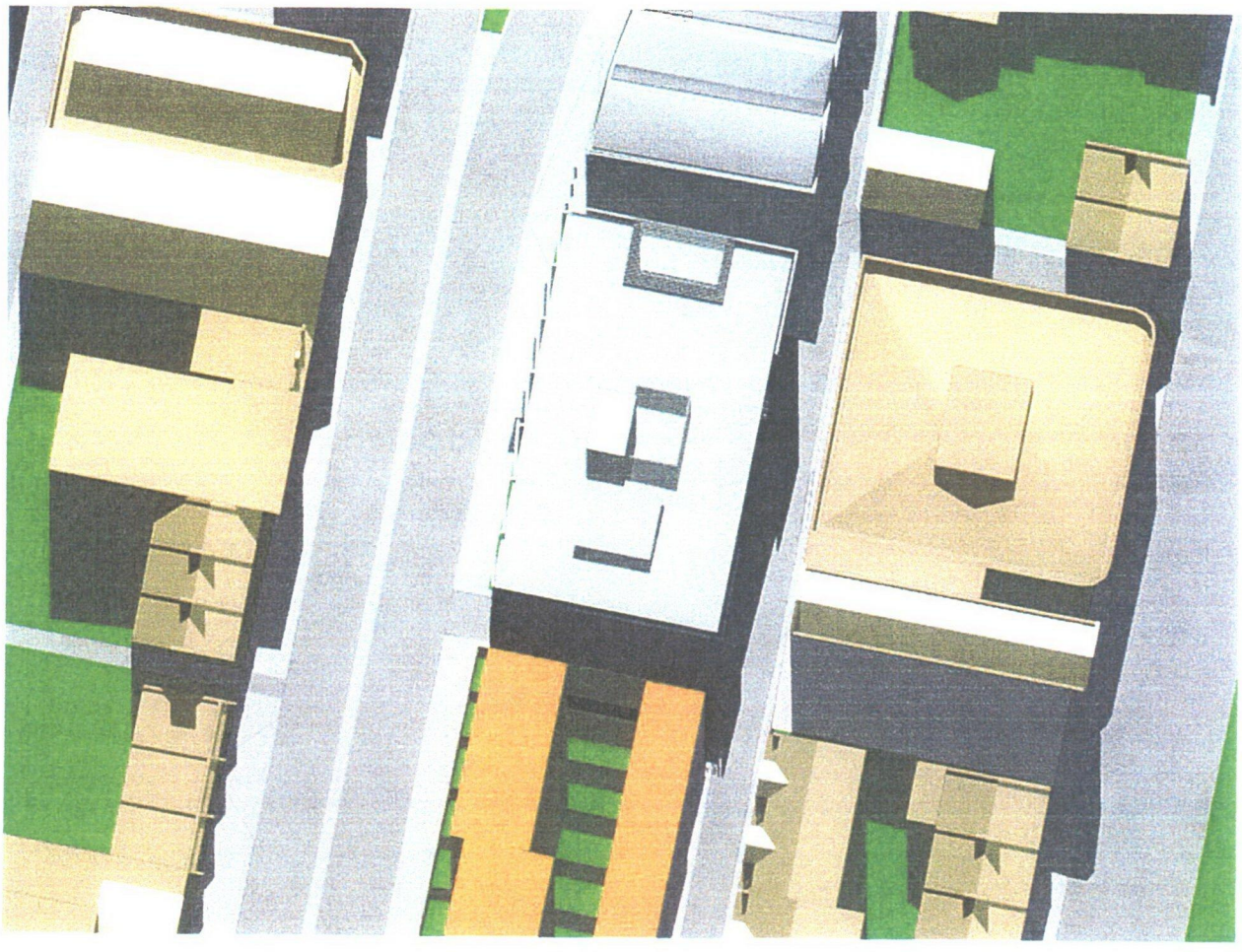


Figure 6: Sun Shading Diagram 22 June 12 noon

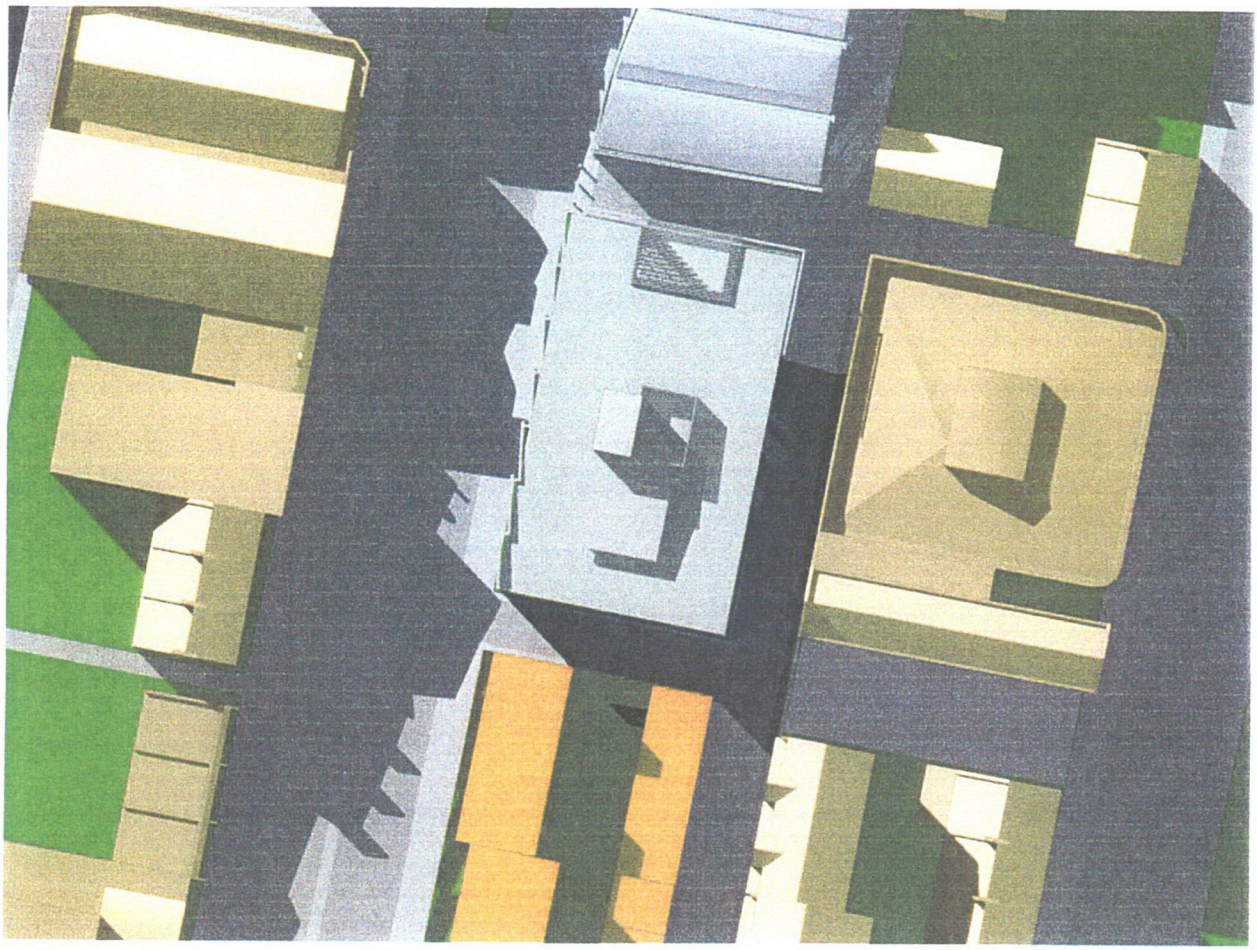


Figure 7: Sun Shading Diagram 22 June 3pm

6.2.7 AMENITY

Visual and Acoustic Privacy
The need for both visual and acoustic privacy should be considered when deciding the location of a building, the room layout, the location of windows, private open space and landscaping.

Comment: The only area of perceived lack of visual privacy is with regard to the windows to the south elevation overlooking the side of the proposed adjacent terraces to be located on Site 3B. For this reason the majority of the windows, which face south, are screened with aluminium slats.

Due to this measure, potential privacy issues have been addressed and minimised.

Safety and Security
Streets, sites and buildings can be designed to discourage crime and increase occupants' sense of security.

Comment: In a general sense the development, by filling a currently vacant site, contributes greatly to the community's sense of security. This is reinforced by the presence of windows to both the east and south frontages thereby allowing the possibility of casual surveillance of the rear lanes, and rear adjacent properties by the users of the proposed building.

Fire Regulations
To ensure building design includes adequate fire safety measures.

Comment: The building has been designed to comply with the requirements of the Building Code of Australia. Note that specific detail as to service requirements of the BCA have not been addressed as that level of detail is more appropriately addressed at the Construction Certificate stage. However, their inclusion is not seen as problematic.

6.2.8 ENERGY EFFICIENCY

Energy efficient site layout and building design and construction
To encourage use of energy from renewable sources.

To encourage site planning and building design that optimises site conditions to achieve energy efficiency.

To ensure reasonable solar and daylight access to within the building.

Comment: The orientation and internal layout of the proposal is, as much as possible given the surrounding development patterns, designed to minimise energy useage by employing a number of recognised features, namely:

- *Providing good solar access to the work spaces which is shaded to limit potential overheating.*
- *Generous floor to ceiling heights which encourage air flow and circulation.*
- *The building will have adequate insulation to ensure heat rejection in summer and retention in winter.*

6.3 SOUTH SYDNEY COUNCIL: DEVELOPMENT CONTROL PLAN NO. 11 – TRANSPORT GUIDELINES FOR DEVELOPMENTS 1996

This section of the report is formatted in accordance with the requirements advised in 2.2 Transport Information to accompany Development Applications.

6.3.1 TRANSPORT FACILITIES INCLUDED IN THE DEVELOPMENT

It is proposed to provide 10 car park spaces, 1 motorbike space and 6 bicycle spaces. All of the car parking spaces are accessed via motorised roller shutters, however 2 of the spaces are set at open during business hours. All of the car parking spaces are accessed from the proposed laneway and the extension to St Kilda Lane. The open spaces are for visitors parking, one which is designed for people with disabilities.

In addition space has been set aside for parking for 3 rigid trucks.

6.3.2 GUIDELINE PARKING REQUIREMENTS

The criteria of the DCP guidelines, when applied to the specifics of this development, generate the following car and motor cycle parking requirements.

Office/Commercial • 1145m^2 GFA @ 1/125 m^2 GFA, 20%allocated to visitors	9.2 car spaces
Servicing • 1 car + 1 motor cycle (nom.)	1 car space 1 motor cycle space
Total required	**10.2 car spaces** **1 motor cycle space**
Total provided	**10 car spaces** **1 motor cycle space**

The criteria of the DCP guidelines when applied to the specifics of this development generate the following bicycle parking requirements:

Office/Commercial • 1 space per 20 staff – reference to BCA Table D1.13 gives an estimated staff population of 115 • Shower facilities should be provided at all places of employment requiring 5 or more bicycle parking spaces	5.75 bicycle spaces shower facilities
Total required	**6 bicycle spaces** **shower facilities**
Total provided	**6 bicycle spaces in locked room** **Shower facilities in change rooms**

Car spaces are sized 2.4 x 6.0 (generally), and 3.1 x 6.0 (accessible).

Resolution of car parking:

Total required	10.2 car spaces 1 motor cycle space 5.75 bicycle spaces
Total provided	10 car spaces 1 motorcycle space 6 bicycle spaces

6.3.3 ACCESS ARRANGEMENTS

Urban Design

In order to minimise the potentially intrusive appearance of the large number of car park entries, the screen motif used to break up the mass of the facades has been integrated into the car park entry areas in the form of a facing to the tilt-up doors to the car spaces.

Driveway Locations

The criteria outlined by Council is addressed as follows:

- All vehicles should enter and leave in a forward direction. The trucks using the facility comply with this requirement. The individual car spaces need to be reversed into or out of. This is not strictly in compliance with the Council policy, however it is a pattern of use which is common in the area and it is not anticipated to lead to problems as the laneway system is characterised by low traffic speeds and low pedestrian volumes.
- Site entry should be located to cause least interference – Development complies.
- No direct access to arterial and sub-arterial roads –
  Development complies with the configuration of the "Eastern Distributor in Woolloomooloo and East Sydney. Surface Works and the Redevelopment of Residual Lands and Air Rights Master Plan." for all cars, motorcycles and bicycles.
  Development complies for the truck entry point.
  The truck exit point does not comply because Palmer Street is an arterial road. The proposal has adopted this approach for the truck exit because the site is narrow and slopes significantly in the north south direction. Access for large trucks is limited by the site constraints. Therefore it is only feasible in floor space terms to have them exiting to Palmer Street.
  The possible negative impact on through traffic flow has been minimised as:
  1. The trucks will be exiting the site infrequently.
  2. The exit is approximately 70 metres from the intersection to the north and further than 100 metres to the approach side of the next intersection to the south. The exit point in this location was considered to be the safest location as it maximises sight lines.
  3. The trucks cannot turn right, as there is a median strip at this point on Palmer Street. As the trucks can only turn left there would be minimal impact on the traffic flow and safety in Palmer Street.
  4. Cars on the arterial road will generally be moving slowly as the driveway is in between two closely spaced intersections and the cars are travelling uphill. The cars will also pass the proposed truck exit in "platoons" with breaks in the flow. This would enable trucks to safely exit onto Palmer Street.
- No driveway at an angle less than 60° to kerb line – Development complies.

Sightline Distance
Traffic speeds in laneways are typically low and this characteristic, when combined with a site accessed via a lane, as is the case in this proposal, will result in a very low traffic speed environment. For this reason it is anticipated that safety issues resulting from inadequate sightline distances will not result.

Traffic speeds on Palmer Street (arterial road) are typically low in this section of the road as the driveway is in between two closely spaced intersections and the cars are travelling uphill. Sightline distances are adequate where the trucks will emerge. Thereby minimising the impact of the proposed exit point.

6.3.4 TRAFFIC GENERATION, DIRECTIONAL DISTRIBUTION

Reference to Council's guide for determining traffic generation, the following outcomes result.

Week day peak hour trips
Office and Commercial = 2 per 100m^2 GFA.

i.e. 2 x 11.45 = 23 per hour

Daily vehicle trips
Office and Commercial = 10 per 100m^2 GFA.

i.e. 10 x 11.45 = 115 per day.

Egan Place and the proposed one way lane discharge into Palmer Street which, due to the completion of the Eastern Distributor, now has a lower traffic load. It is anticipated that the extra traffic the development generates will not significantly affect the newly reduced traffic pattern in the area.

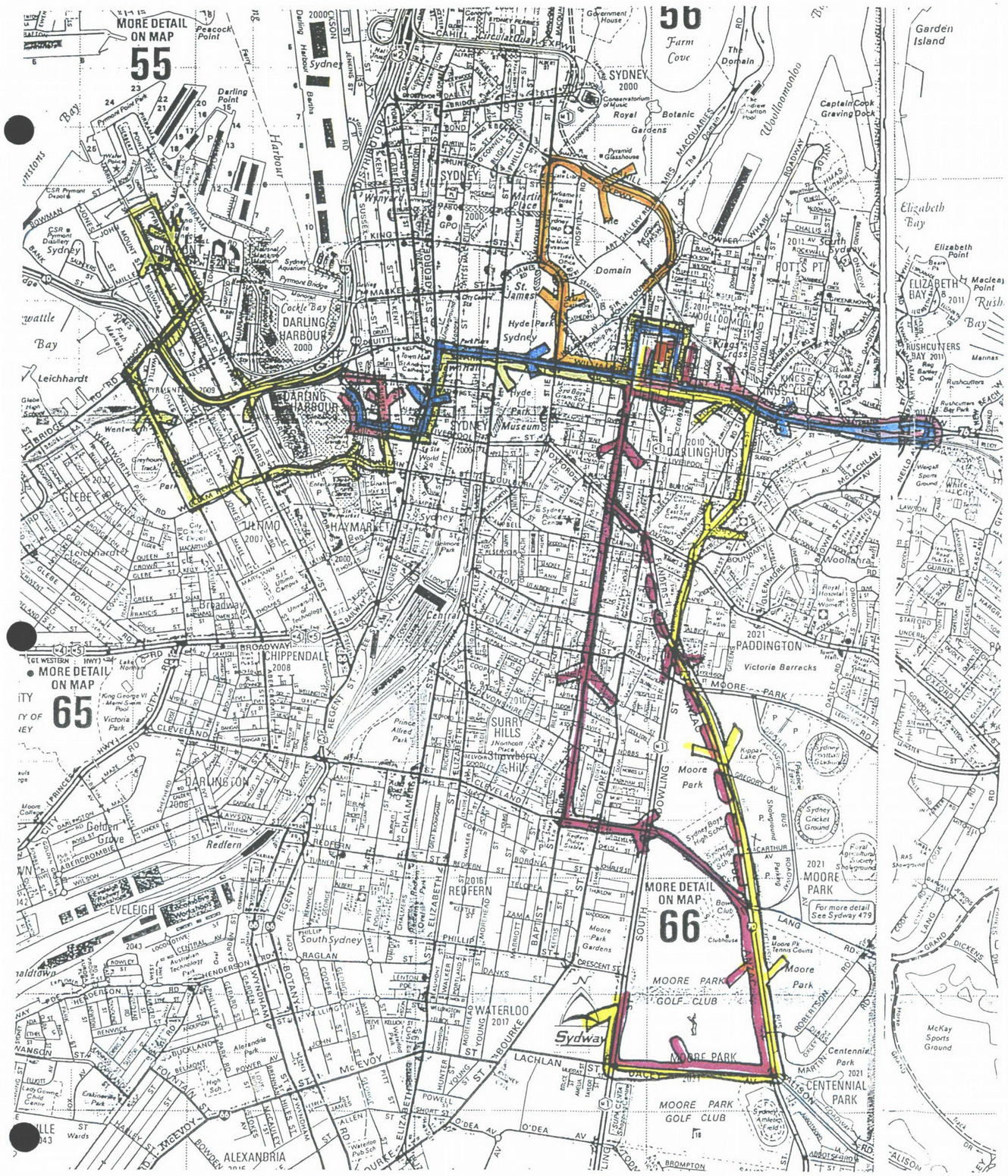
Truck access under operational conditions
A preliminary assessment has been carried out with regard to the likely routes that maintenance trucks will take to service the proposed Cross City Tunnel. This is included as Figure 8. As the exact route could be modified when a successful tender is selected, the route depicted should be viewed as preliminary.

6.4 THE MASTER PLAN FOR AREAS AFFECTED BY THE EASTERN DISTRIBUTOR

The master plan is a document that details the outcome of applying existing Council policy (namely the LEP and DCP) to the specific sites deemed 'residual' and earmarked for disposal by the RTA.

In the context of this site (denoted as Site 3A), the master plan has proposed the development of a 2 to 3 storey commercial type building, with a height limit of 12 metres, and an FSR of 2:1, with a parking requirement for a maximum of 13 cars (10 proposed), and minimum 8 bicycles (6 proposed).

The master plan for Site 3A shows a possible massing form that is driven by streetscape. The approach advocated in the master plan has been adopted in this proposal.



	WESTBOUND CROSS CITY TUNNEL
	1.1 CONTROL CENTRE TO WESTBOUND CROSS CITY TUNNEL (CCT) TO CONTROL CENTRE **Forward journey** Control centre – left Palmer Street – left William Street – Kings Cross Tunnel – right Nield Avenue – right Craigend Street – enter westbound CCT **Return journey** Exit westbound CCT – left Bathurst Street – right Sussex Street – right Liverpool Street – right Harbour Street – enter eastbound CCT – see item 2.1 (return journey)
	1.2 CONTROL CENTRE TO WESTBOUND CCT TO SIR JOHN YOUNG CRESCENT EXIT TO CONTROL CENTRE **Forward journey** See item 1.1 (forward journey) **Return Journey** Exit Sir John Young Crescent northbound – Cahill Expressway – left Macquarie Street – left Prince Albert Road – College Street – left William Street – left Bourke Street – left St. Kilda Lane – left Egan Place – right Control Centre
	1.3 CONTROL CENTRE TO NORTHBOUND EASTERN DISTRIBUTOR (ED) TO CONNECTION WITH WESTBOUND CCT TO CONTROL CENTRE **Forward journey** Control centre – left Palmer Street – left William Street – right Victoria Street – South Dowling Street – left Anzac Parade – right Dacey Avenue – right South Dowling Street – enter Dacey Avenue northbound ramp to ED. **Return journey** See item 1.1 (return journey)

	EASTBOUND CROSS CITY TUNNEL
	2.1 CONTROL CENTRE TO EASTBOUND CCT (HARBOUR STREET ENTRY) TO CONTROL CENTRE - surface option (see item 1.1 for entry via the westbound tunnel) **Forward journey** Control centre – left Palmer Street – left William Street – left Bourke Street – left Cathedral Street – left Crown Street – right William Street – left George Street – right Liverpool Street – right Harbour Street – enter eastbound CCT **Return journey** Exit eastbound CCT at existing eastward Kings Cross Tunnel exit – right Nield Avenue – right Craigend Street – Kings Cross Tunnel westbound – right Bourke Street – left St Kilda Lane – left Egan Place – right control centre
	2.2 CONTROL CENTRE TO EASTBOUND CCT (WESTERN DISTRIBUTOR ENTRY) TO CONTROL CENTRE surface option (see item 1.1 (return journey) for entry via the westbound tunnel) **Forward journey** Control centre – left Palmer Street – left William Street – left Bourke Street – left Cathedral Street – left Crown Street – right William Street – left George Street – right Liverpool Street – left Sussex Street – right Goulburn Street – Pier Street – William Henry Street – right Wattle Street – right Pyrmont Bridge Road – left Harris Street – right John Street – right Pyrmont Street – right Pyrmont Bridge Road – left Western Distributor - enter eastbound CCT **Return Journey** See item 2.1 (return journey)
	2.3 CONTROL CENTRE TO EASTBOUND CCT (HARBOUR STREET ENTRY) TO CONNECTION WITH SOUTHBOUND EASTERN DISTRIBUTOR (ED) TO CONTROL CENTRE **Forward journey (surface option)** See item 2.1 (See item 1.1 for entry via the westbound tunnel) **Return journey** Exit southbound ED at Dacey Ave exit – left Dacey Avenue – left Anzac Parade – (Option A) – left Cleveland Street – right Crown Street (Option B) – Flinders Street – left Oxford Street – right Crown Street - right William Street – left Bourke Street - left St Kilda Lane – left Egan Place – right control centre.

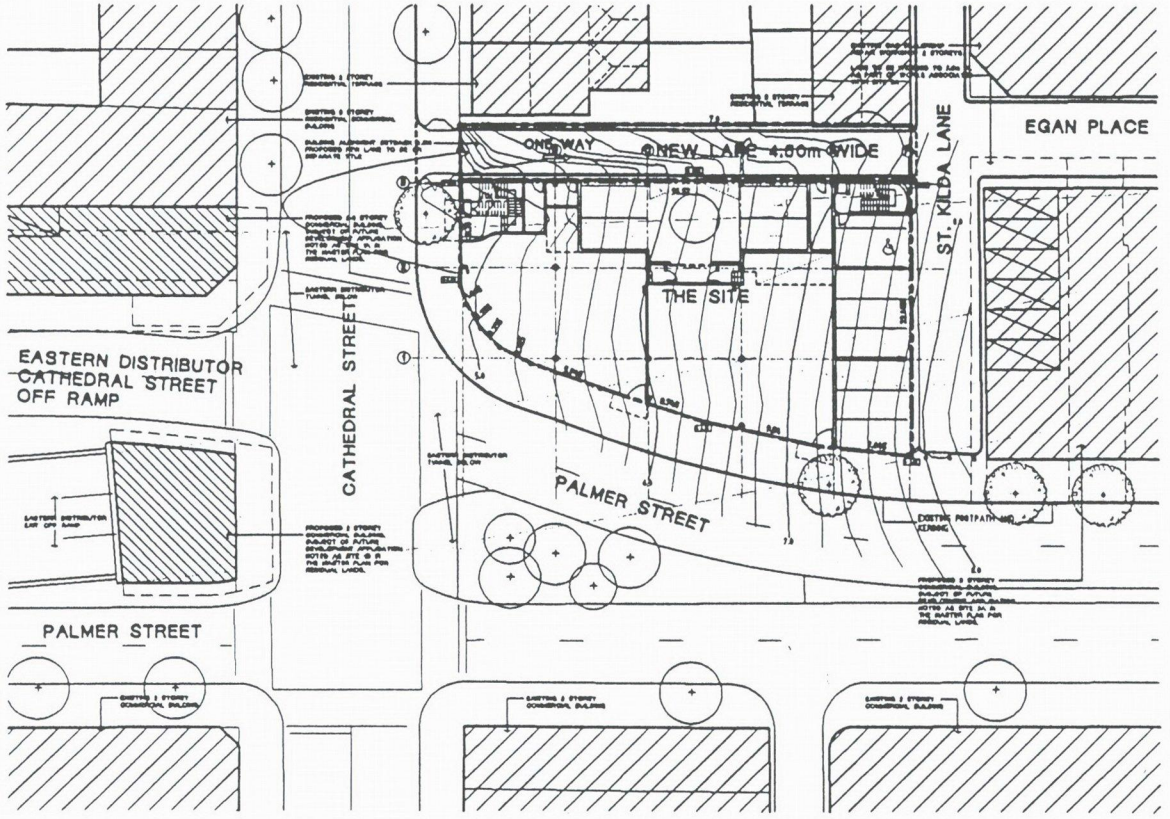
Figure 8

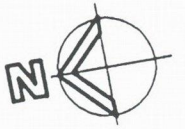
POSSIBLE MAINTENCE TRUCK ACCESS ROUTES TO THE CROSS CITY TUNNEL ENTRY / EXIT POINTS

7.0 APPENDICES

7.1 PROPOSED DA FOR SITE 2 (8 PAGES)
7.2 1970s PLANNING MAP (1 PAGE)
7.3 SURVEY INFORMATION (24 PAGES)
7.4 STRUCTURAL ENGINEER'S REPORT (6 PAGES)
7.5 APPROXIMATE TRUCK TURNING CIRCLES TO ACCESS SITE (2 PAGES)
7.6 ARCHITECTURAL DRAWINGS (8 PAGES AT A3 SIZE)

7.1 PROPOSED DA FOR SITE 2





FSR CALCULATION
AREAS APPROXIMATE

SITE AREA (EXCLUDING PROPOSED LANEWAY)	~683m²
PERMITTED FSR	~2:1
PERMITTED GFA	~1366m²
PROPOSED	
GROUND FL GFA	~431m²
FIRST FL GFA	~683m²
SECOND FL GFA	~683m²
TOTAL GFA	~1797m²
PROPOSED FSR	~2.6:1

NOTE:
LEVELS / BOUNDARY INFORMATION TAKEN FROM RTA SURVEY TITLED

KEY

- EXISTING RL TO AHD
- EXISTING STREET TREE
- NEW STREET TREE SPECIES, SIZE AND FOOTPATH TREATMENT TO COUNCIL SPECIFICATION INSTALLATION BY COUNCIL

No.	Description	Approved	Date
A	DEVELOPMENT APPLICATION		13.11.00

Architects
JACKSON TEECE CHESTERMAN WILLIS
A.C.N. 083 837 280
PTY LTD

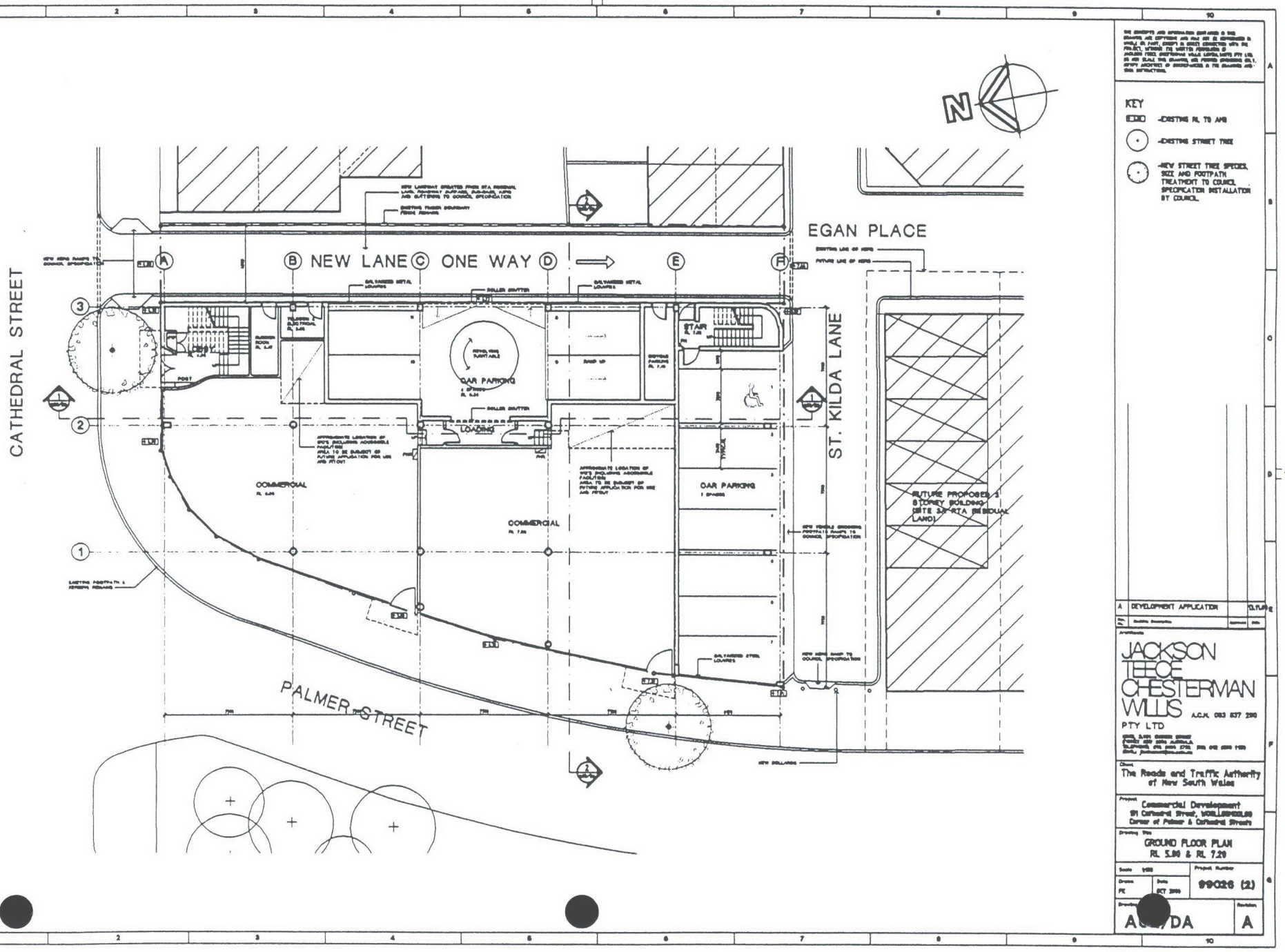
Client
The Roads and Traffic Authority of New South Wales

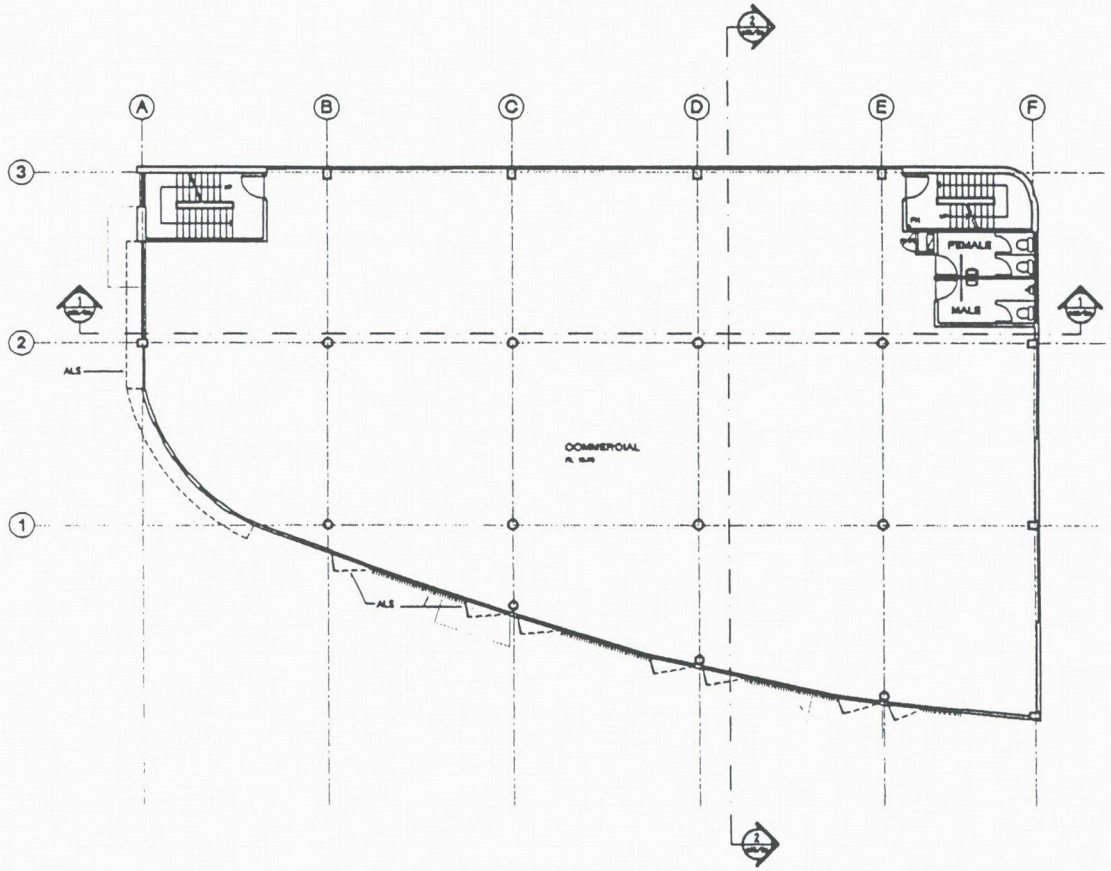
Project
Commercial Development
191 Cathedral Street, WOOLLOOMOOLOO
Corner of Palmer & Cathedral Streets

Drawing Title
SITE PLAN

Scale 1:100
Drawn SM
Date NOV 2000
Project Number 99.026RTA

Drawing Number A.01 / DA
Revision A


CATHEDRAL STREET
EGAN PLACE
NEW LANE
ONE WAY
ST. KILDA LANE
PALMER STREET
CAR PARKING
LOADING
COMMERCIAL
COMMERCIAL
CAR PARKING
STAIR
FUTURE PROPOSED 3 STOREY BUILDING (SITE 3A - RTA RESIDUAL LAND)
N
KEY
-EXISTING RL TO AHD
-EXISTING STREET TREE
-NEW STREET TREE SPECIES, SIZE AND FOOTPATH TREATMENT TO COUNCIL SPECIFICATION INSTALLATION BY COUNCIL
A DEVELOPMENT APPLICATION
JACKSON TEECE CHESTERMAN WILLIS PTY LTD
A.C.N. 053 637 290
Client
The Roads and Traffic Authority of New South Wales
Project
Commercial Development
191 Cathedral Street, WOOLLOOMOOLOO
Corner of Palmer & Cathedral Streets
Drawing Title
GROUND FLOOR PLAN
RL 5.90 & RL 7.20
Project Number
99026 (2)
Revision
A



KEY

ALS - ANODISED ALUMINIUM SUNSHADING

A	DEVELOPMENT APPLICATION		23.11.00
No.	Revision Description	Approved	Date

Architects

JACKSON TEECE CHESTERMAN WILLIS

A.C.N. 053 837 290

PTY LTD

Client

The Roads and Traffic Authority of New South Wales

Project

Commercial Development
191 Cathedral Street, WOOLLOOMOOLOO
Corner of Palmer & Cathedral Streets

Drawing Title

FIRST FLOOR PLAN
RL 16.50

Scale: 1:100	Project Number: 99026 (2)
Drawn: PE	Date: OCT 2000
Drawing Number: A03/DA	Revision: A

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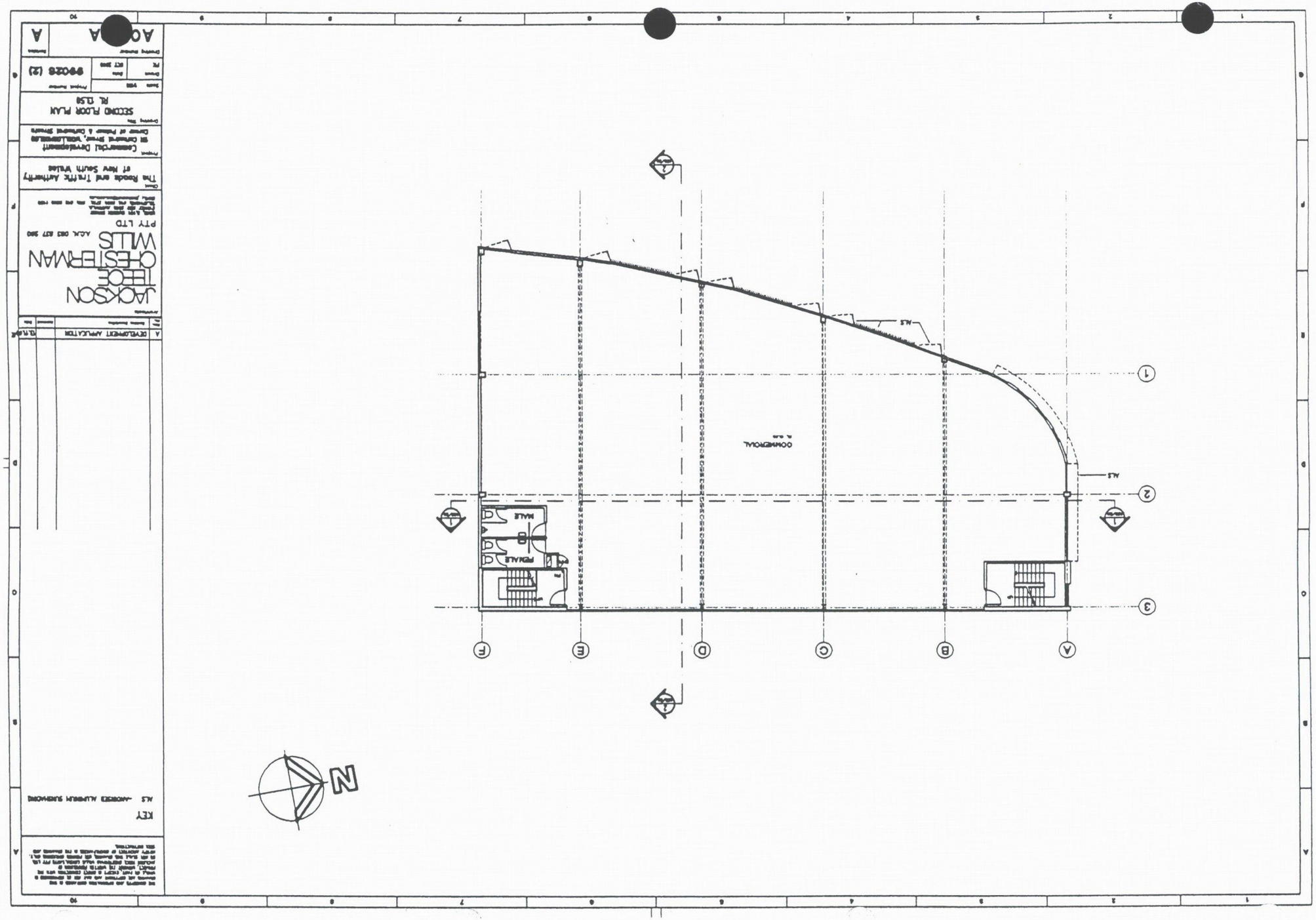

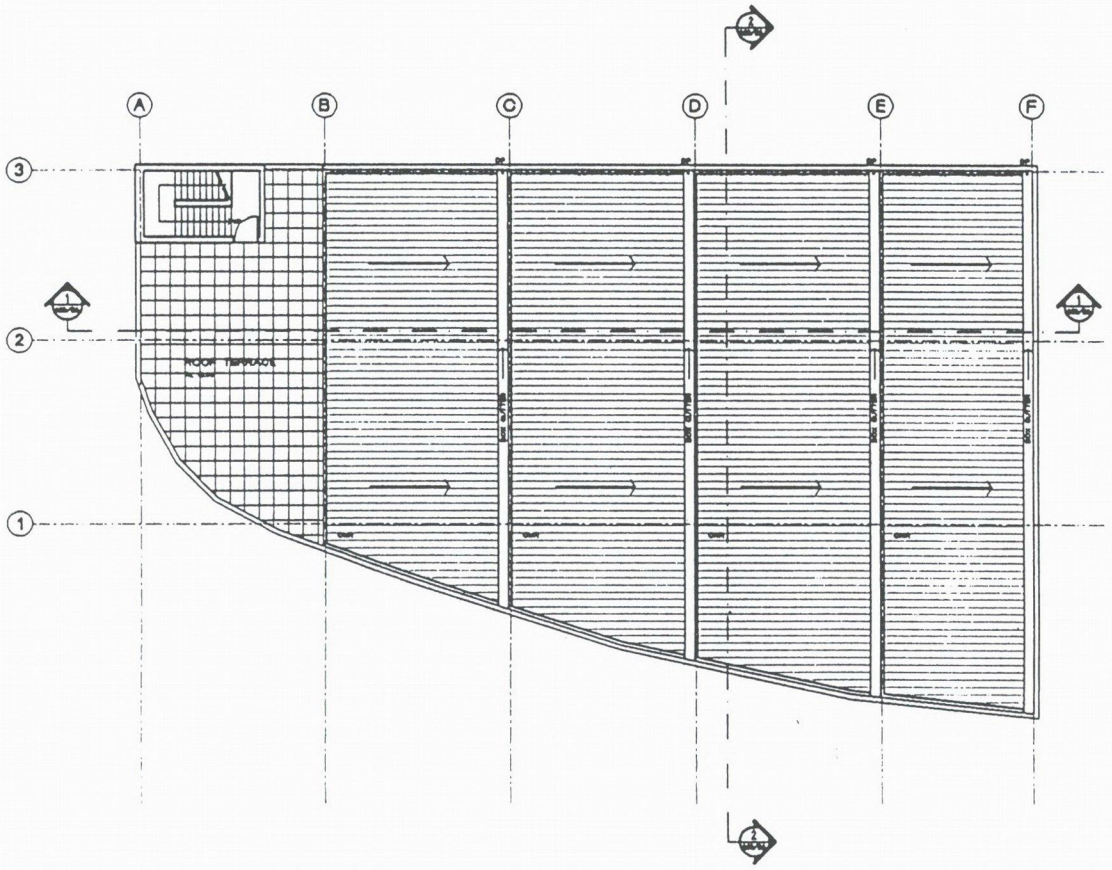

KEY

CHR COLOURBOND FINISHED METAL ROOFING

DP DOWNPIPE

A	DEVELOPMENT APPLICATION	13.11.00
Rev No.	Revision Description	Approved Date

JACKSON TEECE CHESTERMAN WILLIS A.C.N. 083 837 290 PTY LTD

Client: The Roads and Traffic Authority of New South Wales

Project: Commercial Development
191 Cathedral Street, WOOLLOOMOOLOO
Corner of Forbes & Cathedral Streets

Drawing Title: ROOF PLAN

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Drawn: PK | Date: OCT 2000

Drawing Number: A05/DA | Revision: A

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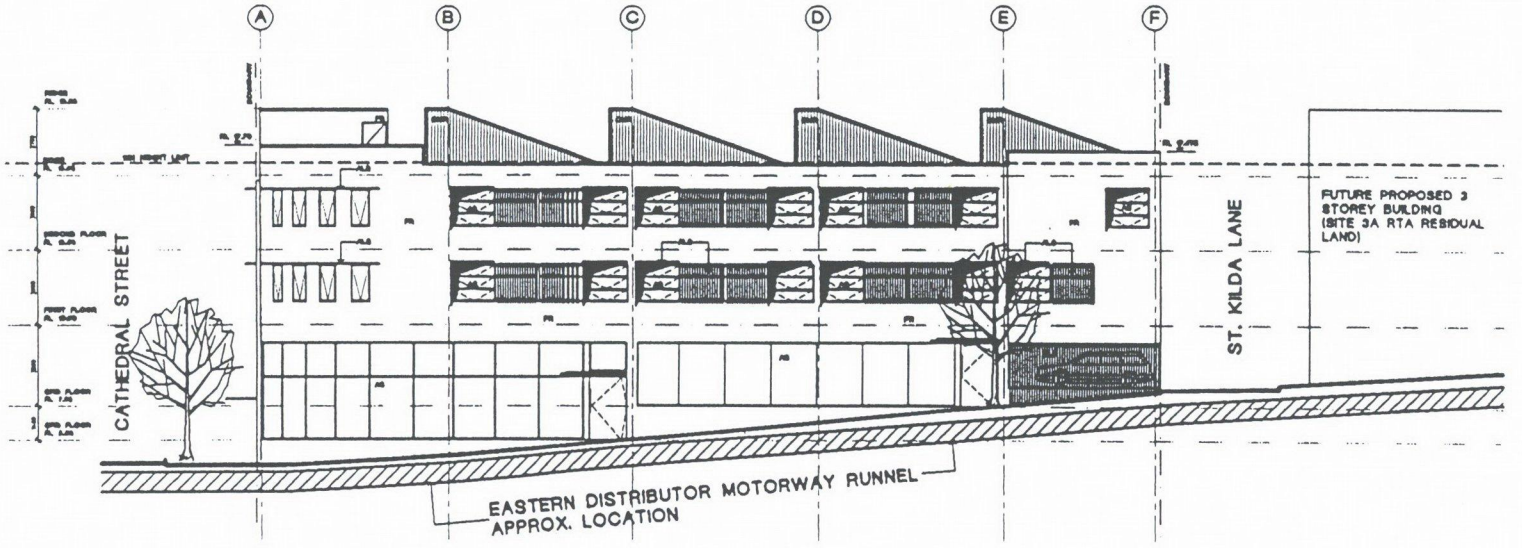

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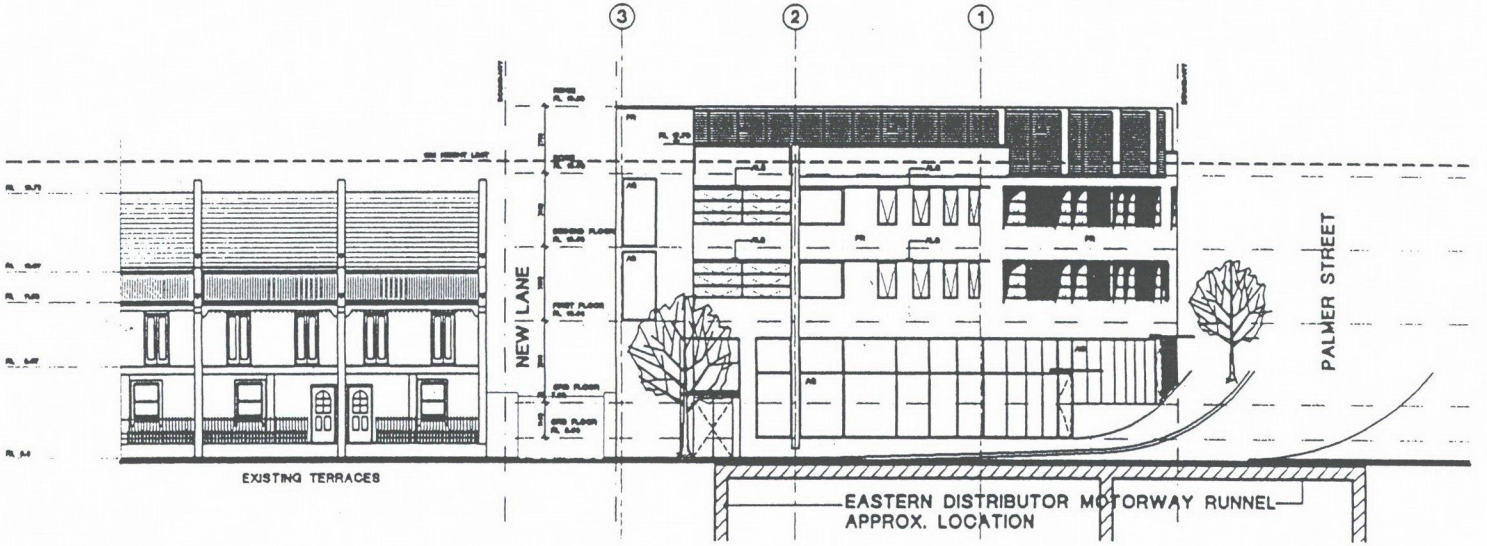
PALMER STREET



2 ELEVATION
CATHEDRAL STREET

KEY

DMR -COLORBOND FINISHED METAL ROOFING.

ALS -ANODISED ALUMINIUM SUNSHADING

BLS -ANODISED METAL LOUVRES SCREEN

LG -LOUVRES GLASS WINDOWS

AS -ALUMINIUM WINDOW CLEAR GLAZING

PR -PAINTED RENDER

A	DEVELOPMENT APPLICATION	

JACKSON TEECE CHESTERMAN WILLIS A.C.N. 083 837 290 PTY LTD

Client: The Roads and Traffic Authority of New South Wales

Project: Commercial Development
191 Cathedral Street, WOOLLOOMOOLOO
Corner of Palmer & Cathedral Streets

Drawing Title: ELEVATIONS

Scale: 1:100 | Project Number: 99026 (2)

Drawn: PE | Date: OCT 2000

Drawing Number: A-06/DA | Revision: A

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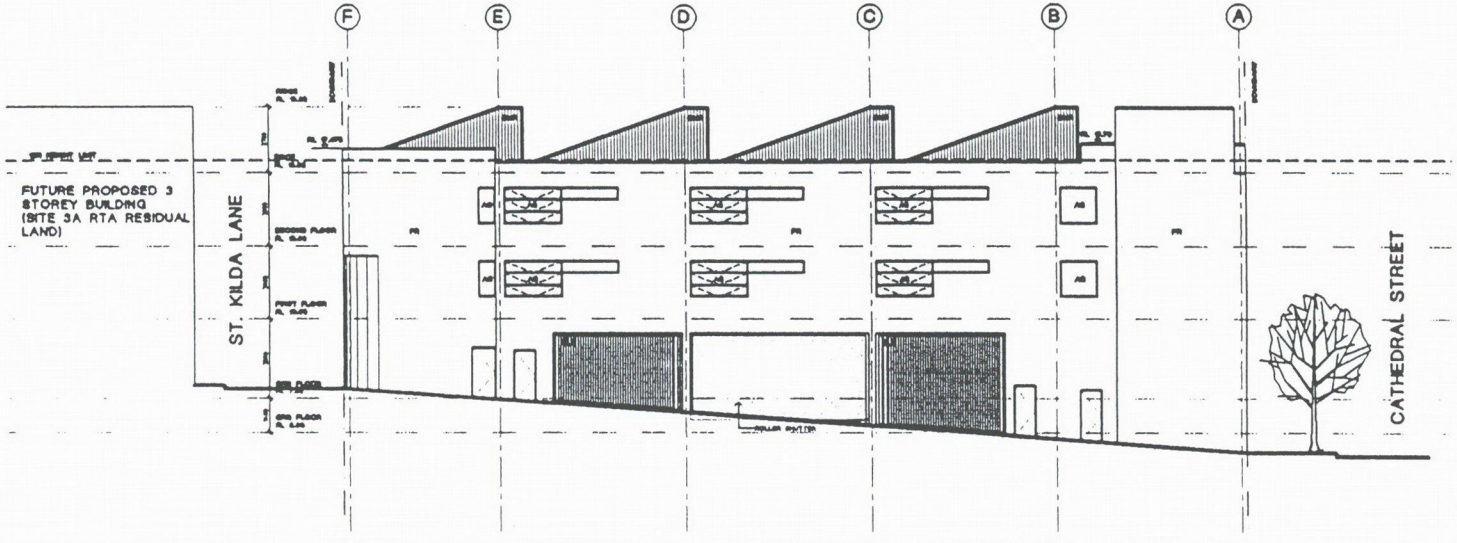

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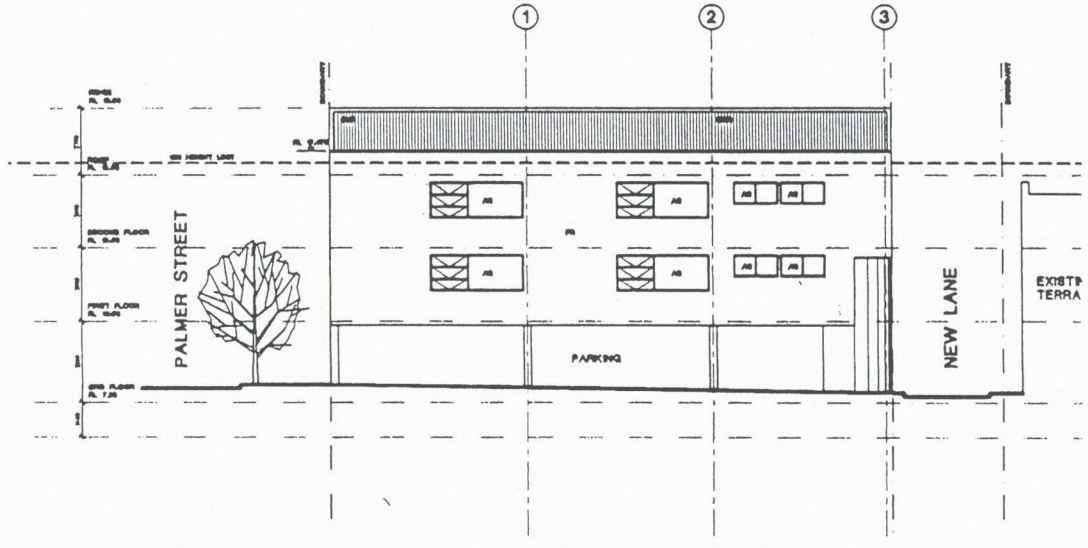
NEW LANE



2 ELEVATION
ST. KILDA LANE

KEY

CHR -COLOURBOND FINISHED METAL ROOFING
ALS -ANODISED ALUMINIUM SUNSHADING
BLS -ANODISED METAL LOUVRES SCREEN
LG -LOUVRES GLASS WINDOWS
AS -ALUMINIUM WINDOW CLEAR GLAZING
PR -PAINTED RENDER

Rev. No.	Revision Description	Approved	Date
A	DEVELOPMENT APPLICATION		13.11.00

Architects
JACKSON TEECE CHESTERMAN WILLIS A.C.N. 083 637 290
PTY LTD

Client
The Roads and Traffic Authority of New South Wales

Project
Commercial Development
191 Cathedral Street, WOOLLOOMOOLOO
Corner of Palmer & Cathedral Streets

Drawing Title
ELEVATIONS

Scale 1:100
Drawn PK
Date OCT 2000
Project Number 99026 (2)
Drawing Number A07/DA
Revision A

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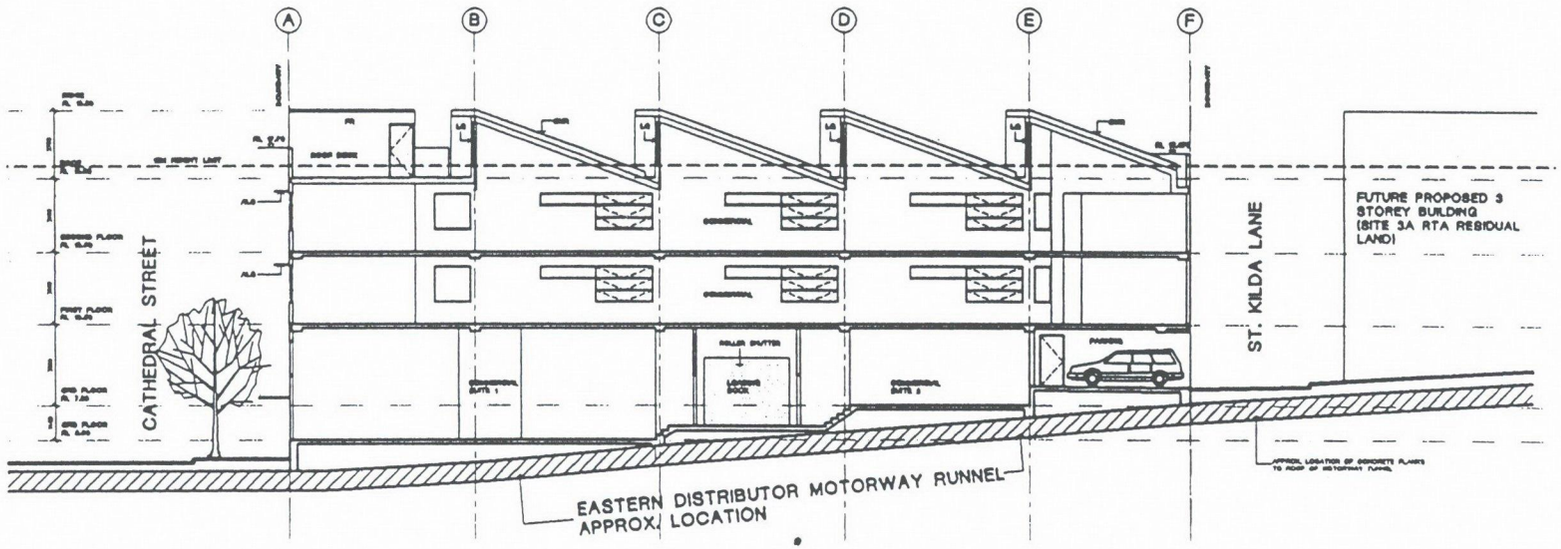

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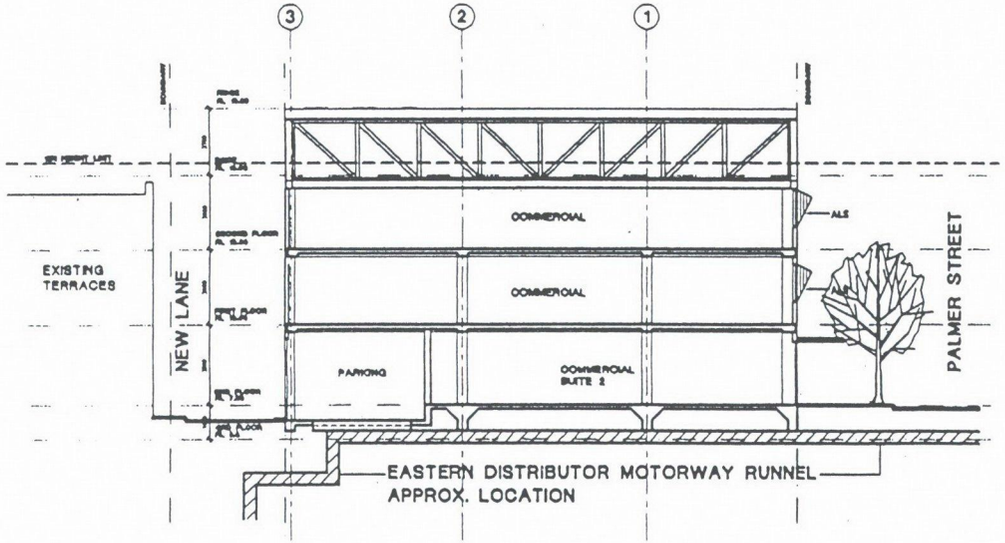

2 SECTION

KEY

CHR -COLOURBOND FINISHED METAL ROOFING

ALS -ANODISED ALUMINUM SUNSHADING

BLS -ANODISED METAL LOUVRES SCREEN

LG -LOUVRES GLASS WINDOWS

AG -ALUMINIUM WINDOW CLEAR GLAZING

PR -PAINTED RENDER

A	DEVELOPMENT APPLICATION	23.11.00

JACKSON TEECE CHESTERMAN WILLIS A.C.N. 053 837 290 PTY LTD

Client: The Roads and Traffic Authority of New South Wales

Project: Commercial Development 91 Cathedral Street, WOOLLOOMOOLOO Corner of Palmer & Cathedral Streets

Drawing Title: SECTIONS

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Drawn: PE | Date: OCT 2000

Drawing Number: /DA | Revision: A

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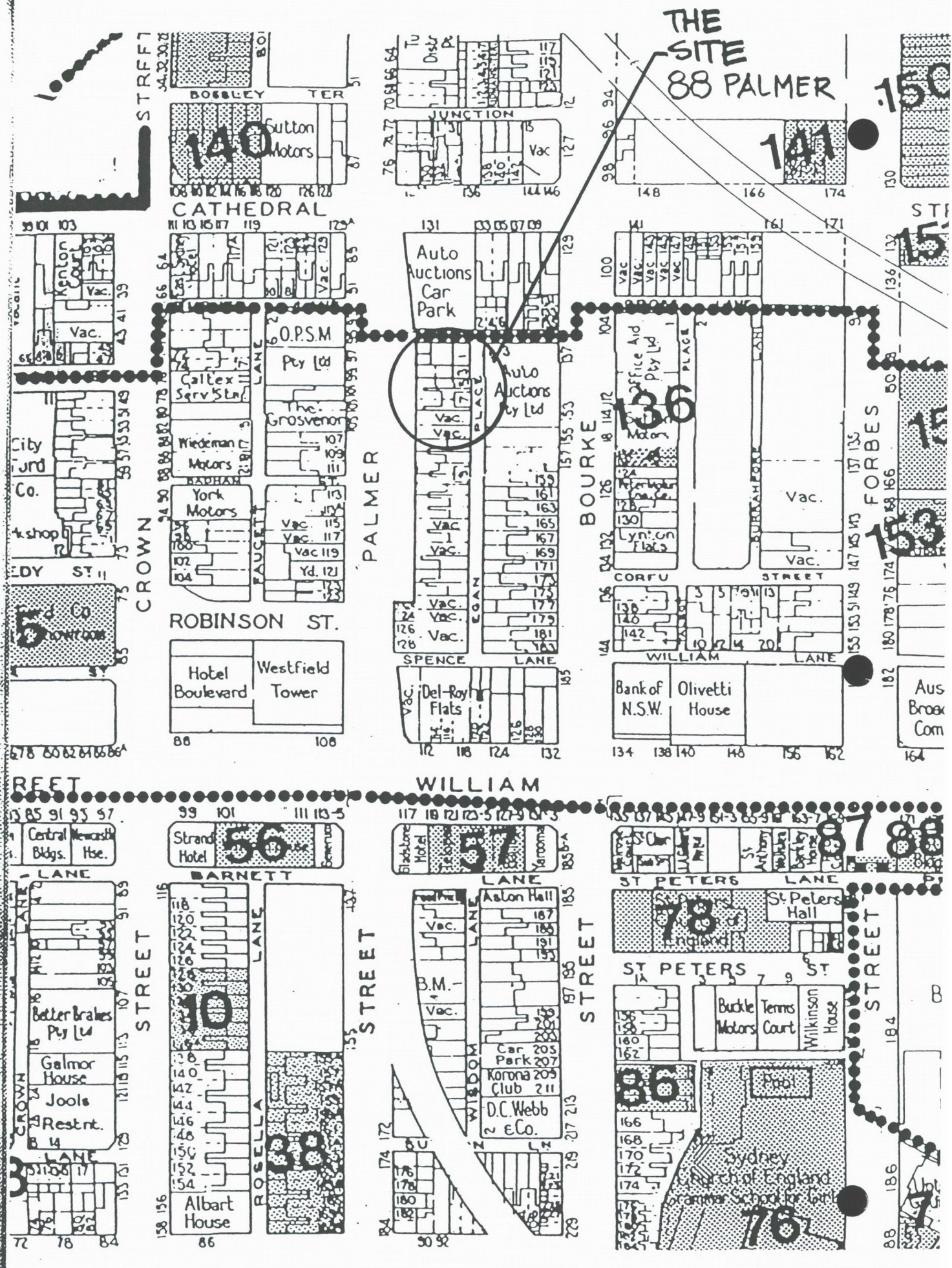
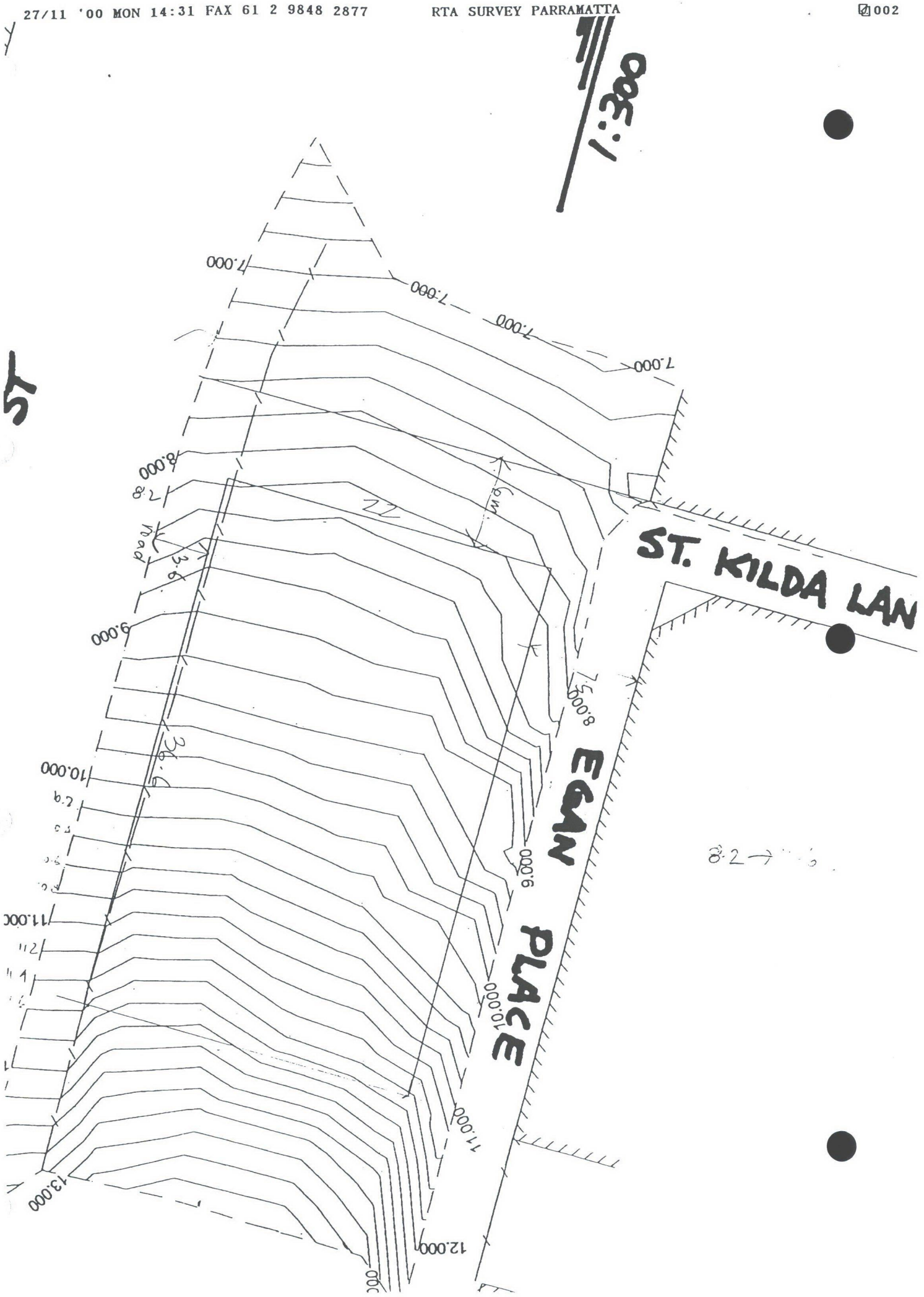
7.2 EXTRACT FROM 1970s PLANNING MAP



EXTRACT FROM PLANNING MAP circa 1970's

7.3 SURVEY INFORMATION CURRENT AND PREVIOUS TO PROPOSED DEVELOPMENT

Received from Alan Hawdon, Survey Section, Roads and Traffic Authority. For further information contact him on ph. 9848 2827, fax. 9848 2877, email. Alan_Hawdon@rta.nsw.gov.au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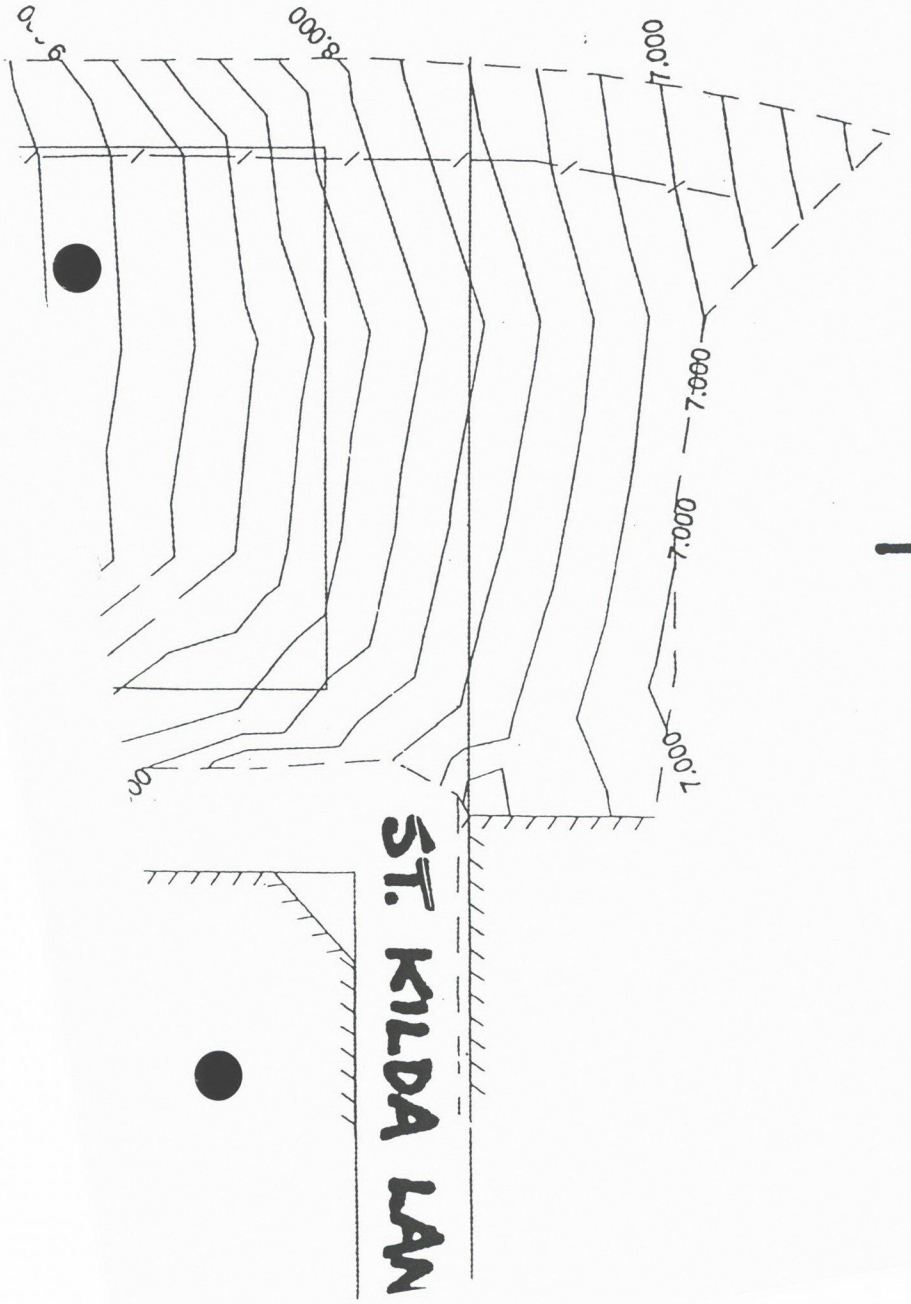

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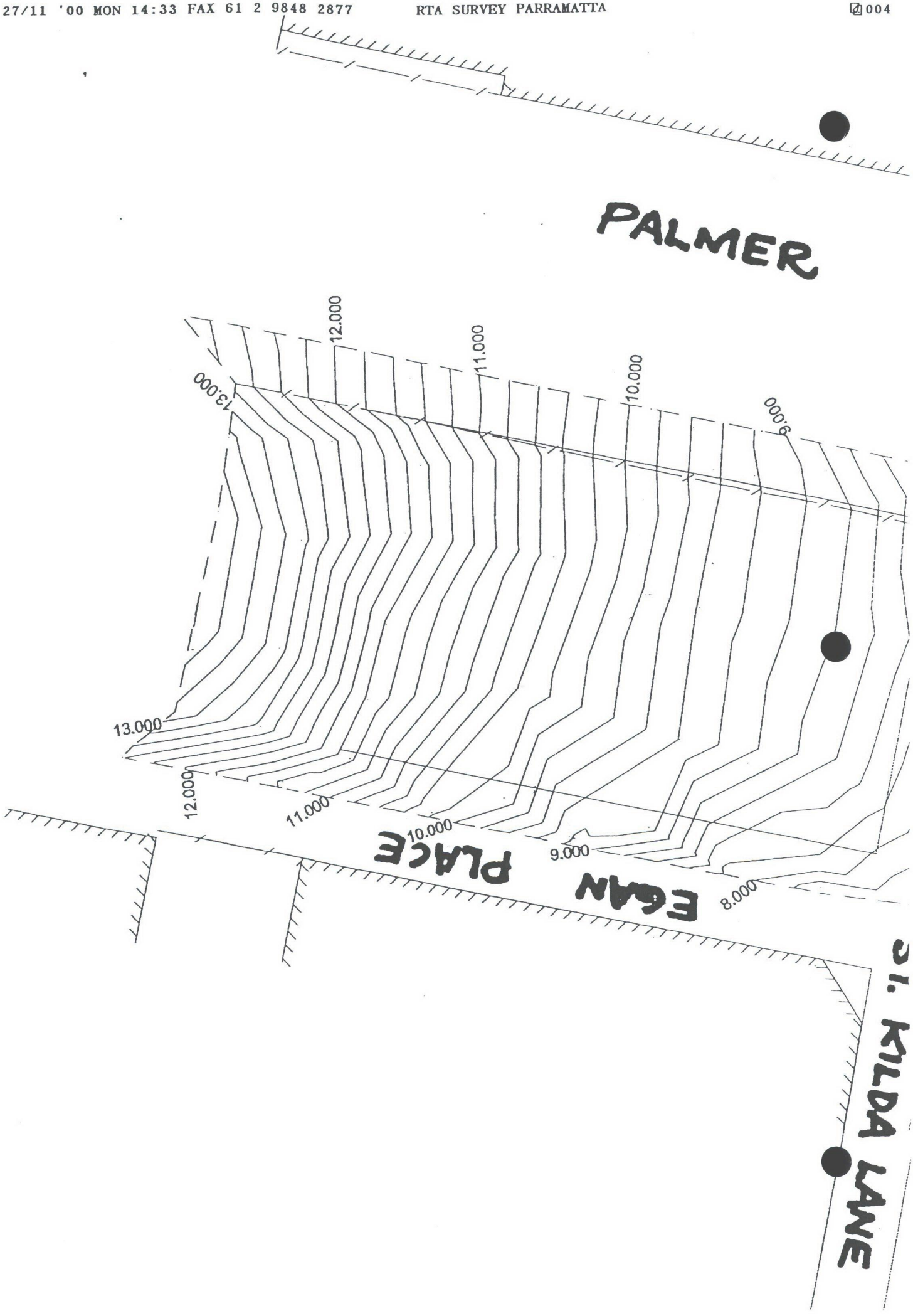
PALMER
13.000
12.000
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EGAN PLACE
ST. KILDA LANE


6.047
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R.L.'s top of cut + cover
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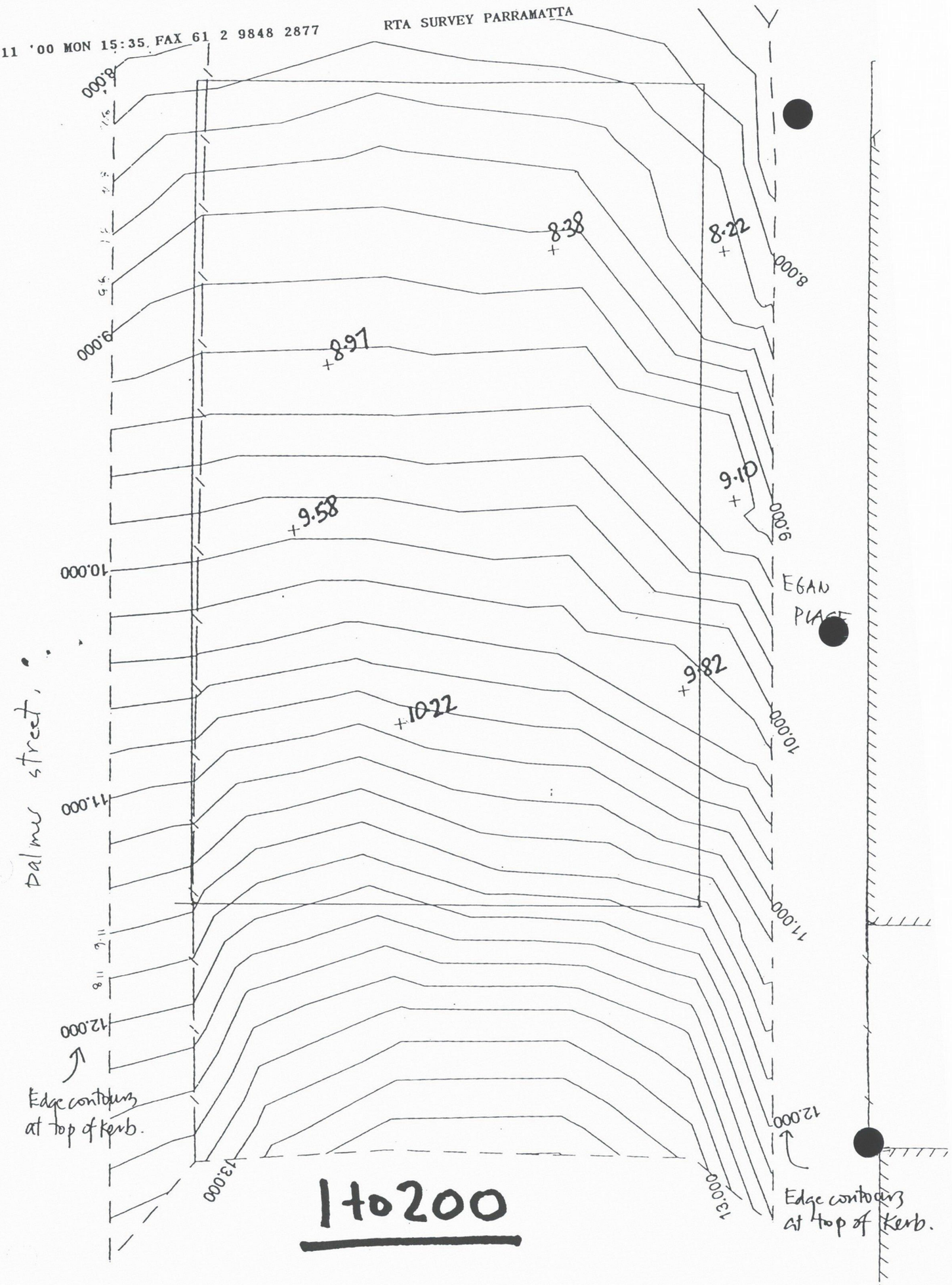
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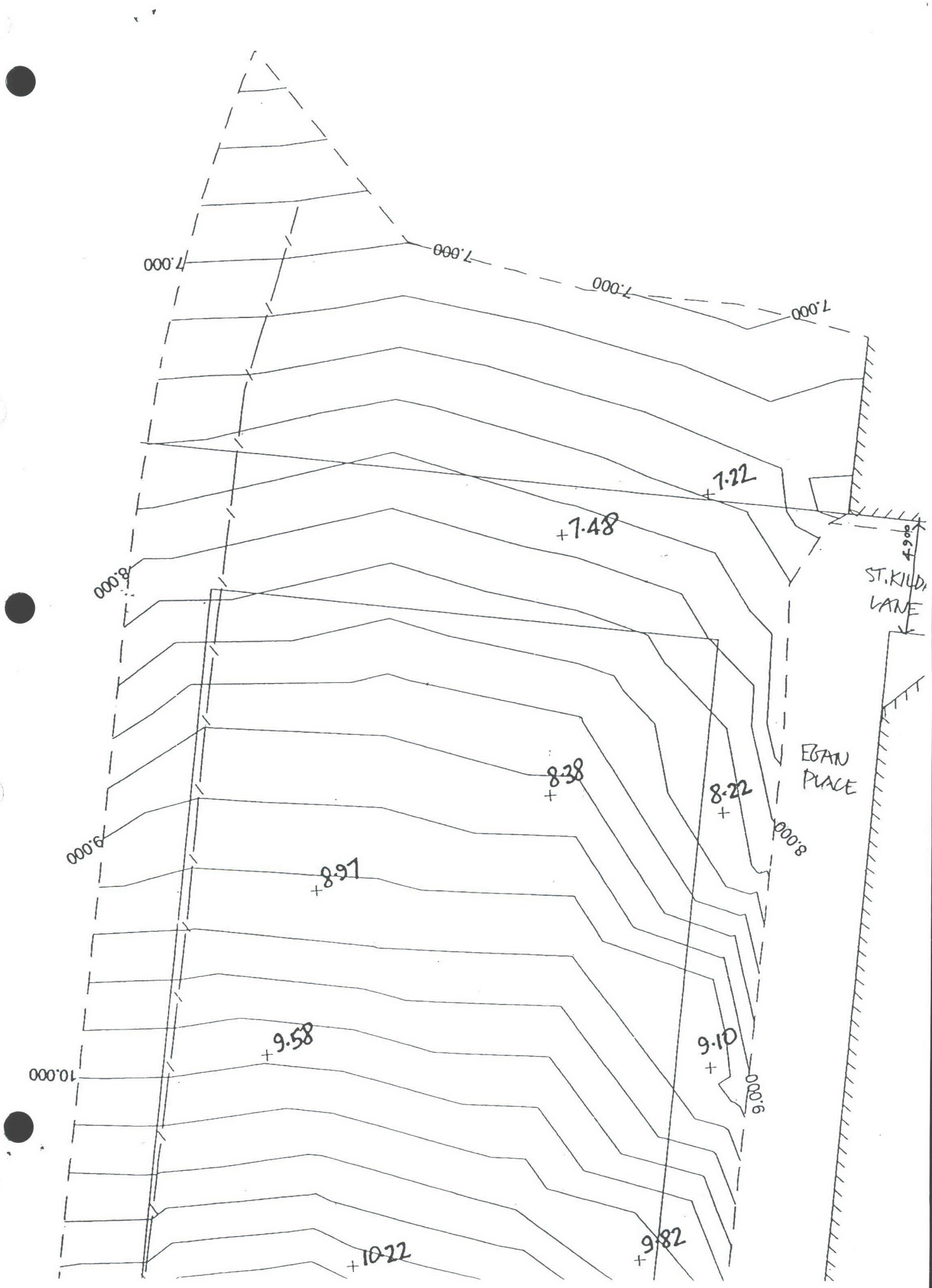
EGAN PLACE
Palmer street.
Edge contours at top of kerb.
Edge contours at top of kerb.

1 to 200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ST. KILDA LANE
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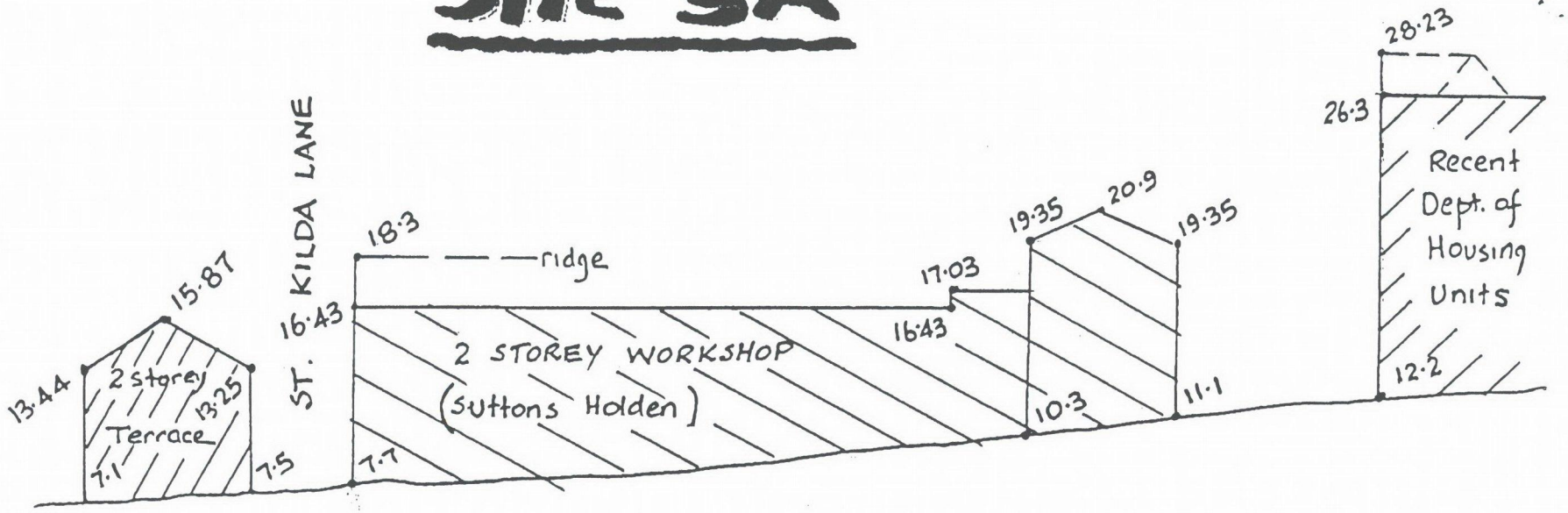
Site 3A



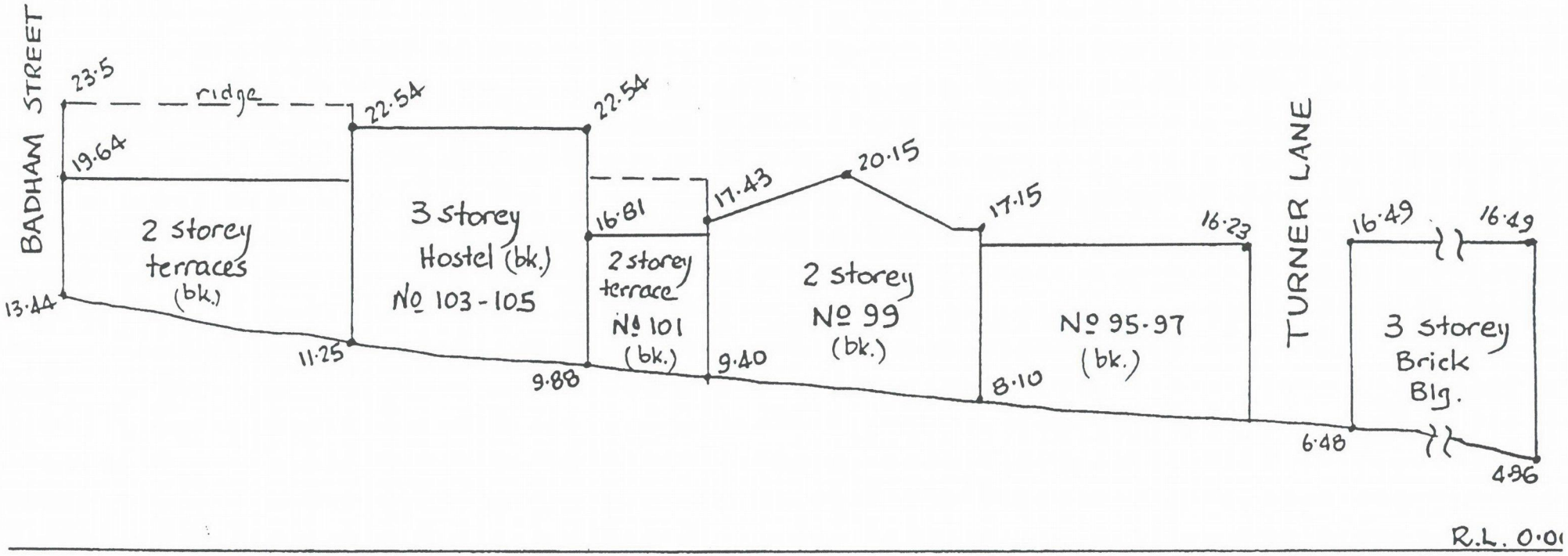
SECTION ALONG EGAN PLACE (Looking East)

SCALE: 1 to 300
1·12.00

01/12 '00 FRI 13:35 FAX 61 2 9848 2877 RTA SURVEY PARRAMATTA 002

002
01/12 '00 FRI 15:31 FAX 61 2 9848 2877 RTA SURVEY PARRAMATTA

Site 3A



SECTION ALONG PALMER STREET (Looking West)

SCALE: 1 to 300

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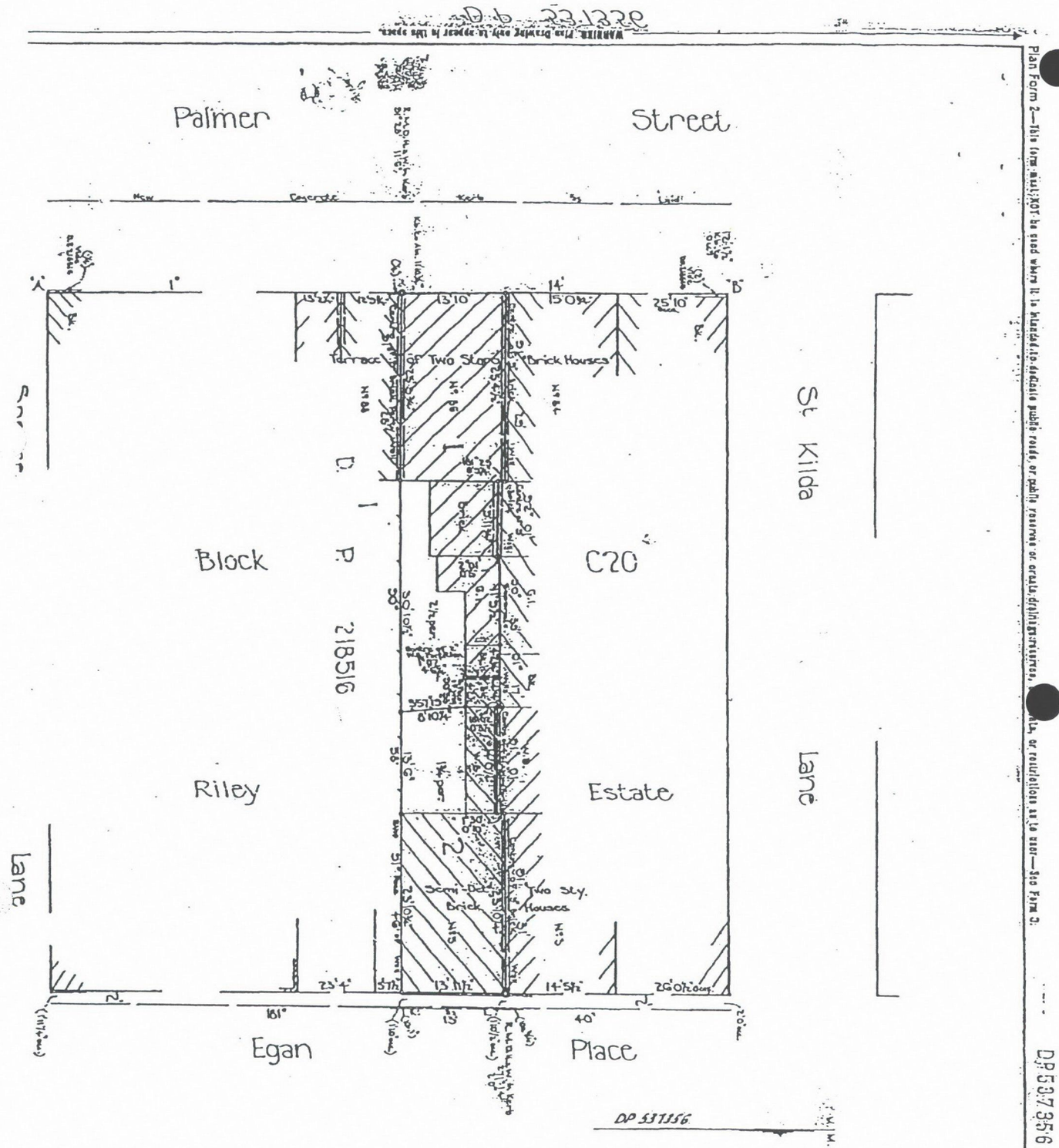
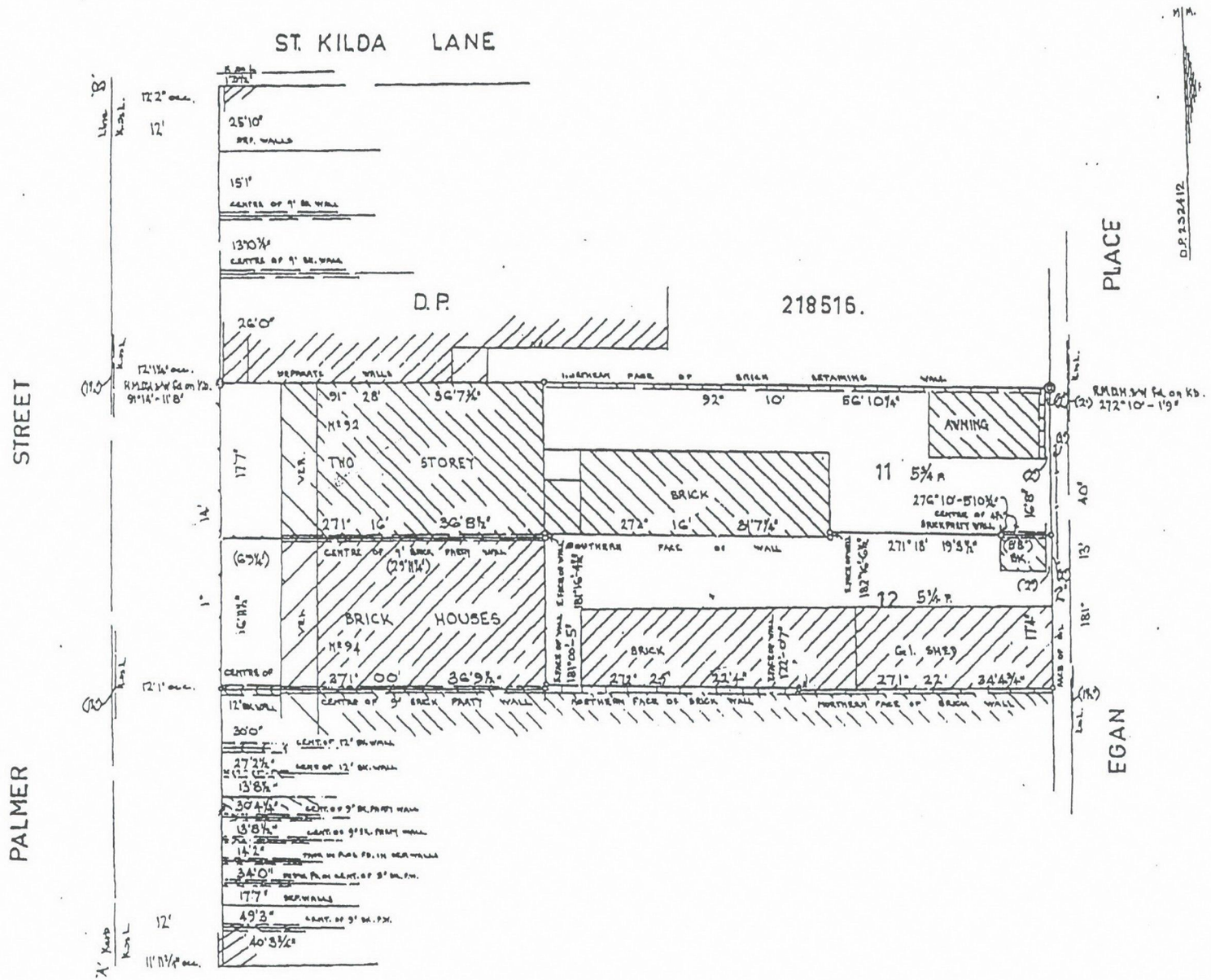

Palmer Street
Terrace of Two Storey Brick Houses
St Kilda Lane
Block C20
D.P. 218516
Riley Estate
Semi-Det. Brick Two Sty. Houses
Egan Place
DP 537356
Plan Form 2—This form must NOT be used where it is intended to dedicate public roads, or public reserves or create drainage reserves, ... or restrictions as to user—See Form 3.
WARNING. CREASING OR FOLDING WILL LEAD TO REJECTION.
DP 537356
Registered: 27/9/69
Title System: Old System
Purpose: Subdivision
Ref. Map: C20 Riley Estate
Last Plan: ob.
PLAN OF Sub. of Part of Block C20 of the Riley Estate
Bk 2938 No 76
Scale: 10 Feet to an Inch
City: Sydney
Locality: Woollahmoolaa
Parish: Alexandria
County: Cumberland
Richard John Holmes
Council Clerk's Certificate.
Council Clerk
OFFICE USE ONLY.
W002A1C

m 2—This form must NOT be ... where it is intended to dedicate public roads or public reserves or create drainage reserves, easements, or restrictions as to user.—See Form 2. WARNING: CREASING OR FOLDING ...



DP 232412

Registered: 20.9.67

C.A.:

Title System: Old System

Purpose: Subdivision

Ref. Map: Riley Estate C 20

Last Plan: Riley Estate C20

PLAN OF SUBDIVISION OF PART OF BLOCK C 20 OF THE RILEY ESTATE

Scale: 10 ft. to an inch

~~Town~~/City: SYDNEY

Locality: WOOLLOOMOOLOO

Parish: ALEXANDRIA

County: CUMBERLAND

I, Norman T.J. van Cooth

of Cox, Martin & Cutler,

a surveyor registered under the Surveyors Act, 1929, as amended, hereby certify that the survey represented in this plan

is accurate and has been made *(1) by me (2) under my immediate supervision in accordance with the Survey Practice Regulations, 1933, and was completed on [illegible]

Signature

Surveyor registered under Surveyors Act, 1929, as amended

Datum Line of Azimuth: A. – B.

I hereby certify that—

(a) the requirements of the Local Government Act, 1919 [other than the requirements for the registration of plans], and

*(b) the requirements of section 24 of the Metropolitan Water, Sewerage and Drainage Act, 1924, as amended,

have been complied with by the applicant in relation to proposed

(insert "new road" or "subdivision") set out in Subdivision No.

(Signature)

SHEET 1 OF 2 SHEETS

D.P. 979963 sh1/2

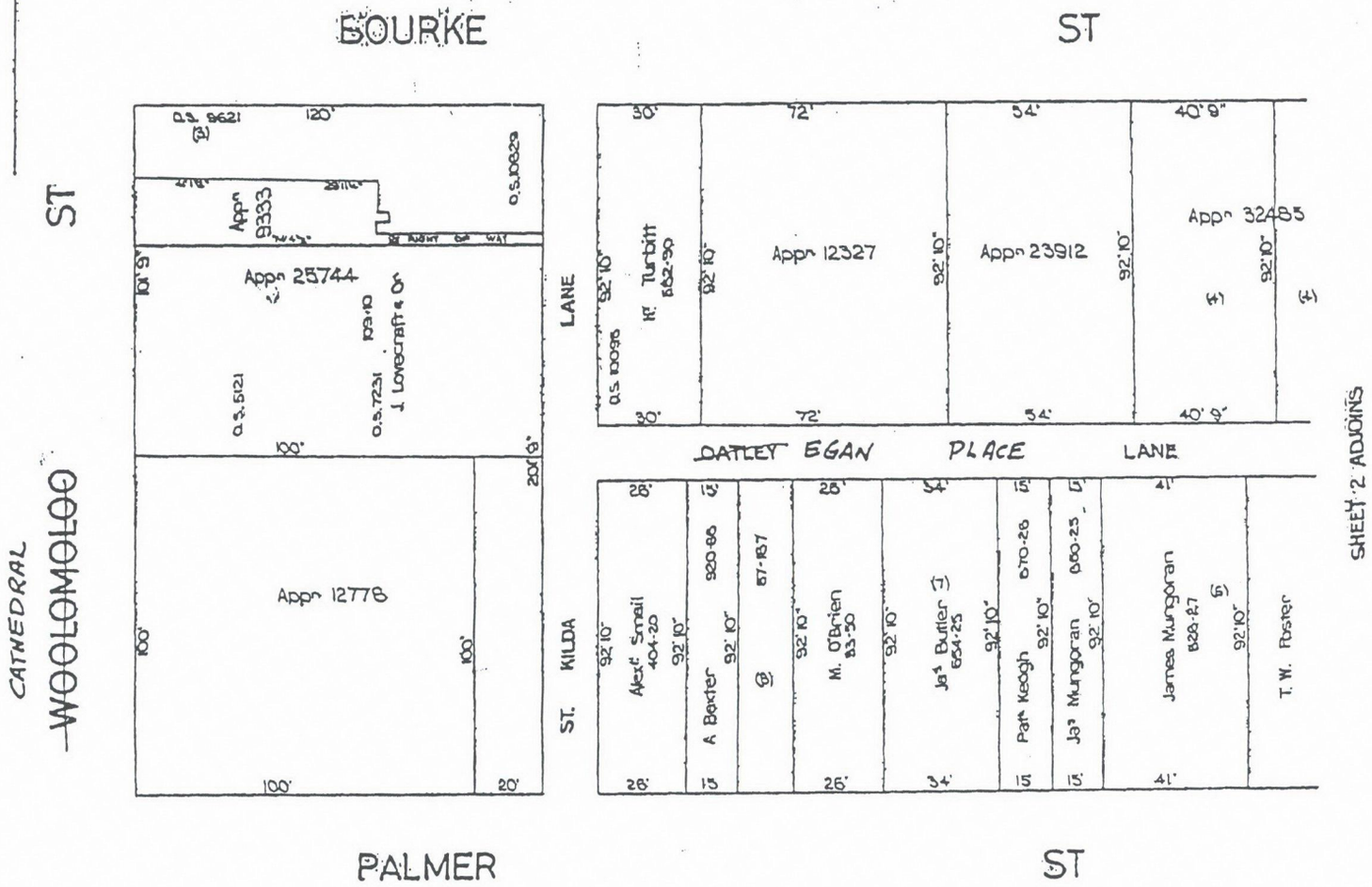
BLOCK C20 RILEY ESTATE

P.H. ALEXANDRIA CO CUMBERLAND

Scale 30 feet to one inch

NOTES

No	Particulars
(1)	F.P.171549 (Sur.)
(2)	F.P.171791 (Sur.)
(3)	49M8340
(4)	F.P.436231 (Sur.)
(5)	F.P.107116 (Sur.)
(6)	D.P.230686 (Suc) 67M6121
(7)	D.P.232412 (Sur.)
(8)	D.P.537356 (Sur.) IVA3846 (lot 1) N.P.W.

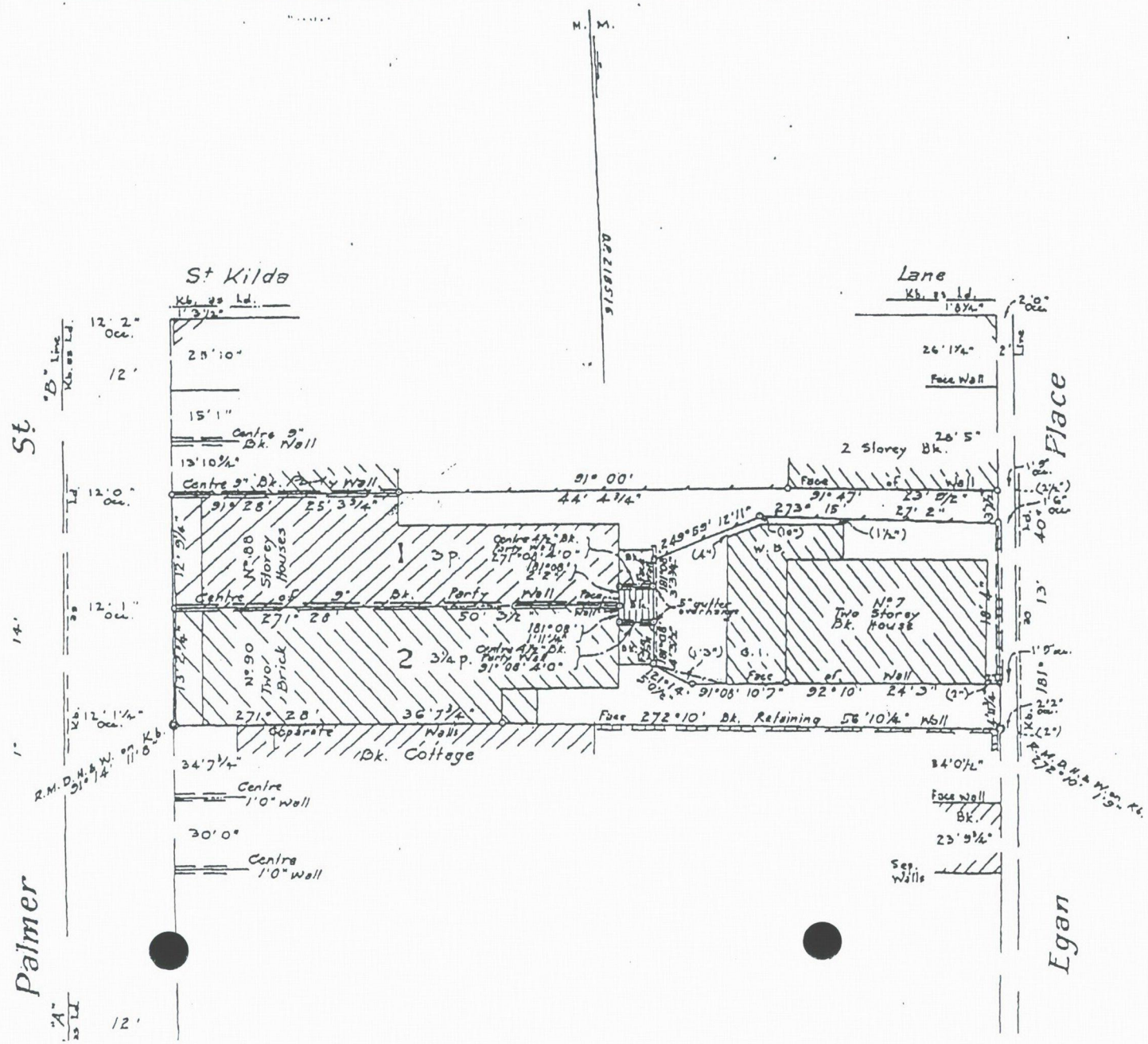


BLOCK 20 RILEY ESTATE

SHEET 2 OF 2 SHEETS

...n must NOT be used where any Dedication, Drainage Reserve or Public Garden and Recreation Space is provided. — See Form 3. WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION.

188/57



DP218516

Registered: [illegible]

~~C.A.~~

Title System: Old System

Purpose: Subdivision

Ref. Map: C20 Riley Estate

Last Plan " " "

PLAN OF subdivision of part of Block C 20 of the Riley Estate

Bk. 2481 No. 639

Scale: 10 Feet to an Inch

~~Mun. Shire~~

City: Sydney

Locality: Woolloomooloo

Parish: Alexandria

County: Cumberland

I, George Henry Martin

of Sydney

a surveyor registered under the Surveyors Act, 1929, as amended, hereby certify that the survey represented in this plan is accurate and has been made ~~(1) by me (2)~~ under my immediate supervision in accordance with the Survey Practice Regulations, 1933, and was completed on 27-5-1963

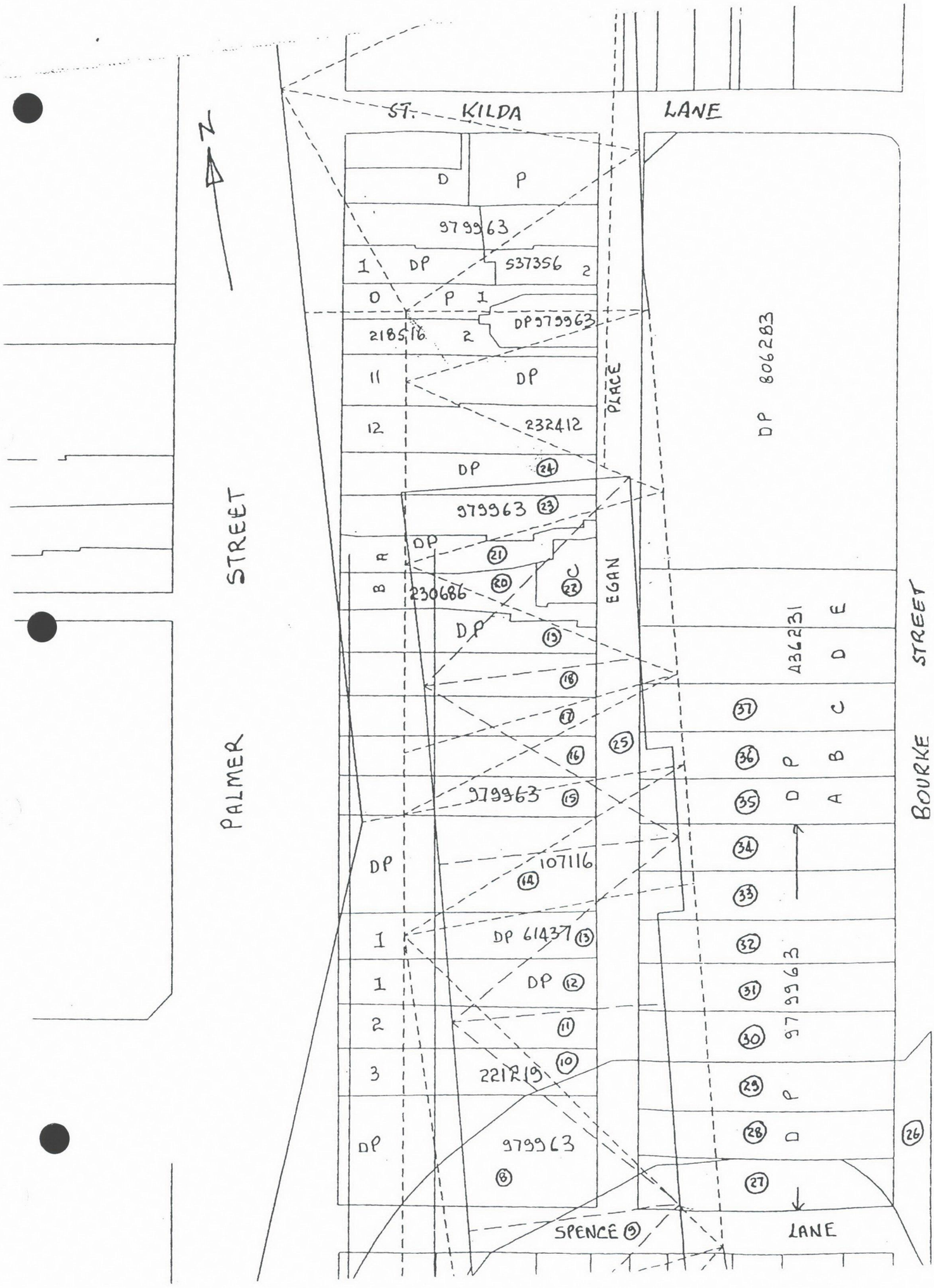
Signature: [signature]

Surveyor registered under Surveyors Act, 1929, as amended. Datum Line of Azimuth: "A" — "B"

Statements of Proposed Easements.

OFFICE USE ONLY.

DP218516



ST. KILDA LANE
N
PALMER STREET
BOURKE STREET
EGAN PLACE
SPENCE LANE
979963
537356
DP 979963
218516
232412
230686
107116
DP 61437
221219
DP 806283
436231

No	File	Land	Title	Location	Proprietor	Access Date	Comments
22		Part Lot C, DP 230686 C/230686*	Conv. No. 919 Book 3027	No. 9 Egan Place, Woolloomooloo	Roads and Traffic Authority of NSW		Stratum (Tunnel) only
23		Part DP 979963 1/135250*	Resumed and Vested Gov. Gaz. 29.8.75 F.3451	No. 98 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW		Stratum (Tunnel) only
24		Part DP 979963 *	Conv. No. 417 Book 3079	No. 96 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW		Stratum (Tunnel) only
25		PART EGAN PLACE	ROAD	Woolloomooloo	SOUTH SYDNEY CITY COUNCIL		Part Bourke Street Onload Ramp & Stratum (Tunnel)
26		Part Bourke Street	Road	Woolloomooloo	South Sydney City Council		Part Bourke Street Onload Ramp
27		Part DP 979963 2/135251*	Part Conv. No. 516 Book 3206	No. 183 Bourke Street, Woolloomooloo	Roads and Traffic Authority of NSW		Part Bourke Street Onload Ramp & Stratum (Tunnel)
28		Part DP 979963 1/135251*	Part Conv. No. 516 Book 3206	No. 181 Bourke Street, Woolloomooloo	Roads and Traffic Authority of NSW		Part Bourke Street Onload Ramp & Stratum (Tunnel)
29		Part DP 979963 *	Conv. No. 391 Book 3150	No. 179 Bourke Street, Woolloomooloo	Roads and Traffic Authority of NSW		Part Bourke Street Onload Ramp & Stratum (Tunnel)
30		Part DP 979963 5/135330*	Pt. Conv. No. 80 Book 3859	No. 177 Bourke Street, Woolloomooloo	New South Wales Land and Housing Corporation		Stratum (Tunnel) only
31		Part DP 979963 4/135330*	Pt. Conv. No. 80 Book 3859	No. 175 Bourke Street, Woolloomooloo	New South Wales Land and Housing Corporation		Stratum (Tunnel) only

Alexandria Sheet 4

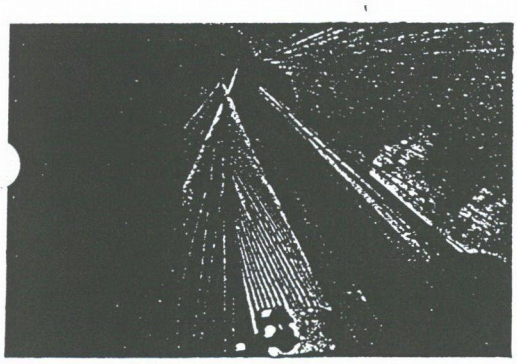
8/08 '00 FRI 09:31 FAX 61 2

No	File	Land	Title	Location	Proprietor	Access Date	Comments
12		Part Lot 1, DP 221219	C.T. 1/221219	No. 120 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW		Stratum (Tunnel) only
13		Part Lot 1, DP 61437	C.T. 1/61437	No. 118 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW		Stratum (Tunnel) only
14		Part Lots A & B, DP 107116	C.T. A/107116 & C.T. B/107116	Nos. 114-116 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW		Stratum (Tunnel) only
15		Part DP 979963 1/135249*	Conv. No. 817 Book 3237 RTA.	No. 112 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW ✓		Stratum (Tunnel) only
16		Part DP. 979963 1/136401*	Conv. No. 423 Book 3012 RTA.	No. 110 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW ✓		Stratum (Tunnel) only
17		Part DP 979963 2/135340*	Part Conv. No. 803 Book 3365 RTA	No. 108 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW ✓		Stratum (Tunnel) only
18		Part DP 979963 1/135340*	Part Conv. No. 803 Book 3365 RTA.	No. 106 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW ✓		Stratum (Tunnel) only
19		Part DP 979963 1/136400*	Conv. No. 626 Book 3133 RTA.	No. 104 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW ✓		Stratum (Tunnel) only
20		Part Lot B, DP 230686 B/230686*	Conv. No. 322 Book 3042 RTA.	No. 102 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW ✓		Stratum (Tunnel) only
21		Part Lot A, DP 230686 A/230686*	Conv. No. 571 Book 3040 RTA	No. 100 Palmer Street, Woolloomooloo	Roads and Traffic Authority of NSW ✓		Stratum (Tunnel) only

7.4 STRUCTURAL ENGINEER'S REPORT REGARDING LOAD CAPACITY OF TUNNEL UNDER THE SITE

Eastern Distributor, Sydney Structural Assessment of Development Sites in Woolloomooloo and East Sydney

April 2000



Hyder

Consulting

Eastern Distributor, Sydney Structural Assessment of Development Sites in Woolloomooloo and East Sydney

Author: Paul Lovarini P. Lovarini

Approver: Paul Lovarini P. Lovarini

NT007F3E.doc 26 April 2000

This report has been prepared for Evans & Peck Management on behalf of the Roads & Traffic Authority of NSW in accordance with the terms and conditions of appointment for Eastern Distributor, Sydney Structural Assessment of Development Sites in Woolloomooloo and East Sydney dated . Hyder Consulting (Australia) Pty Limited cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

Hyder

Contents

1 Summary 1

2 Site 1A 2

3 Site 1B 3

4 Site 2 4

5 Site 3A 5

6 Site 3B 6

7 Site 4 7

8 Sites 5A/5B 8

9 Site 6A 9

10 Site 6C 10

11 Site 7A 11

12 Site 7B 12

13 Site 8 13

14 Site 9 14

15 Appendix 1 15

1 Summary

At the request of Evans and Peck, Hyder Consulting have reviewed documentation in relation to the Eastern Distributor project in order to provide structural engineering advice for various potential development sites. A review of relevant documentation supplied (refer to Appendix 1) in conjunction with some preliminary structural analysis has resulted in an assessment of:

i) the structural load capacity of the various sites

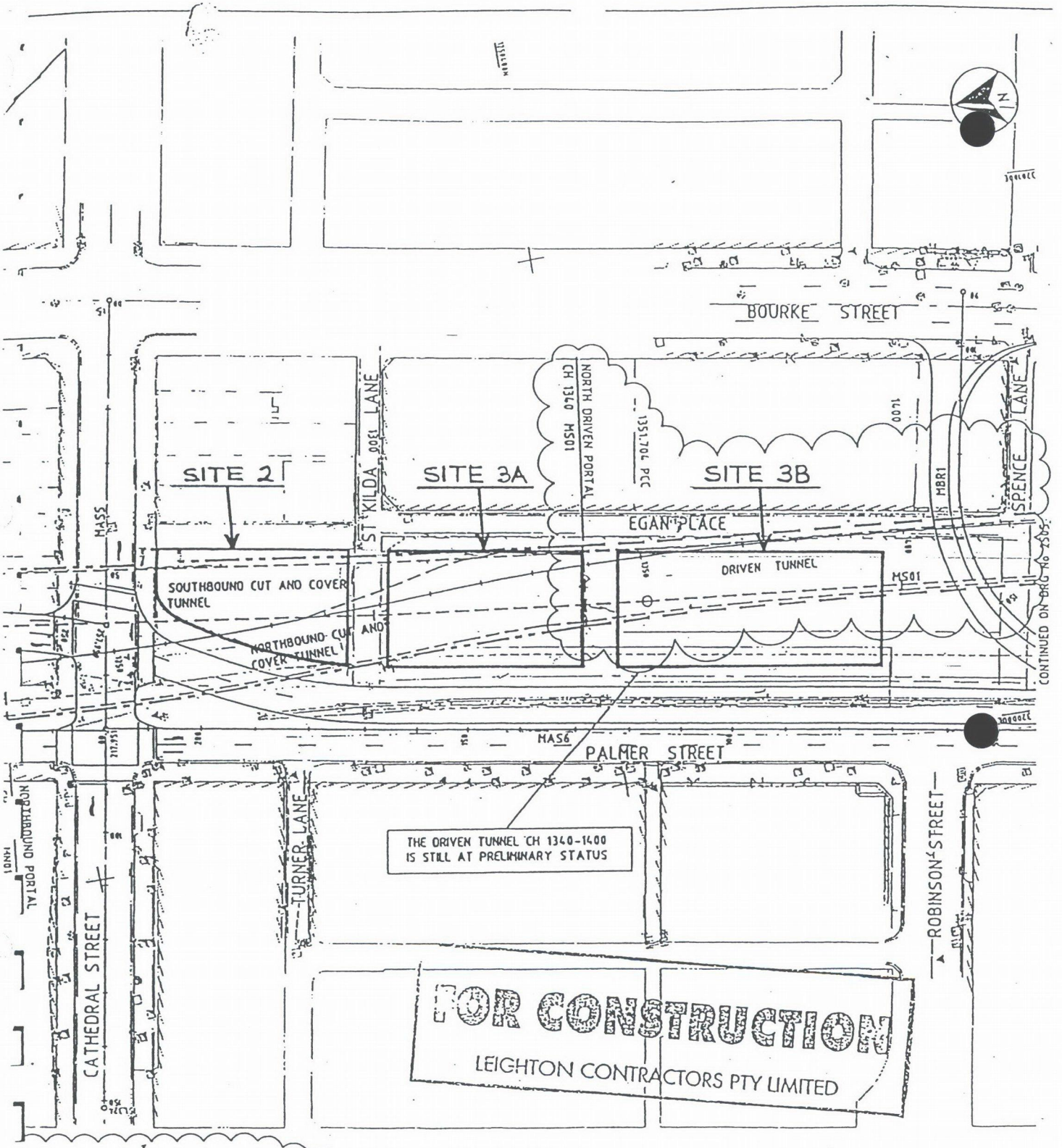
ii) the fire resistance level of the prestressed concrete roof structures in the cut and cover tunnel sites.

The fire resistance level has been determined in accordance with AS3600-1994 the Australian Concrete Structures Code. The Building Code of Australia does not prescribe fire resistance levels for tunnel structures and consequently we cannot comment on the adequacy of the fire resistance levels achieved. However, it may be prudent to undertake a fire/explosion risk assessment particularly if dangerous goods are transported through the tunnels.

This report should be read in conjunction with the report prepared by Jackson Teece Chesterman Willis, titled: Eastern Distributor in Woolloomooloo and East Sydney, Surface Works and The Redevelopment of Residual Lands and Air Rights, Master Plan.

5 Site 3A

- The site is located over a cut and cover tunnel. Refer to the Sites 2/3 Plan. The cut and cover tunnel roof structure comprises of precast pretensioned concrete planks with an insitu concrete topping.
- The additional allowable live load capacity of the cut and cover tunnel roof is estimated to be in the range of 15kPa to 20kPa for load factors of 2.0 and 1.5 respectively. This assumes removal of all overburden material.
- The cut and cover tunnel section could support a two-storey development of the type described for Site 1A. Alternatively, a lightweight three-storey development could be constructed comprised of a concrete ground floor slab and timber/steel upper floors.
- The development could incorporate a storey of carparking, however the total load imposed by the development would need to be limited to the 15 to 20 kPa noted above.
- In the event that the imposed loads from a development exceeds the capacity of the cut and cover tunnel roof, there is limited opportunity to bridge over the tunnel roof structure.
- Vibration/acoustic isolation measures may need to be incorporated into the future development.
- The roof structure over the cut and cover tunnel comprises of pretensioned concrete planks of type TN1-TN4 with 67mm of concrete cover to the pretensioned wires. These planks achieve a 3.75 hour fire resistance level.



NOTES:

1. FOR GENERAL NOTES REFER ORG. No. 1005.
2. FOR COMBINED SERVICES LAYOUT REFER ORG. No. 2003.
3. FOR SERVICE RELOCATIONS REFER ORG. No. 2054.
4. FOR TYPICAL CROSS SECTIONS REFER ORG. No. 2573.
5. FOR DRAINAGE LAYOUT REFER ORG. No. 3104
6. FOR PAVEMENT LAYOUT REFER ORG. No. 3204.
7. FOR LINEMARKING AND SIGNS REFER ORG. No. 3304.
8. FOR STREET LIGHTING AND ROAD FURNITURE LAYOUT REFER ORG. No. 3404.

SITES 2/3 PLAN

Scale 1:1000 Approx.

nsell Pty Ltd
04 845 824
Engrs, Planners, & Project Managers

LEIGHTONS

Leighton Contractors Pty Limited
Level 10, 12 Help Street
Chatswood NSW 2067
Australia
ACN 000 893 667

AIRPORT MOTORWAY

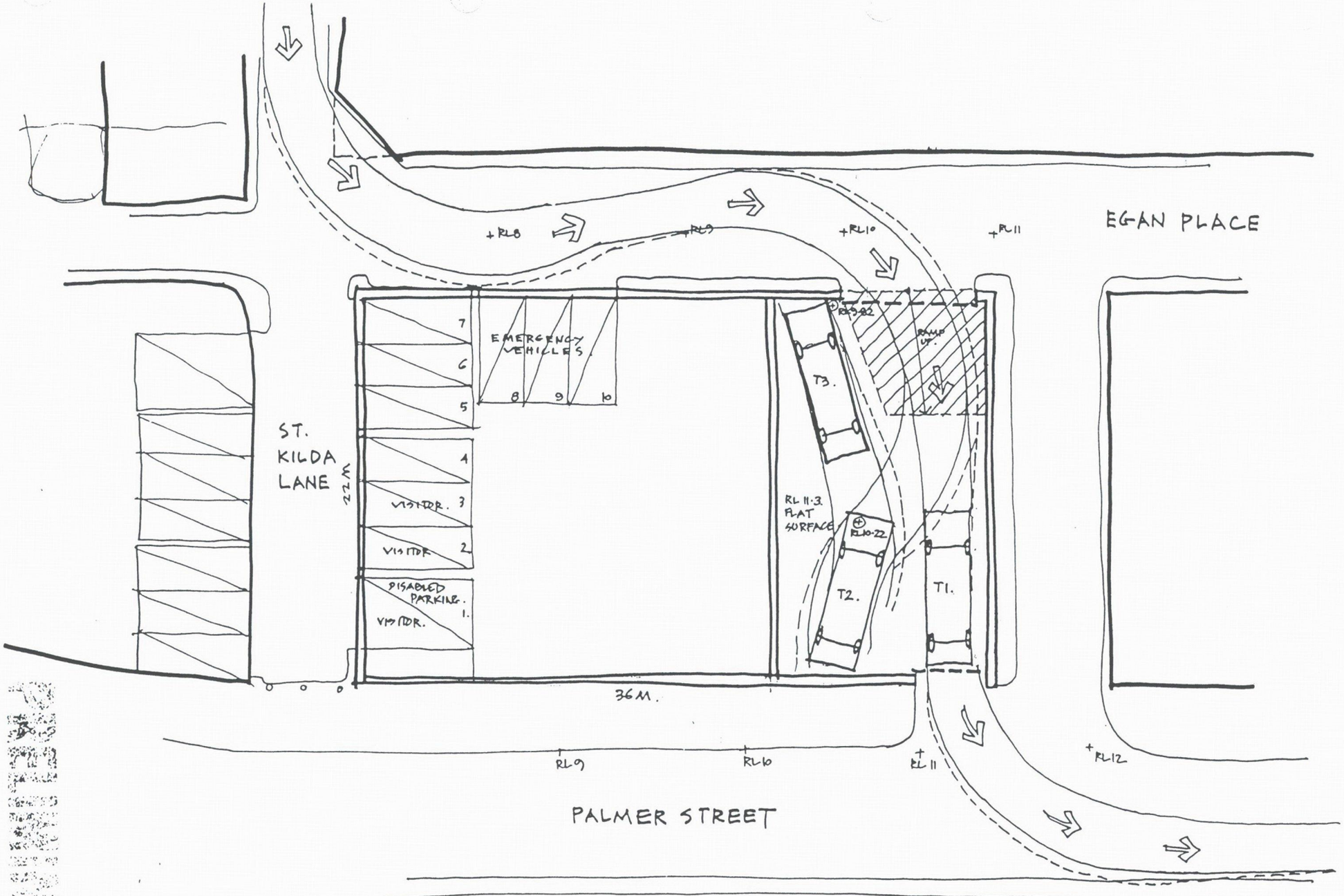
EASTERN DISTRIBUTOR

DRG. TITLE NORTHERN
ALIGNMENT PLAN

CH. 1050 - 1400 MS01

ORG. No. REV.

7.5 APPROXIMATE TRUCK TURNING CIRCLES TO ACCESS SITE

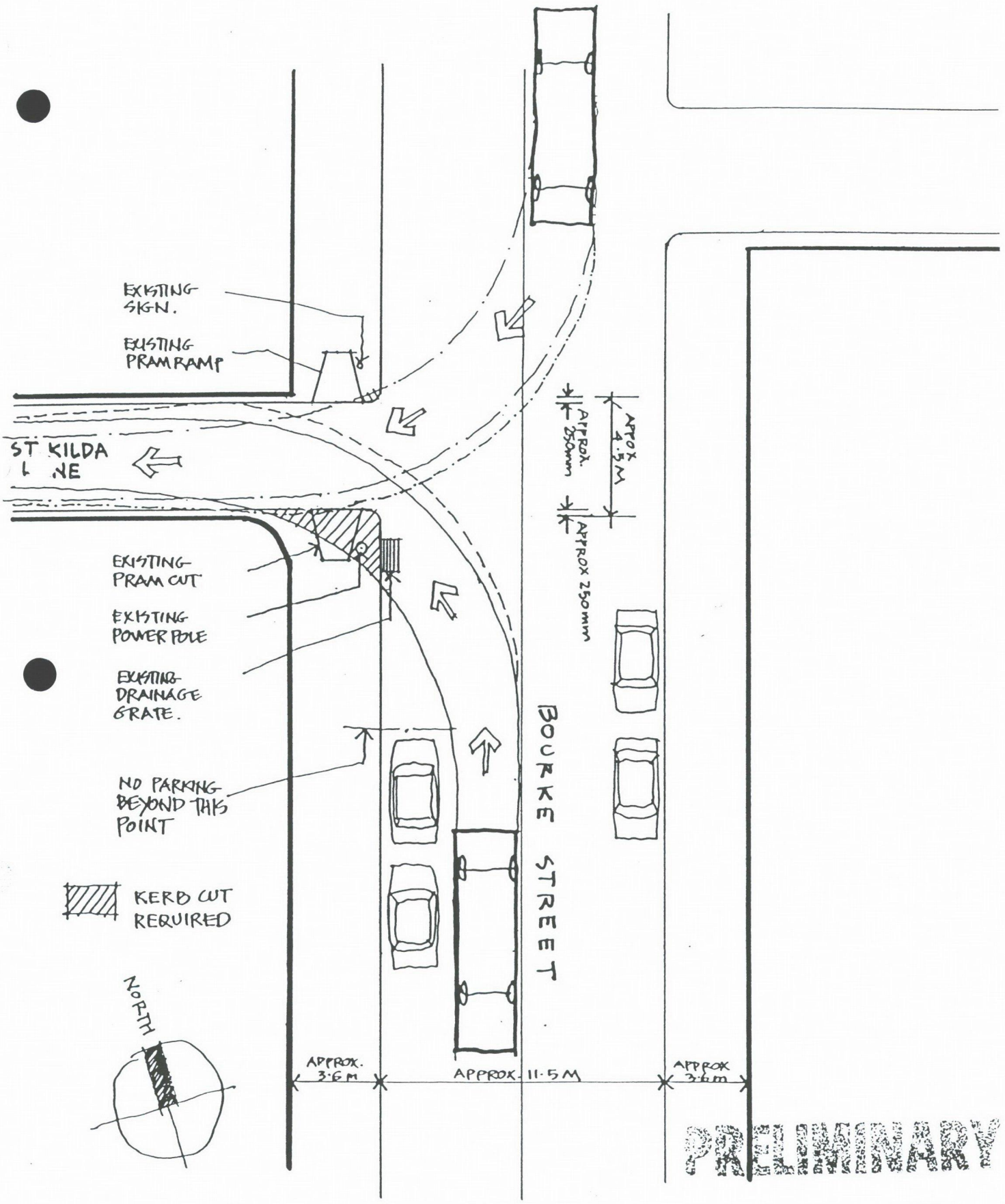


Jackson Teece Chesterman Willis Pty Ltd
101 Sussex Street Sydney
New South Wales Australia 2000

Telephone 61 2 9290 2722
Facsimile 61 2 9290 1150
Email jtcwhome@jtcw.com.au
ACN 083 837 290

PROJECT NAME: CCT CONTROL ROOMS.	PROJECT No: 2[redacted]119	SCALE: 1:200 AT A3
DRAWING TITLE: TRUCK PARKING EGAN PLACE → PALMER STREET	DWG No: SK.06	REVISION: A.
		DATE: 29.11.00

THE CONCEPT AND INFORMATION CONTAINED IN THIS DRAWING ARE COPYRIGHT AND MAY NOT BE REPRODUCED IN WHOLE OR PART, EXCEPT IN DIRECT CONNECTION WITH THE PROJECT, WITHOUT THE WRITTEN PERMISSION OF JACKSON TEECE CHESTERMAN WILLIS PTY LTD. DO NOT SCALE THIS DRAWING, USE FIGURED DIMENSIONS ONLY. NOTIFY ARCHITECT OF DISCREPANCIES IN THE DRAWINGS AND SEEK INSTRUCTIONS.



PRELIMINARY

jtcw
Jackson Teece Chesterman Willis Pty Ltd
101 Sussex Street Sydney
New South Wales Australia 2000
Telephone 61 2 9290 2722
Facsimile 61 2 9290 1150
Email jtcwhome@jtcw.com.au
ACN 003 837 290

PROJECT NAME:	PROJECT No.	SCALE:
CCT CONTROL ROOMS	2000.119	1:200 AT A4
DRAWING TITLE:	DWG No.	REVISION:
TRUCK ACCESS FROM BOURKE STREET	SK.07	B
		DATE: 30.11.00

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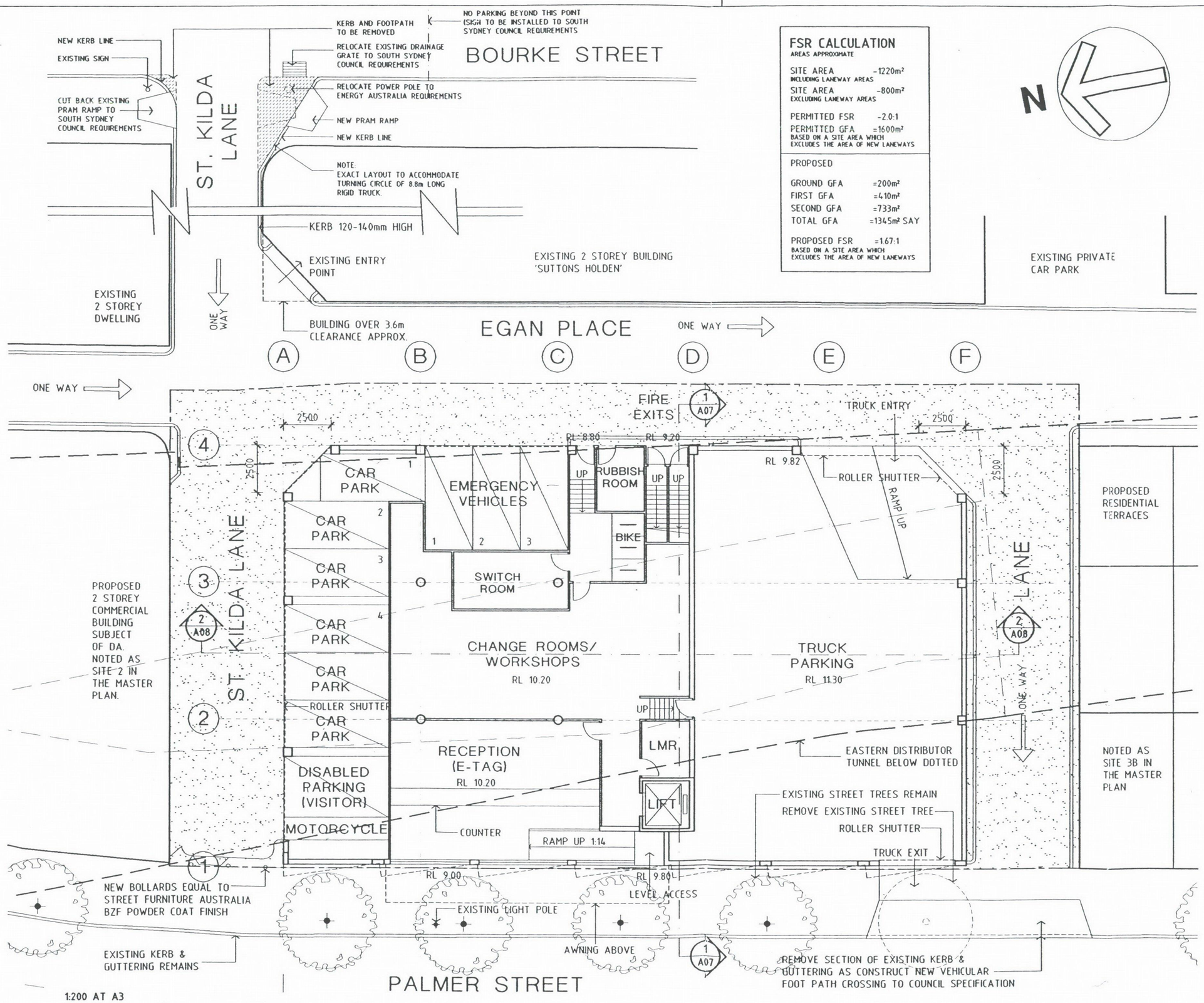
7.5 ARCHITECTURAL DRAWINGS



NOTE: REFER A02 FOR BUILDING SETOUT.

FSR CALCULATION

AREAS APPROXIMATE

SITE AREA INCLUDING LANEWAY AREAS	-1220m²
SITE AREA EXCLUDING LANEWAY AREAS	-800m²
PERMITTED FSR	-2.0:1
PERMITTED GFA BASED ON A SITE AREA WHICH EXCLUDES THE AREA OF NEW LANEWAYS	=1600m²

PROPOSED

GROUND GFA	=200m²
FIRST GFA	=410m²
SECOND GFA	=733m²
TOTAL GFA	=1345m² SAY
PROPOSED FSR BASED ON A SITE AREA WHICH EXCLUDES THE AREA OF NEW LANEWAYS	=1.67:1

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KEY

NEW LANEWAY, FOOTPATH, KERB GUTTERING; ROAD SURFACE & SUB BASE DRAINAGE TO COUNCIL SPECIFICATION. NOTE THIS AREA TO BE DEDICATED FOR PUBLIC USE AND OWNERSHIP TRANSFERED TO COUNCIL UPON COMPLETION OF WORKS.

NEW FOOTPATH, KERB AND GUTTERING TO COUNCIL SPECIFICATION.

Rev. No.	Revision Description	Approved	Date
A	APPENDIX TO REP'S REPORT		10.01.01

Consultants

Architects

JACKSON TEECE CHESTERMAN WILLIS A.C.N. 083 837 290 PTY LTD

LEVEL 3,101 SUSSEX STREET
SYDNEY NSW 2000 AUSTRALIA
TELEPHONE: 612 9290 2722 FAX: 612 9290 1150
EMAIL: jtcwhome@jtcw.com.au

Client

The Roads and Traffic Authority of New South Wales

Project

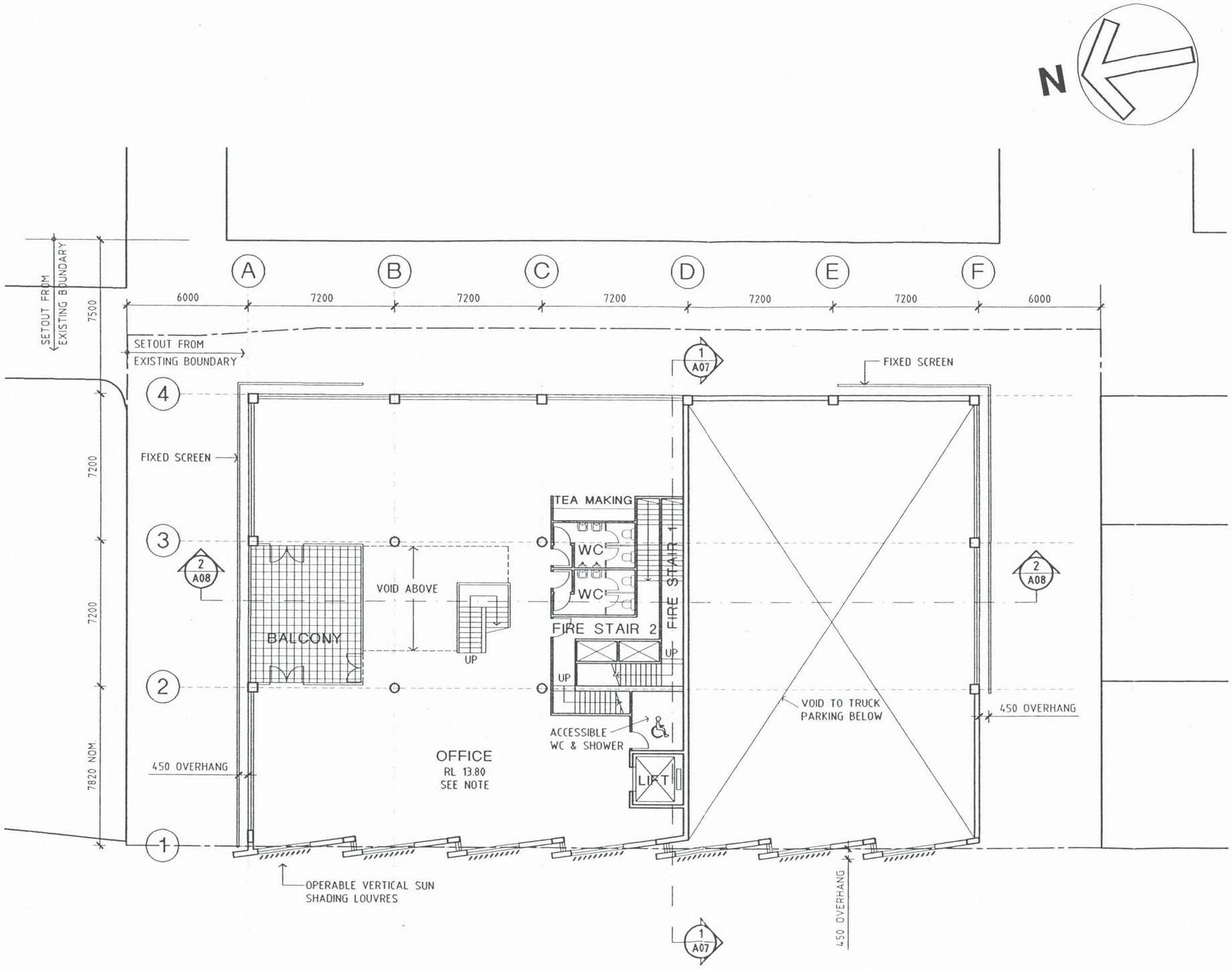
Cross City Tunnel, Control Centre
88 Palmer Street, Woolloomooloo

Drawing Title

GROUND FLOOR PLAN

Scale	Project Number
1:200	2000.119
Drawn: PK	Date: 27.11.2000

Drawing Number	Revision
A01	A



1:200 AT A3

0 5 10 15 20m

NOTE:
APPROX AREA OF OFFICE IS 325m² INTERNAL LAYOUT TO BE SUBJECT OF FUTURE DETERMINATION.

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A	APPENDIX TO REP'S REPORT	Lewis	10.01.01

Consultants

Architects

JACKSON TEECE CHESTERMAN WILLIS A.C.N. 083 837 290 PTY LTD

LEVEL 3,101 SUSSEX STREET
SYDNEY NSW 2000 AUSTRALIA
TELEPHONE: 612 9290 2722 FAX: 612 9290 1150
EMAIL: jtcwhome@jtcw.com.au

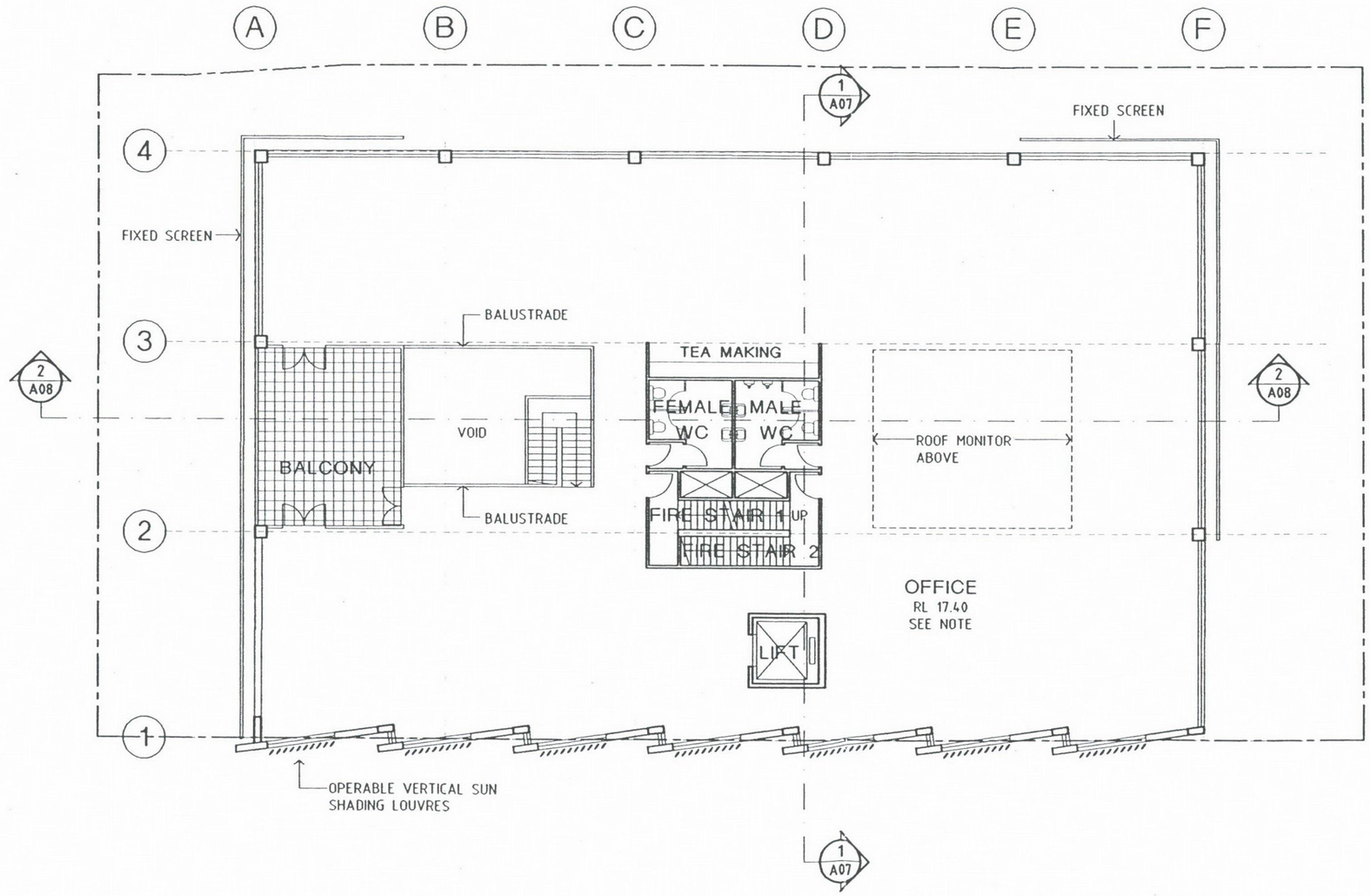
Client
The Roads and Traffic Authority of New South Wales

Project
Cross City Tunnel, Control Centre
88 Palmer Street, Woolloomooloo

Drawing Title
FIRST FLOOR PLAN

Scale	1:200	Project Number
Drawn	PK	2000.119
Date	27.11.2000	

Drawing Number	Revision
A02	A



1:200 AT A3

0 5 10 15 20m

NOTE:
APPROX AREA OF OFFICE IS 630m² INTERNAL LAYOUT TO BE SUBJECT OF FUTURE DETERMINATION.

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Rev. No.	Revision Description	Approved	Date
A	APPENDIX TO REP'S REPORT	[signature]	10.01.01

Consultants

Architects

JACKSON TEECE CHESTERMAN WILLIS PTY LTD A.C.N. 083 837 290
LEVEL 3,101 SUSSEX STREET
SYDNEY NSW 2000 AUSTRALIA
TELEPHONE: 612 9290 2722 FAX: 612 9290 1150
EMAIL: jtcwhome@jtcw.com.au

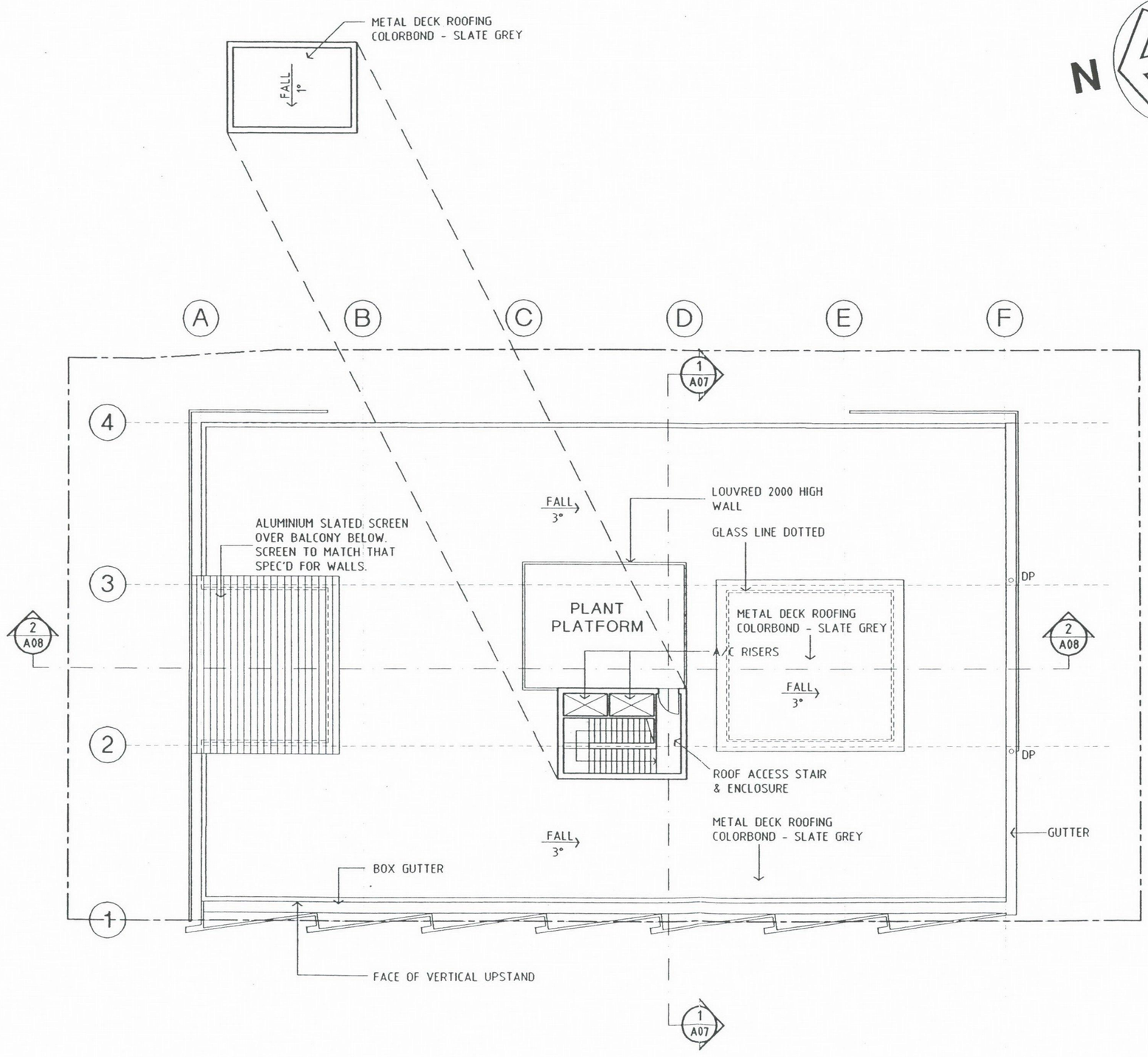
Client
The Roads and Traffic Authority of New South Wales

Project
Cross City Tunnel, Control Centre
88 Palmer Street, Woolloomooloo

Drawing Title
SECOND FLOOR PLAN

Scale	1:200	Project Number
Drawn PK	Date 27.11.2000	2000.119

Drawing Number	Revision
A03	A



1:200 AT A3

0 5 10 15 20m

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Rev. No.	Revision Description	Approved	Date
A	APPENDIX TO REP'S REPORT		10.01.01

Consultants

Architects

JACKSON TEECE CHESTERMAN WILLIS A.C.N. 083 837 290 PTY LTD

LEVEL 3,101 SUSSEX STREET
SYDNEY NSW 2000 AUSTRALIA
TELEPHONE: 612 9290 2722 FAX: 612 9290 1150
EMAIL: jtcwhome@jtcw.com.au

Client

The Roads and Traffic Authority of New South Wales

Project

Cross City Tunnel, Control Centre
88 Palmer Street, Woolloomooloo

Drawing Title

ROOF PLAN

Scale	1:200	Project Number
Drawn	PK	Date 27.11.2000
		2000.119

Drawing Number	Revision
A04	A

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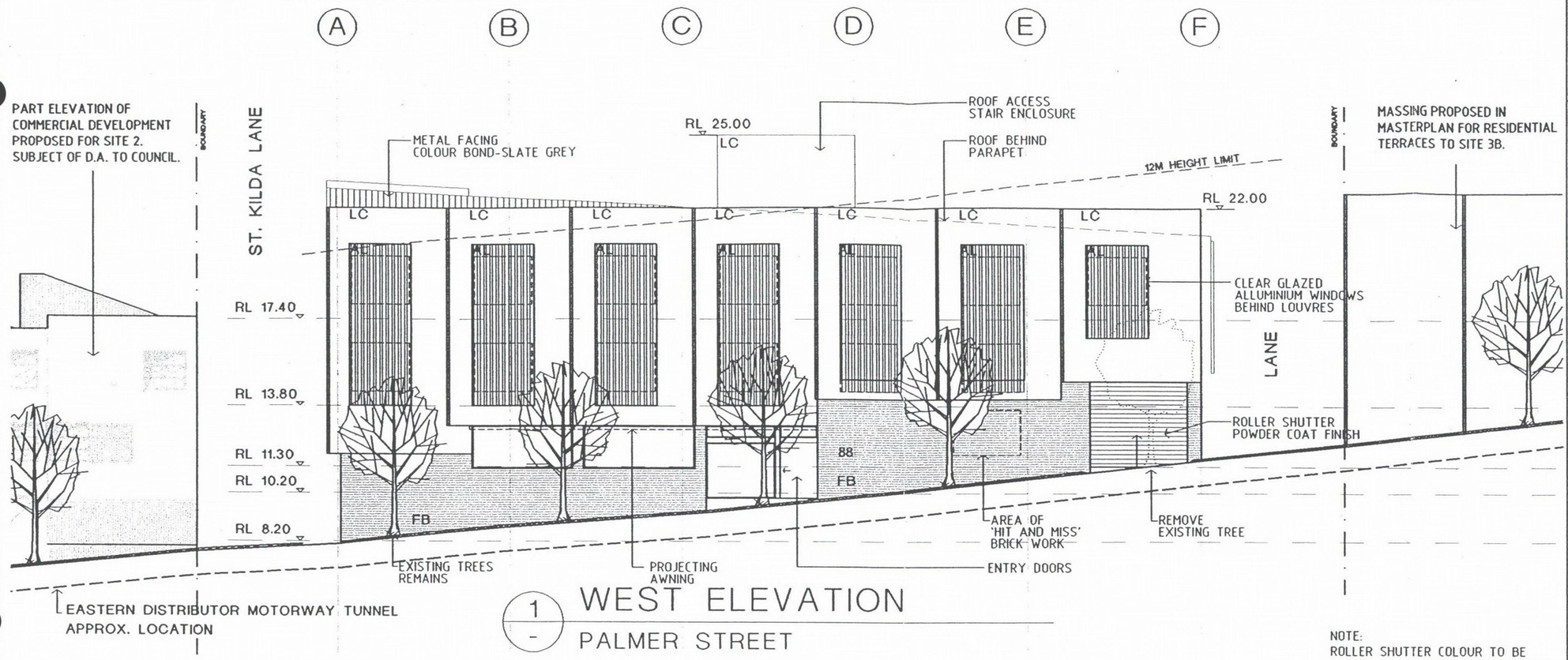


1 - WEST ELEVATION
PALMER STREET

NOTE:
ROLLER SHUTTER COLOUR TO BE DULUX 'ANOTEC DARK GREY 51275' POWDER COAT.

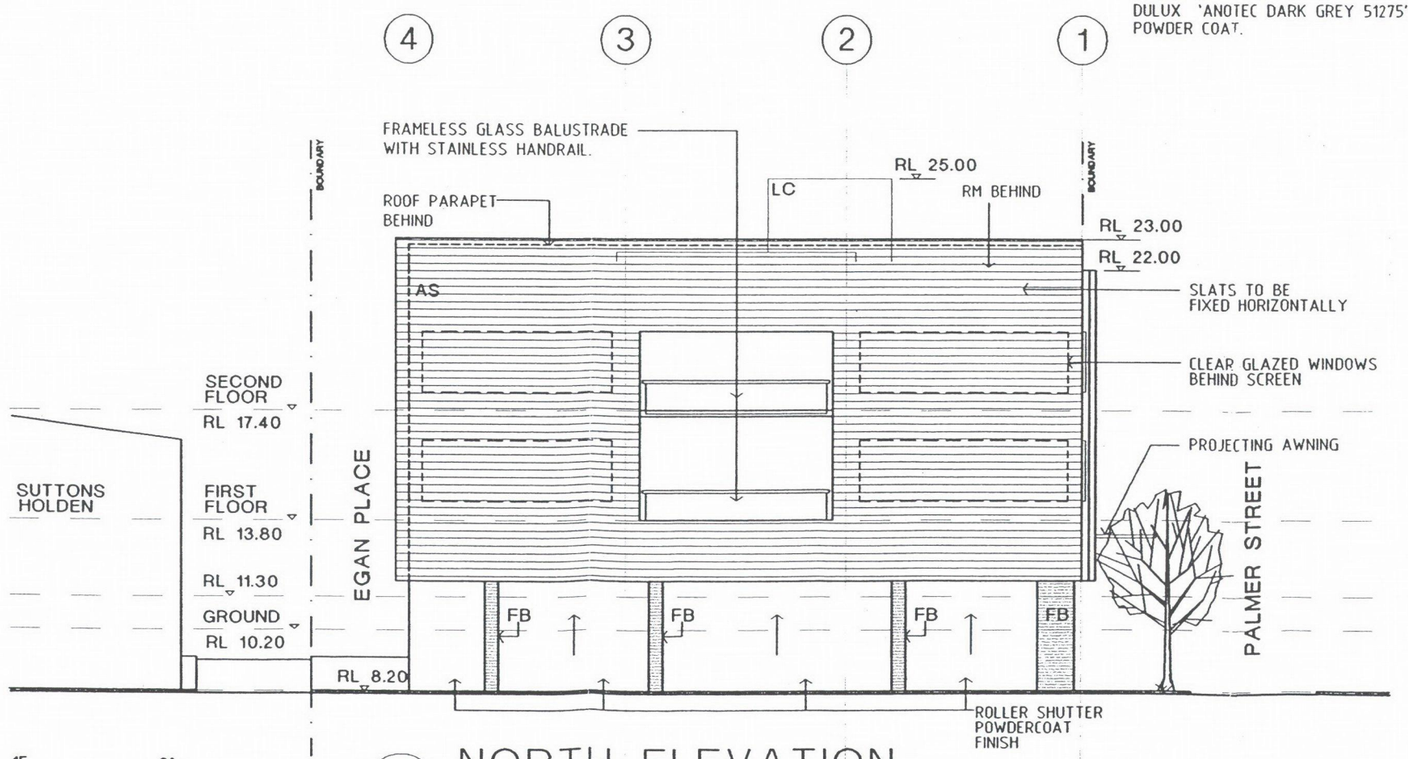
KEY

AL- ALUMINIUM VERTICAL SUN CONTROL LOUVRE.
Equal to Louvre Windows Australia (LWA) Ellipsoid Sun Louvres (270x50 Nominal) with manual remote control. natural anodised finish

LC- LIGHTWEIGHT CLADDING.
Compressed Fibre Cement panel with pre-finished coating.
Equal to Architectural Industrial Coatings Vitrapanel.
Color -K200 (White)

AS- ALUMINIUM SLATTED SCREEN.
Equal to Hi-Light Industries HA Standard pattern in natural anodised finish

FB- FACE BRICKWORK.
Equal to CSR PGH Blue Black' Smooth Face, note brick to the 50mm high.
Mortar to be tinted to match brick color, joints struck flush every 4th course raked.
Provide anti-graffiti clear coating for full extent of brickwork.



2 - NORTH ELEVATION
ST. KILDA LANE

1:200 AT A3
0 5 10 15 20m

Rev. No.	Revision Description	Approved	Date
A	APPENDIX TO REP'S REPORT	LAC	10.01.01

Consultants

Architects
JACKSON TEECE CHESTERMAN WILLIS PTY LTD
A.C.N. 083 837 290
LEVEL 3,101 SUSSEX STREET
SYDNEY NSW 2000 AUSTRALIA
TELEPHONE: 612 9290 2722 FAX: 612 9290 1150
EMAIL: jtcwhome@jtcw.com.au

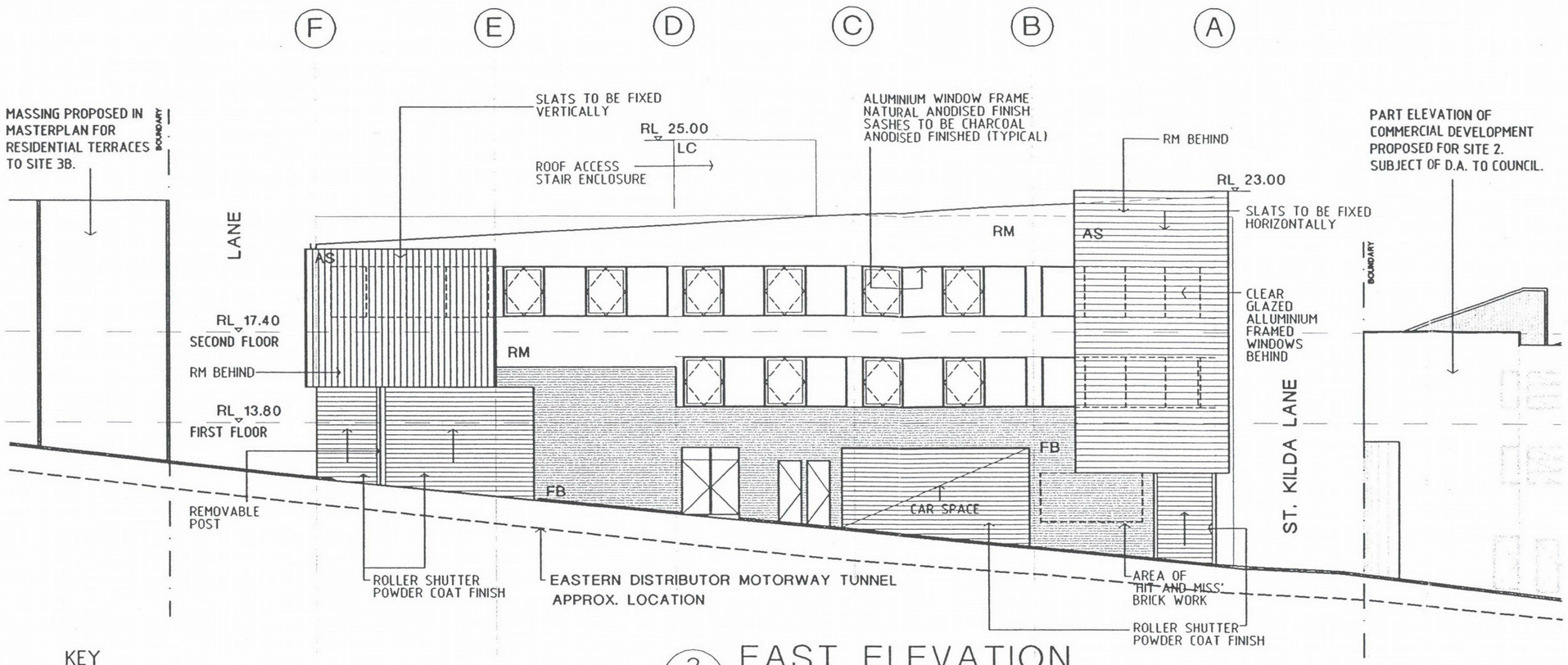
Client
The Roads and Traffic Authority of New South Wales

Project
Cross City Tunnel, Control Centre
88 Palmer Street, Woolloomooloo

Drawing Title
NORTH+WEST ELEVATIONS

Scale	1:200	Project Number
Drawn	ST	Date 4/12/2000	2000.119

Drawing Number	Revision
A-05	A



3 - EAST ELEVATION
EGAN PLACE

NOTE:
ROLLER SHUTTER COLOUR TO BE DULUX 'ANOTEC DARK GREY 51275' POWDER COAT

KEY

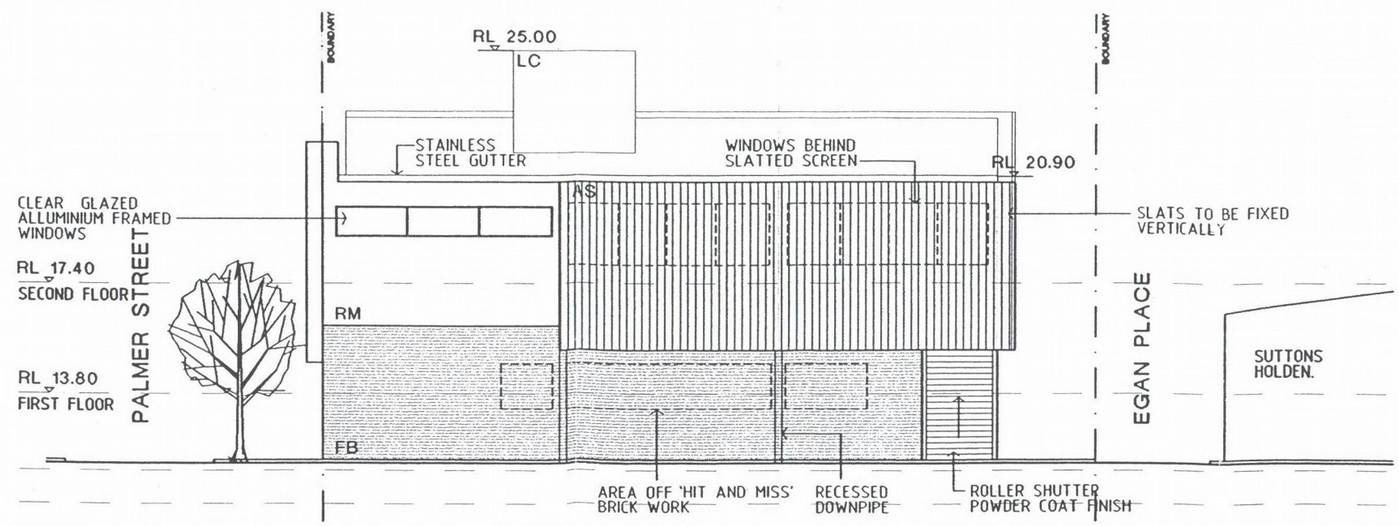
AL- ALUMINIUM VERTICAL SUN CONTROL LOUVRE.
Equal to Louvre Windows Australia (LWA) Ellipsoid Sun Louvres (270x50 Nominal) with manual remote control. natural anodised finish

LC- LIGHTWEIGHT CLADDING.
Compressed Fibre Cement panel with pre-finished
Equal to Architectural Industrial Coatings Vitrapanel.
Color -K200 (White)

AS- ALUMINIUM SLATTED SCREEN.
Equal to Hi-Light Industries HA Standard pattern in natural anodised finish

FB- FACE BRICKWORK.
Equal to CSR PGH 'Blue Black' Smooth Face, note brick to the 50mm high.
Mortar to be tinted to match brick color, joints struck flush every 4th course raked.
Provide anti-graffiti clear coating for full extent of brickwork.

RM- RENDERED MASONRY
Paint finish Colour-Dulux Natural White 5044 83/029



4 - SOUTH ELEVATION
LANEWAY

1:200 AT A3
0 5 10 15 20m

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Rev. No.	Revision Description	Approved	Date
A	APPENDIX TO REP'S REPORT		10.01.01

Consultants

Architects
JACKSON TEECE CHESTERMAN WILLIS PTY LTD
A.C.N. 083 837 290
LEVEL 3,101 SUSSEX STREET
SYDNEY NSW 2000 AUSTRALIA
TELEPHONE: 612 9290 2722 FAX: 612 9290 1150
EMAIL: jtcwhome@jtcw.com.au

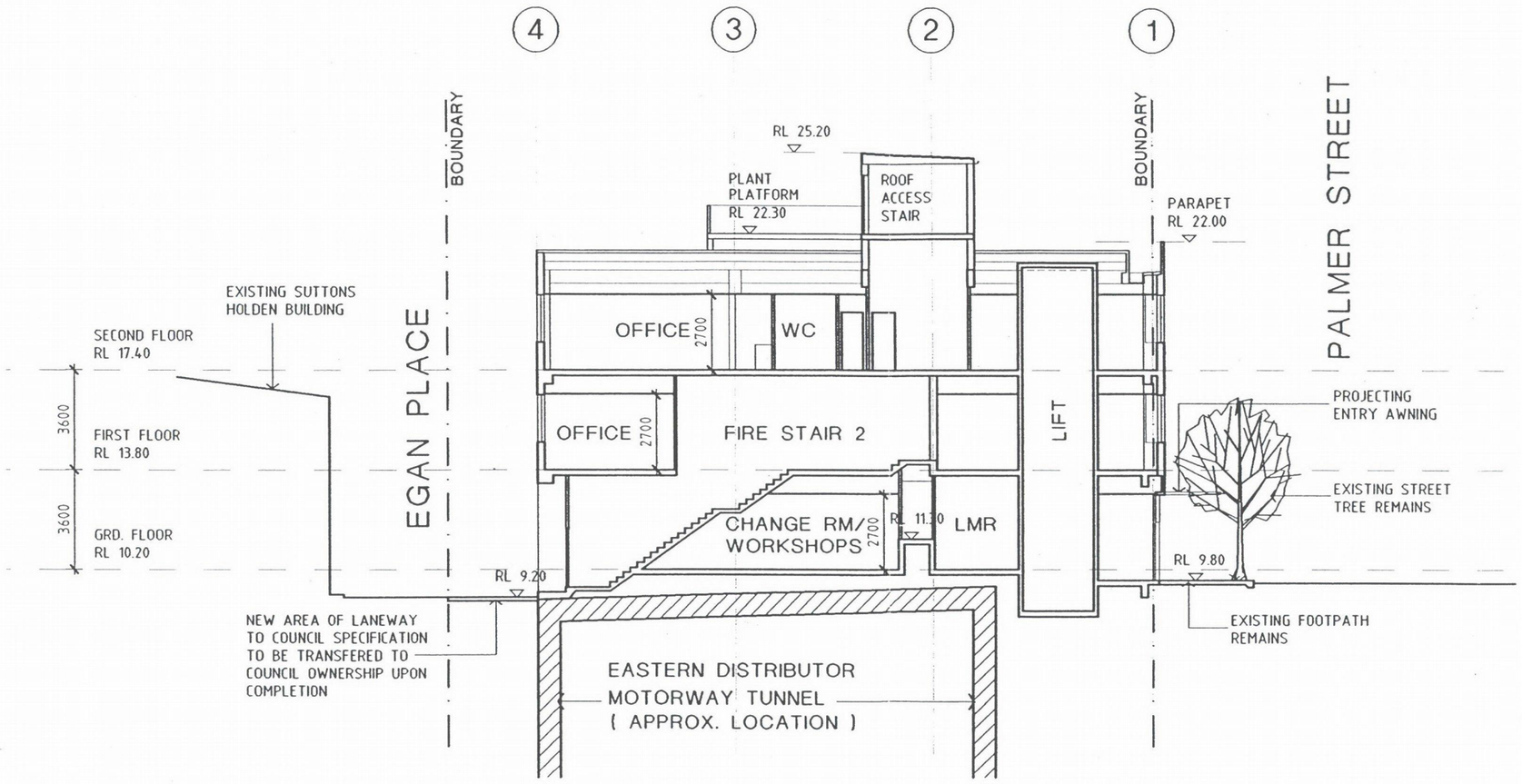
Client
The Roads and Traffic Authority of New South Wales

Project
Cross City Tunnel, Control Centre
88 Palmer Street, Woolloomooloo

Drawing Title
SOUTH + EAST ELEVATIONS

Scale	1:200	Project Number
Drawn	ST	Date 4/12/2000	2000.119

Drawing Number	Revision
A-06	A



1 SECTION

1:200 AT A3

0 5 10 15 20m

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Rev. No.	Revision Description	Approved	Date
A	APPENDIX TO REP'S REPORT	[signature]	10.01.01

Consultants

Architects

JACKSON TEECE CHESTERMAN WILLIS A.C.N. 083 837 290 PTY LTD

LEVEL 3,101 SUSSEX STREET
SYDNEY NSW 2000 AUSTRALIA
TELEPHONE: 612 9290 2722 FAX: 612 9290 1150
EMAIL: jtcwhome@jtcw.com.au

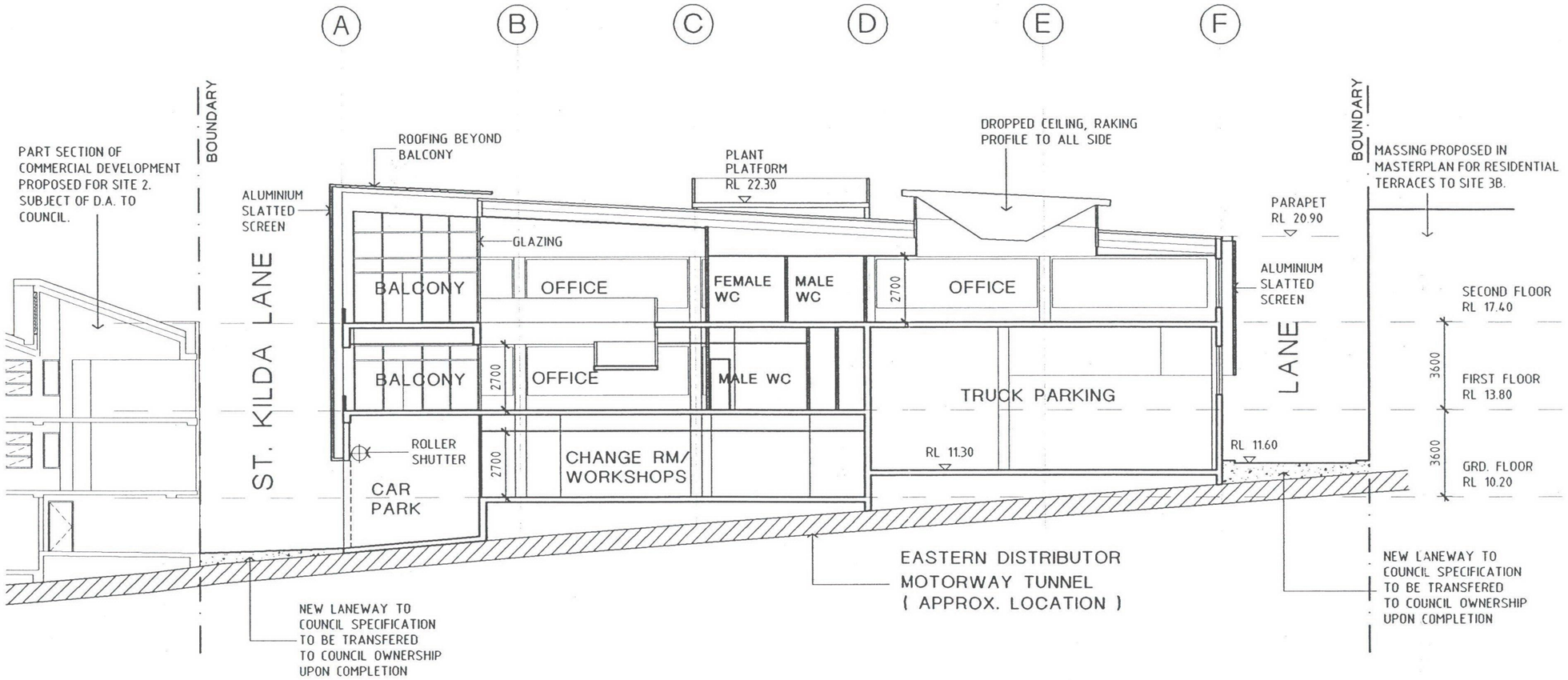
Client
The Roads and Traffic Authority of New South Wales

Project
Cross City Tunnel, Control Centre
88 Palmer Street, Woolloomooloo

Drawing Title
SECTION 1

Scale	1:200	Project Number
Drawn	PK	Date 27.11.2000
		2000.119

Drawing Number	Revision
A07	A



2 / - SECTION

1:200 AT A3

0 5 10 15 20m

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Rev. No.	Revision Description	Approved	Date
A	APPENDIX TO REP'S REPORT		10.01.01

Consultants

Architects

JACKSON TEECE CHESTERMAN WILLIS A.C.N. 083 837 290 PTY LTD

LEVEL 3,101 SUSSEX STREET
SYDNEY NSW 2000 AUSTRALIA
TELEPHONE: 612 9290 2722 FAX: 612 9290 1150
EMAIL: jtcwhome@jtcw.com.au

Client
The Roads and Traffic Authority of New South Wales

Project
Cross City Tunnel, Control Centre
88 Palmer Street, Woolloomooloo

Drawing Title
SECTION 2

Scale	1:200	Project Number
Drawn	PK	Date 27.11.2000
		2000.119

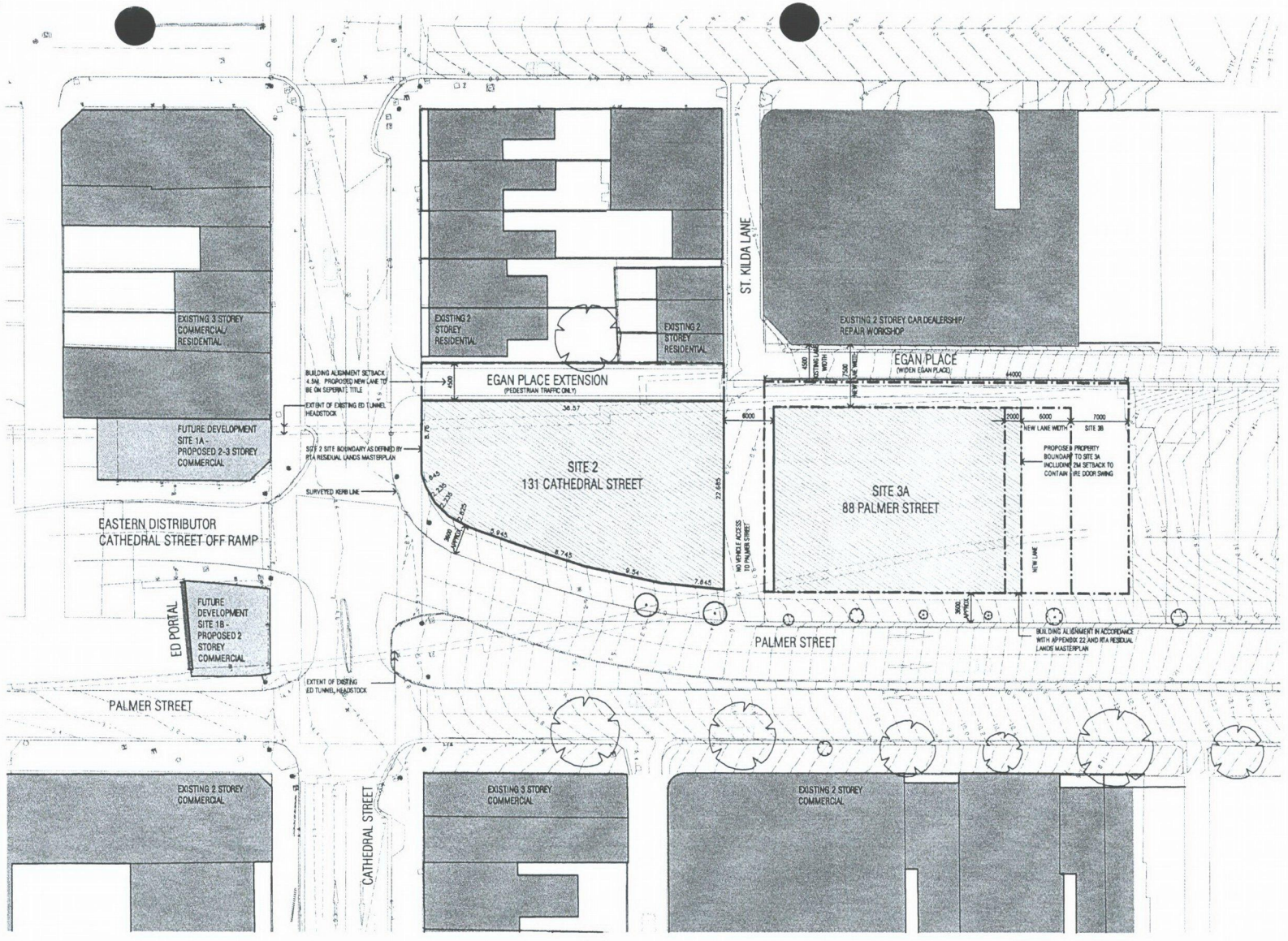
Drawing Number	Revision
A08	A

Appendix I

Plans of the Proposed Modifications

A1

THIS DRAWING HAS BEEN REDUCED



SITE PLAN

1:250@A1 / 1:500@A3

FSR CALCULATIONS:

SITE 2:	SITE AREA	848 M²
	SITE AREA (EXCLUDING PROPOSED LANEWAY)	683 M²
	GROUND GFA	383 M²
	LEVEL 1 GFA	617 M²
	LEVEL 2 GFA	412 M²
	TOTAL	1,412 M²
	PROPOSED FSR	2.06:1
SITE 3A:	SITE AREA	784M²
	SITE AREA (EXCLUDING PROPOSED LANEWAY)	665M²
	GROUND GFA	466M²
	PROPOSED FSR	0.70:1

LANDSCAPING LEGEND:

- EXISTING TREE TO BE REMOVED
- EXISTING TREE
- POTENTIAL NEW TREE
- TREE AS SHOWN ON RTA MASTER PLAN

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01	03.10.2003	REF - DRAFT ISSUE NO.2	YJW		

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Client: BAULDERSTONE HORNIBROOK / BILFINGER BERGER

Drawn YJW	Signed	Date	
Designed DM/DB	Signed	Date	
Verified	Signed	Date	
Approved RD	Signed	Date	

Drawing Title:

CROSS CITY TUNNEL
DESIGN LOT UD 625
TUNNEL CONTROL CENTRE
SITE PLAN

HASSELL Project No. PSA7191

Scale 1:250@A1 1:500@A3

Drawing No. G-UD625-REF501 Rev. 02

A1

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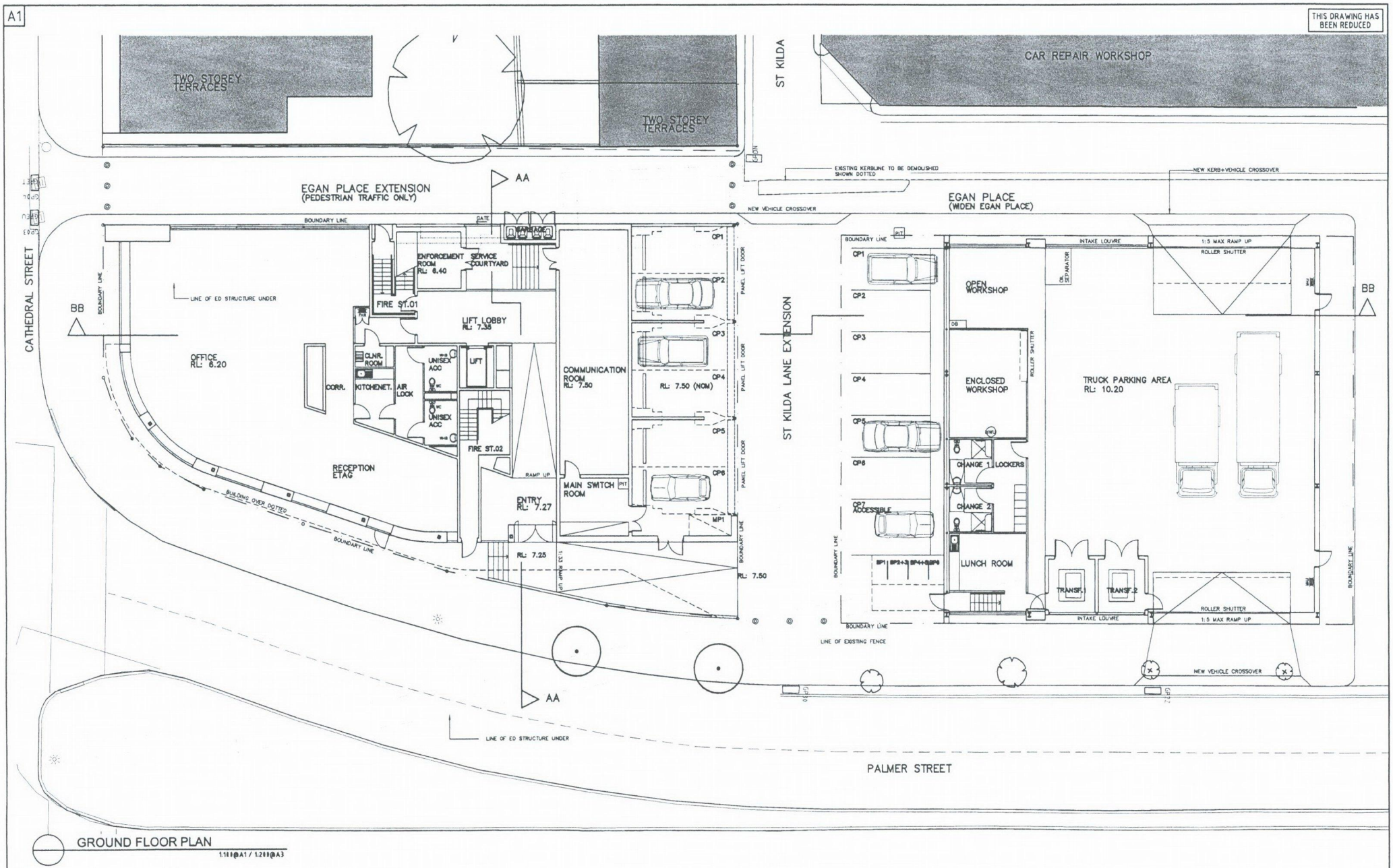

GROUND FLOOR PLAN

1:100@A1 / 1:200@A3

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05	21.10.2003	REF SUBMISSION	YJW		
04	14.10.2003	REF SUBMISSION (DRA	DJB		
03	10.10.2003	REF - DRAFT ISSUE NO	DJB		
02	09.10.2003	REF - DRAFT ISSUE NO 3	DJB		
01	03.10.2003	REF - DRAFT ISSUE NO.2	YJW		

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Drawn YJW	Signed	Date
Designed DM/DB	Signed	Date
Verified	Signed	Date
Approved RD	Signed	Date

Drawing Title:

CROSS CITY TUNNEL
DESIGN LOT UD 625
TUNNEL CONTROL CENTRE
GROUND FLOOR PLAN

HASSELL Project No. PSA7191

1:100@A1
1:200@A3

Drawing No. G-UD625-REF502 Rev. 05

A1

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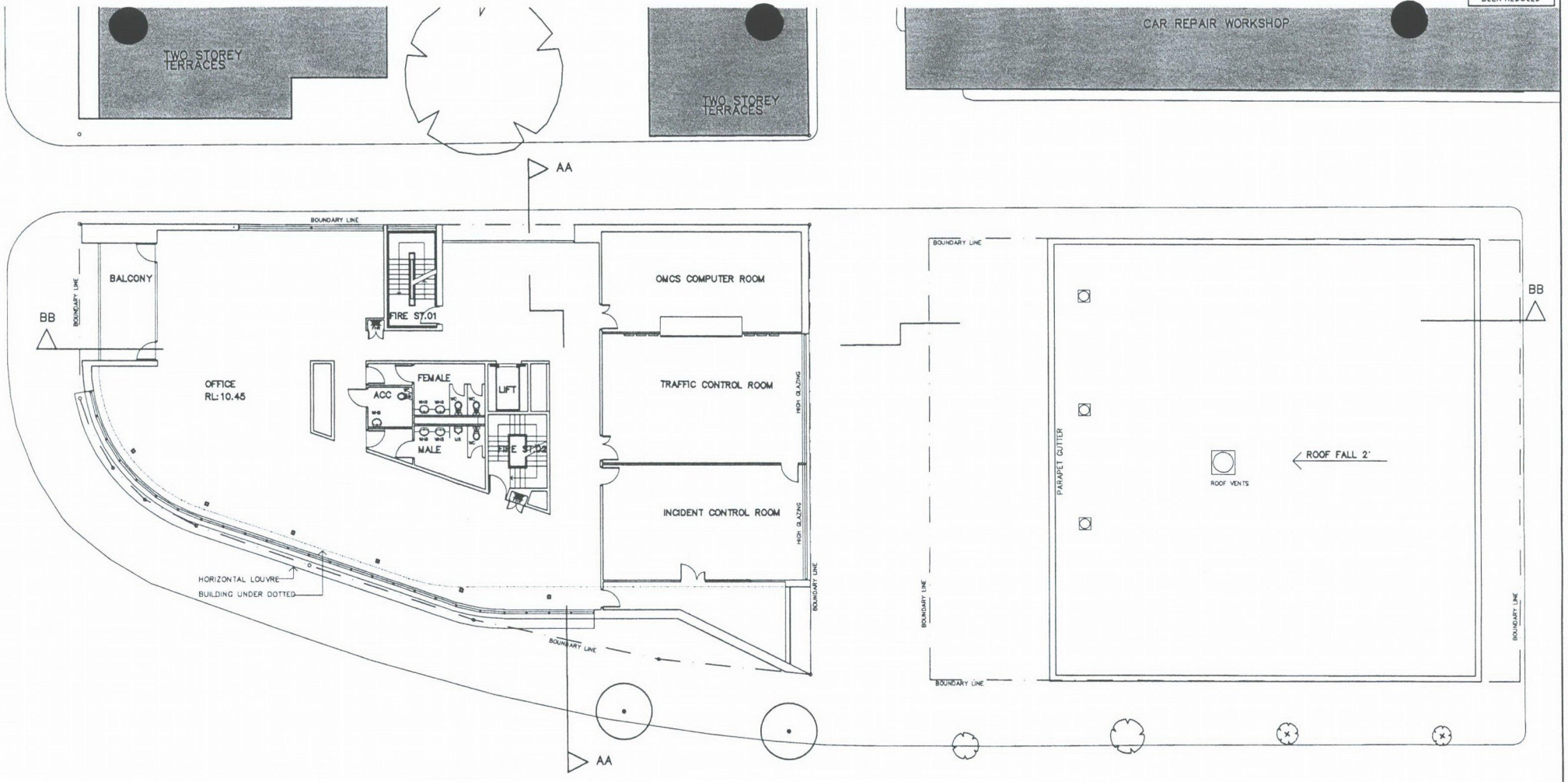

LEVEL 1 PLAN

1:100@A1 / 1:200@A3

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Rev.	Date	Revision Details	By	Ver.	App.
04	21.10.2003	REF SUBMISSION	YJW		
03	14.10.2003	REF SUBMISSION (DRAFT)	DJB		
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01	03.10.2003	REF - DRAFT ISSUE NO.2	YJW		

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Designed	DM/DB	Signed	Date
Verified		Signed	Date
Approved	RD	Signed	Date

Drawing Title:

CROSS CITY TUNNEL
DESIGN LOT UD 625
TUNNEL CONTROL CENTRE
LEVEL 1 FLOOR PLAN

HASSELL Project No.: PSA7191

Scale: 1:100@A1, 1:200@A3

Drawing No.: G-UD625-REF503 Rev.: 04

A1

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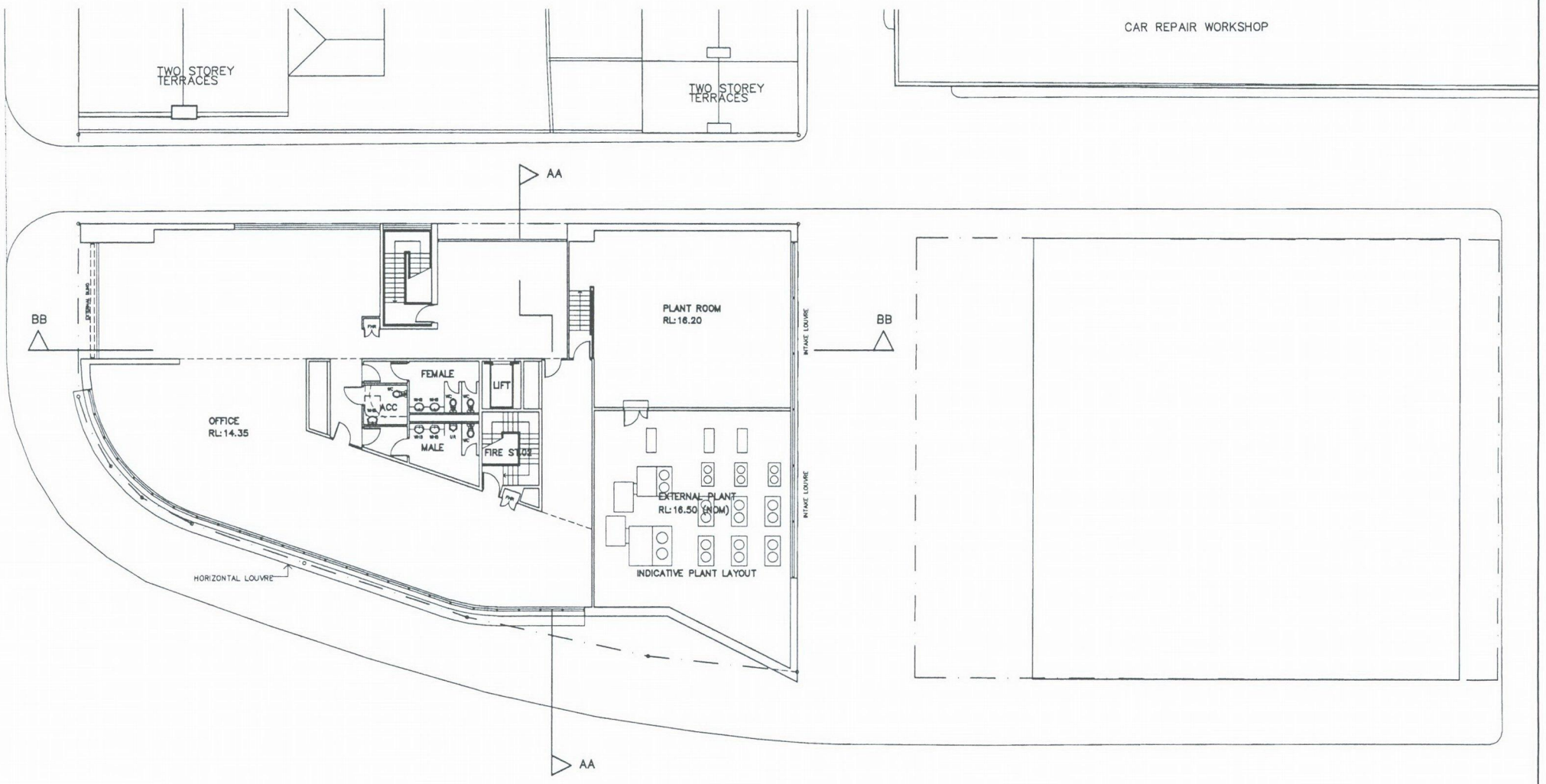

LEVEL 2 PLAN

1:100@A1 / 1:200@A3

N

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Rev.	Date	Revision Details	By	Ver.	App.
04	21.10.2003	REF SUBMISSION	YJW		
03	14.10.2003	REF SUBMISSION (DRA	DJB		
02	10.10.2003	REF - DRAFT ISSUE NO 3	DJB		
01	03.10.2003	REF - DRAFT ISSUE NO. 2	YJW		

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Client: BAULDERSTONE HORNIBROOK BILFINGER BERGER

Drawn DB	Signed	Date
Designed DM/DB	Signed	Date
Verified	Signed	Date
Approved RD	Signed	Date

Drawing Title:

CROSS CITY TUNNEL
DESIGN LOT UD 625
TUNNEL CONTROL CENTRE
LEVEL 2 FLOOR PLAN

HASSELL Project No.

PSA7191

1:100@A1
1:200@A3

Drawing No. G-UD625-REF504 Rev. 04

A1

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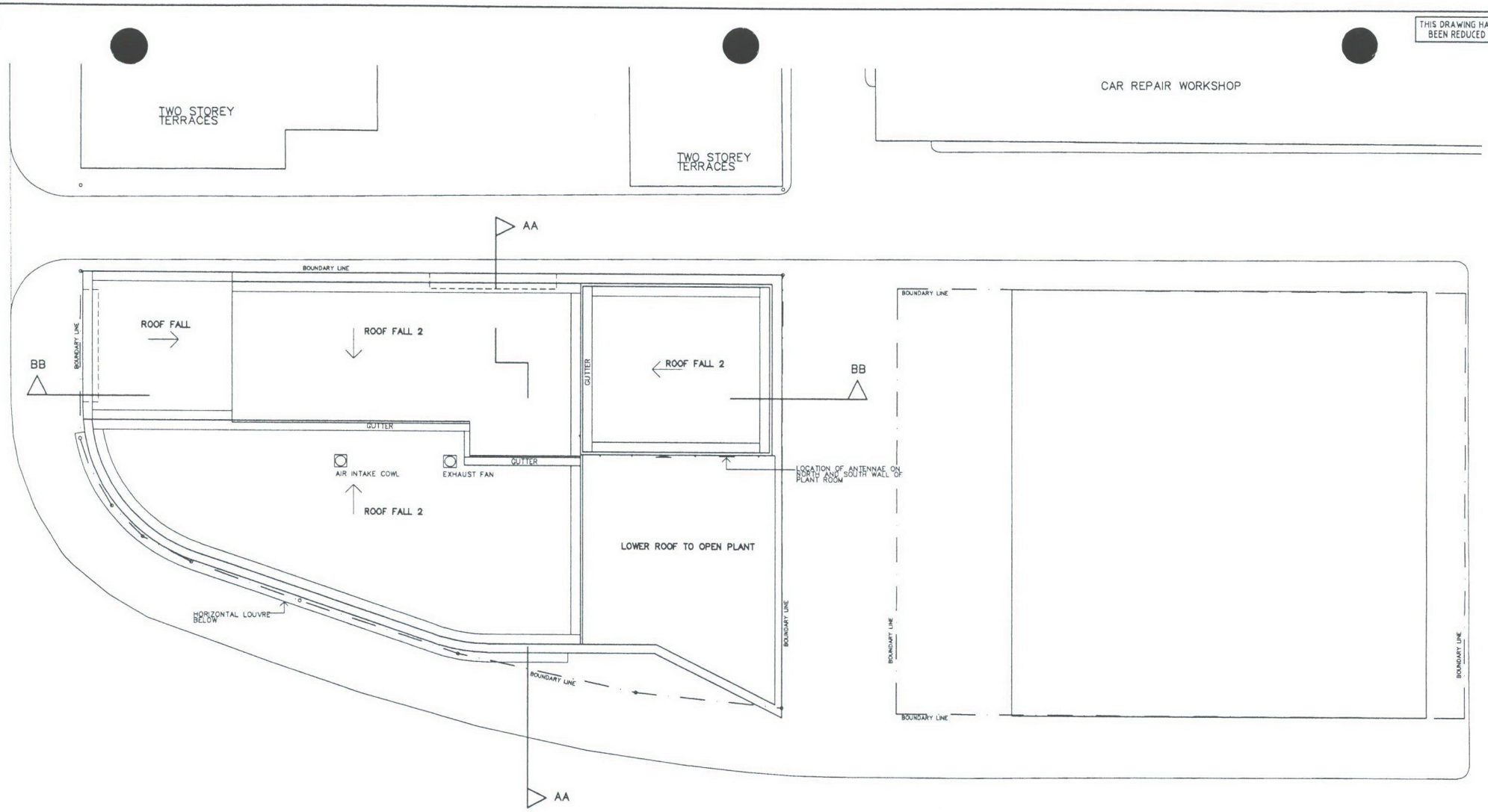

ROOF PLAN

1:100@A1 / 1:200@A3

N

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Rev.	Date	Revision Details	By	Ver.	App.
03	14.10.2003	REF SUBMISSION	DJB		
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01	03.10.2003	REF - DRAFT ISSUE NO. 2	YJW		

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Project: Cross City Tunnel

Client: BAULDERSTONE HORNIBROOK | BILFINGER BERGER

Drawn DB	Signed	Date
Designed DM/DB	Signed	Date
Verified	Signed	Date
Approved RD	Signed	Date

Drawing Title:

CROSS CITY TUNNEL
DESIGN LOT UD 625
TUNNEL CONTROL CENTRE
ROOF PLAN

HASSELL Project No. PSA7191

Scale 1:100@A1 1:200@A3

Drawing No. G-UD625-REF505 Rev. 03

A1

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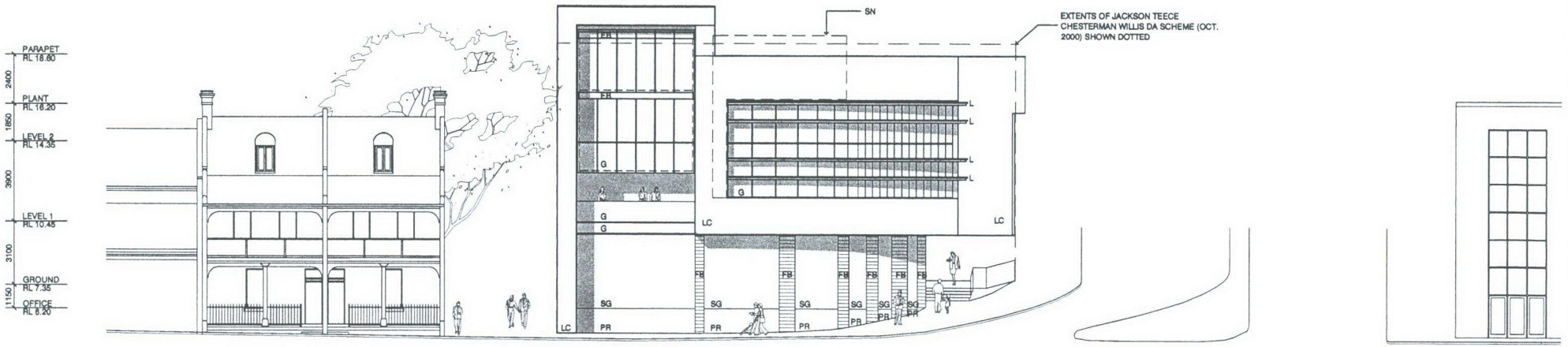
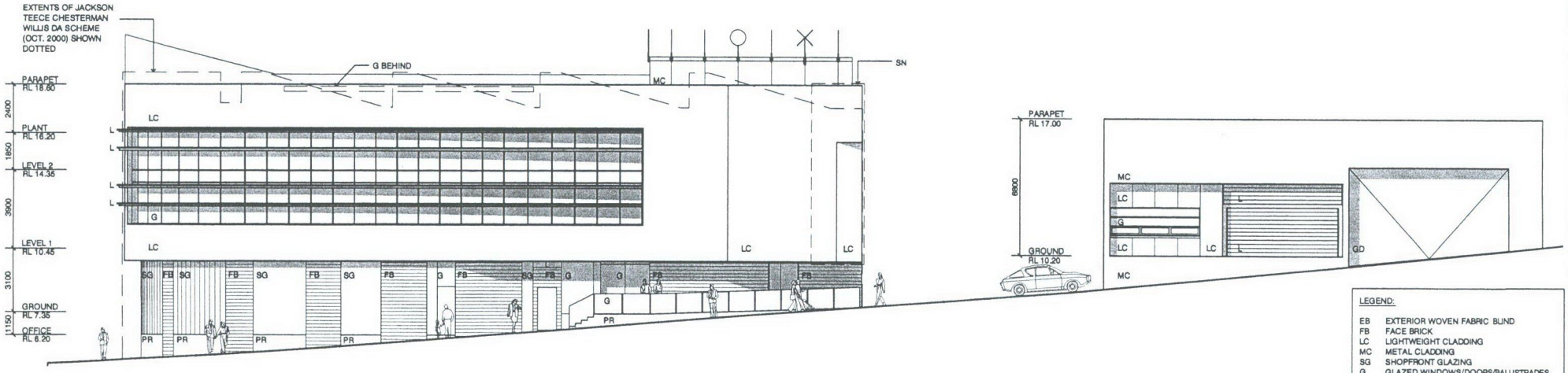


NORTH ELEVATION

CATHEDRAL STREET 1:100@A1 / 1:200@A3



WEST ELEVATION

PALMER STREET 1:100@A1 / 1:200@A3

LEGEND:

EB	EXTERIOR WOVEN FABRIC BLIND
FB	FACE BRICK
LC	LIGHTWEIGHT CLADDING
MC	METAL CLADDING
SG	SHOPFRONT GLAZING
G	GLAZED WINDOWS/DOORS/BALUSTRADES
L	ALUMINIUM LOUVRES
GD	GARAGE DOOR
PR	PAINTED RENDER
PGD	PERFORATED GARAGE DOOR/PANEL
SN	LOCATION OF FUTURE BUILDING SIGNAGE SHOWN DOTTED

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Rev.	Date	Revision Details	By	Ver.	App.
04	22.10.2003	REF SUBMISSION	YJW		
03	14.10.2003	REF SUBMISSION (DRA[redacted]	DJB		
02	10.10.2003	REF - DRAFT ISSUE NO 3	DJB		
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Project: Cross City [redacted]nel

Client: BAULDERSTONE HORNIBROOK | BILFINGER BERGER

Drawn DB	Signed	Date
Designed DM/DB	Signed	Date
Verified	Signed	Date
Approved RD	Signed	Date

Drawing Title:

CROSS CITY TUNNEL
DESIGN LOT UD 625
TUNNEL CONTROL CENTRE
NORTH AND WEST ELEVATIONS

HASSELL Project No. PSA7191

Scale: 1:100@A1 1:200@A3

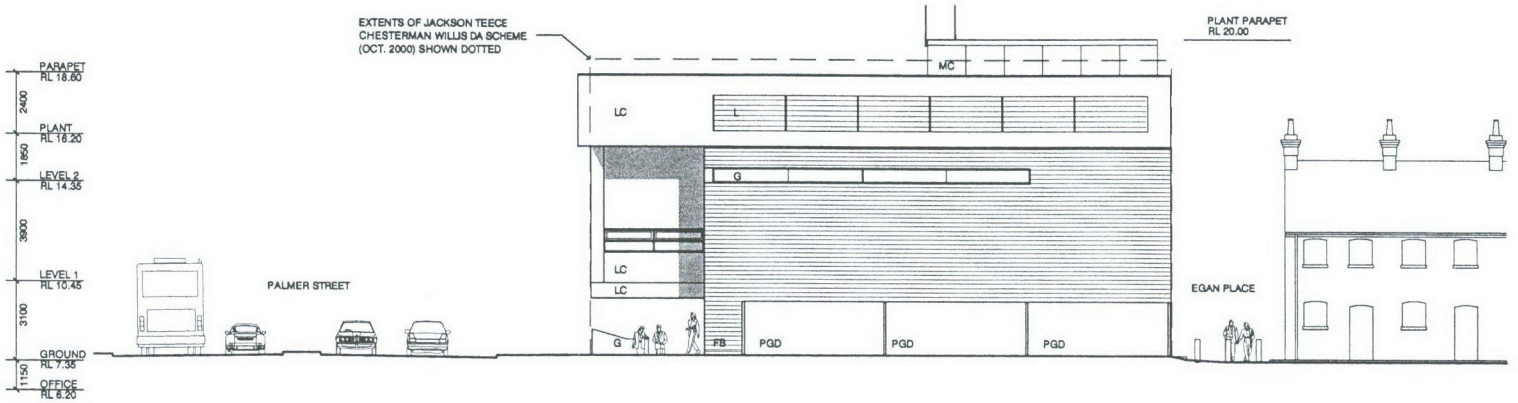
Drawing No. G-UD625-REF506 Rev. 04

A1

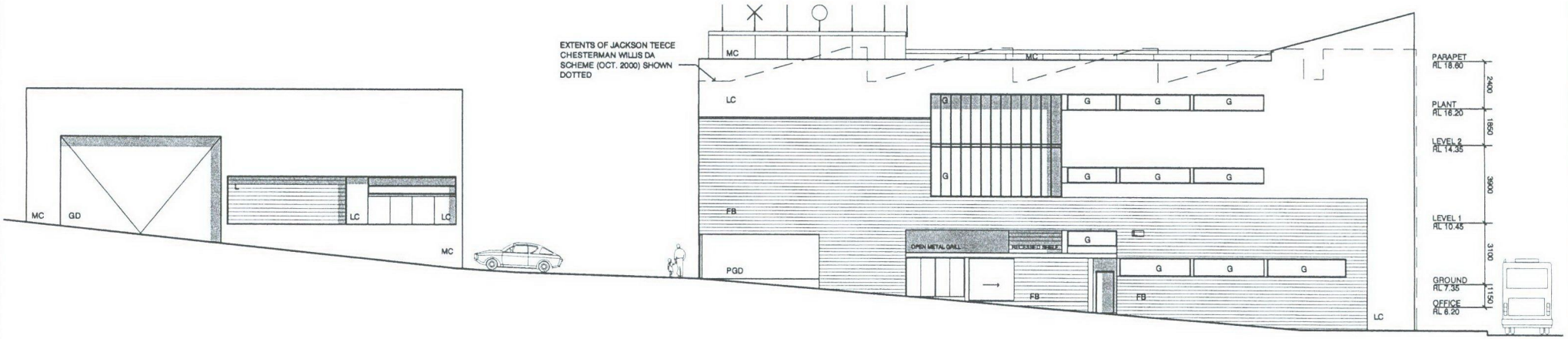
THIS DRAWING HAS BEEN REDUCED

LEGEND:

EB	EXTERNAL WOVEN FABRIC BLIND
FB	FACE BRICK
LC	LIGHTWEIGHT CLADDING
MC	METAL CLADDING
SG	SHOPFRONT GLAZING
G	GLAZED WINDOWS/DOORS/BALUSTRADES
L	ALUMINIUM LOUVRES
GD	GARAGE DOOR
PR	PAINTED RENDER
PGD	PERFORATED GARAGE DOOR/PANEL



SOUTH ELEVATION
SITE 2
1:100@A1 / 1:200@A3



EAST ELEVATION
EGAN PLACE
1:100@A1 / 1:200@A3

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Rev.	Date	Revision Details	By	Ver.	App.
04	14.10.2003	REF SUBMISSION	DJB		
03	10.10.2003	REF - DRAFT ISSUE NO 4	DJB		
02	09.10.2003	REF - DRAFT ISSUE NO 3	DJB		
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Client: BAULDERSTONE HORNIBROOK | BILFINGER BERGER

Drawn DB	Signed	Date
Designed DM/DB	Signed	Date
Verified	Signed	Date
Approved RD	Signed	Date

Drawing Title:
CROSS CITY TUNNEL
DESIGN LOT UD 625
TUNNEL CONTROL CENTRE
SOUTH AND EAST ELEVATIONS

HASSELL Project No.
PSA7191

Scale
1:100@A1
1:200@A3

Drawing No. G-UD625-REF507 Rev. 04

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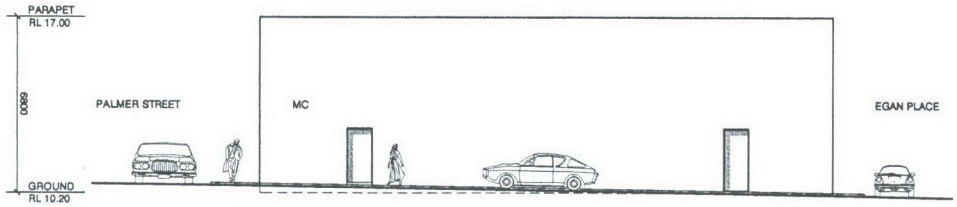
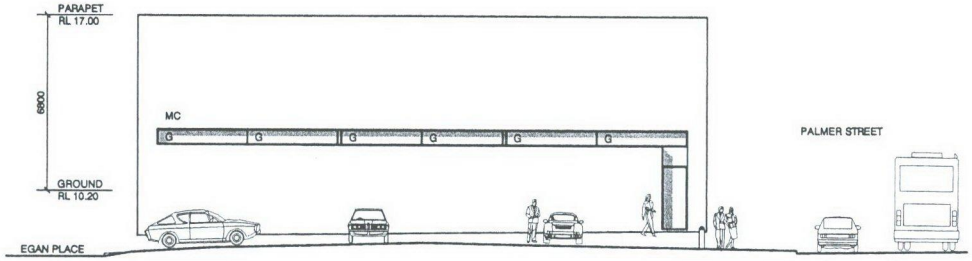


SOUTH ELEVATION
SITE 3A
1:100@A1 / 1:200@A3



NORTH ELEVATION
SITE 3A
1:100@A1 / 1:200@A3

LEGEND:

EB	EXTERIOR WOVEN FABRIC BLIND
FB	FACE BRICK
LC	LIGHTWEIGHT CLADDING
MC	METAL CLADDING
SG	SHOPFRONT GLAZING
G	GLAZED WINDOWS/DOORS/BALUSTRADES
L	ALUMINIUM LOUVRES
GD	GARAGE DOOR
PR	PAINTED RENDER
PGD	PERFORATED GARAGE DOOR/PANEL

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Drawn DB	Signed	Date
Designed DM/DB	Signed	Date
Verified	Signed	Date
Approved RD	Signed	Date

Drawing Title:
CROSS CITY TUNNEL
DESIGN LOT UD 625
TUNNEL CONTROL CENTRE
NORTH & SOUTH ELEVATION SITE 3A

HASSELL Project No. PSA7191

1:100@A1
1:200@A3

Drawing No. G-UD625-REF508 Rev. 03

A1

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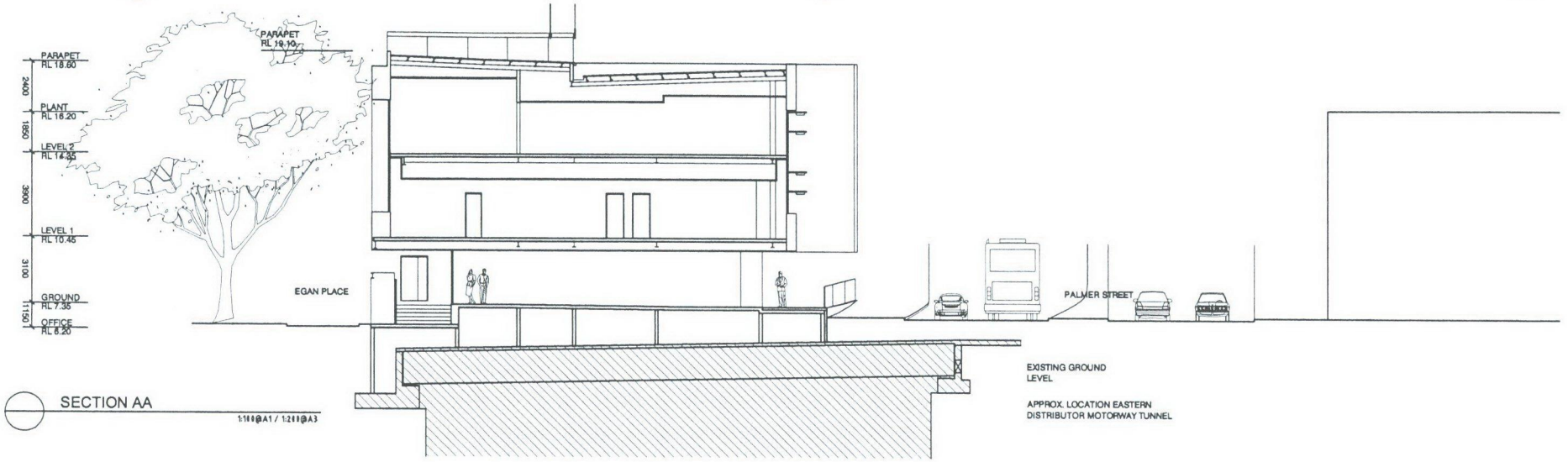
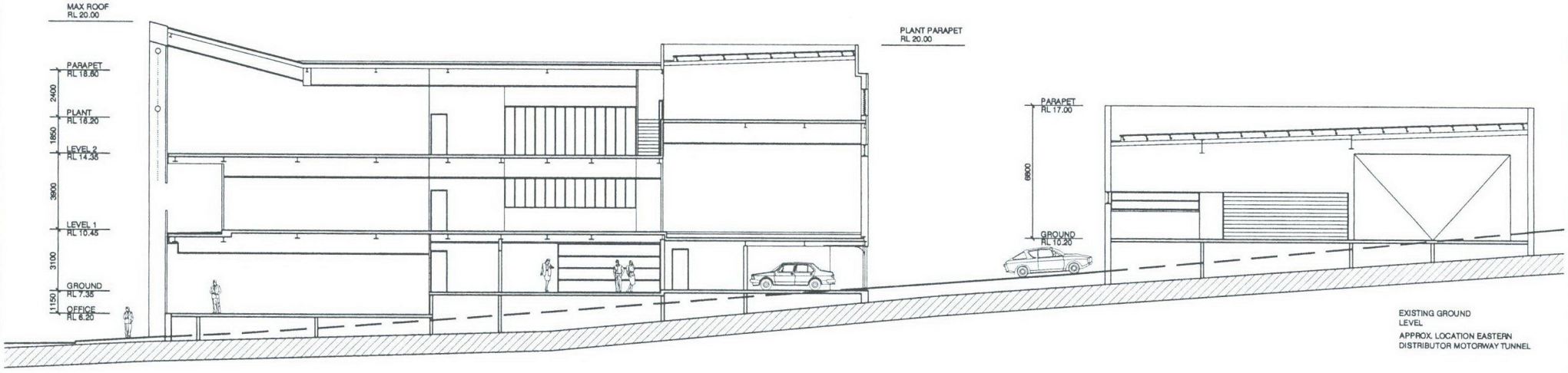


SECTION AA

1:100@A1 / 1:200@A3



SECTION BB

1:100@A1 / 1:200@A3

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02	10.10.2003	REF - DRAFT ISSUE NO 03	DJB		
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TUNNEL CONTROL CENTRE
SECTIONS AA & BB

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Scale 1:100@A1 1:200@A3

Drawing No. G-UD625-REF509 Rev. 03

Appendix J

Sun Shadow Diagrams

A1

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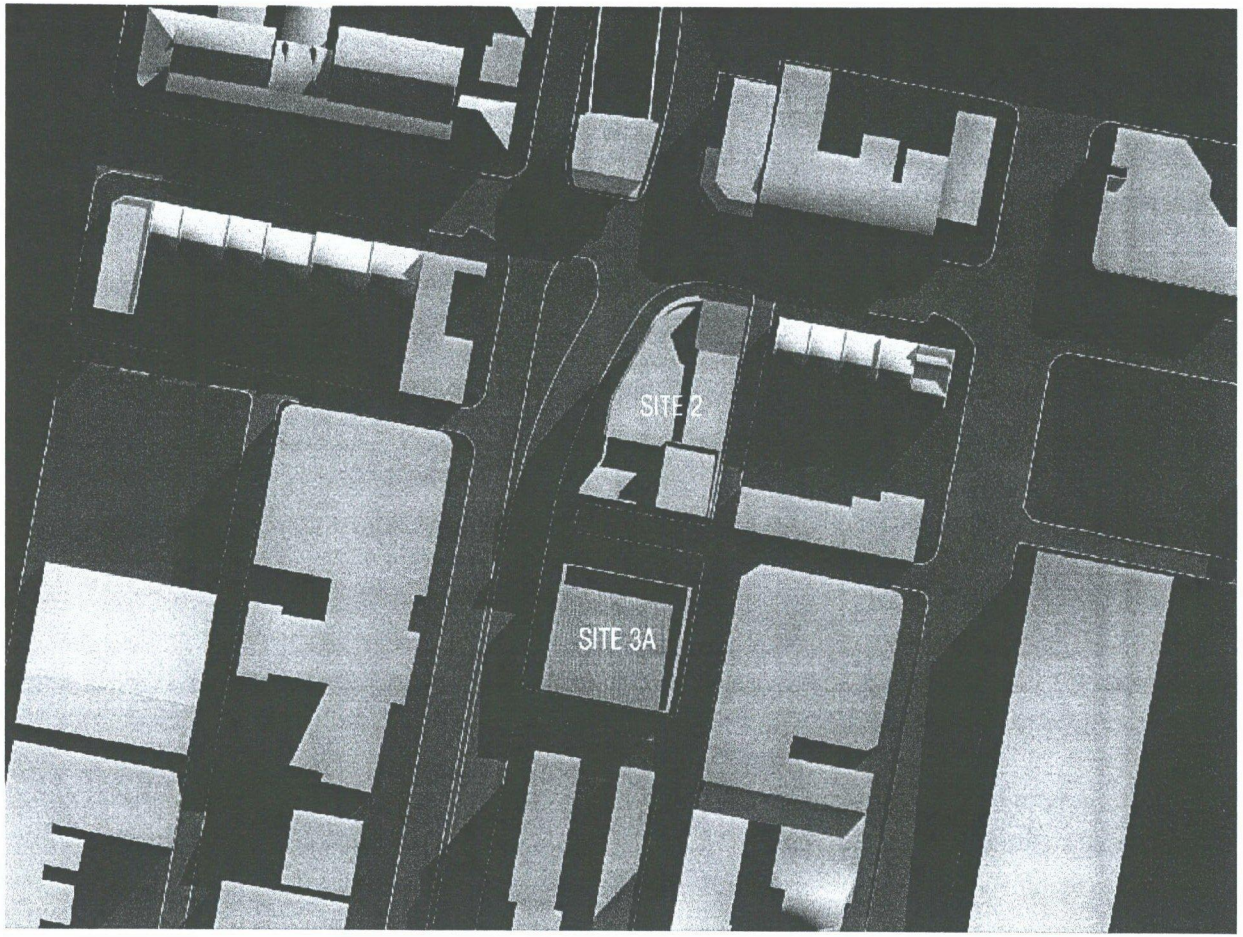

SHADOW CASTING DIAGRAM
9AM JUNE 22

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TUNNEL CONTROL CENTRE
SHADOW CASTING DIAGRAM 9AM

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Drawing No.: G-UD625-REF510
Rev.: 02

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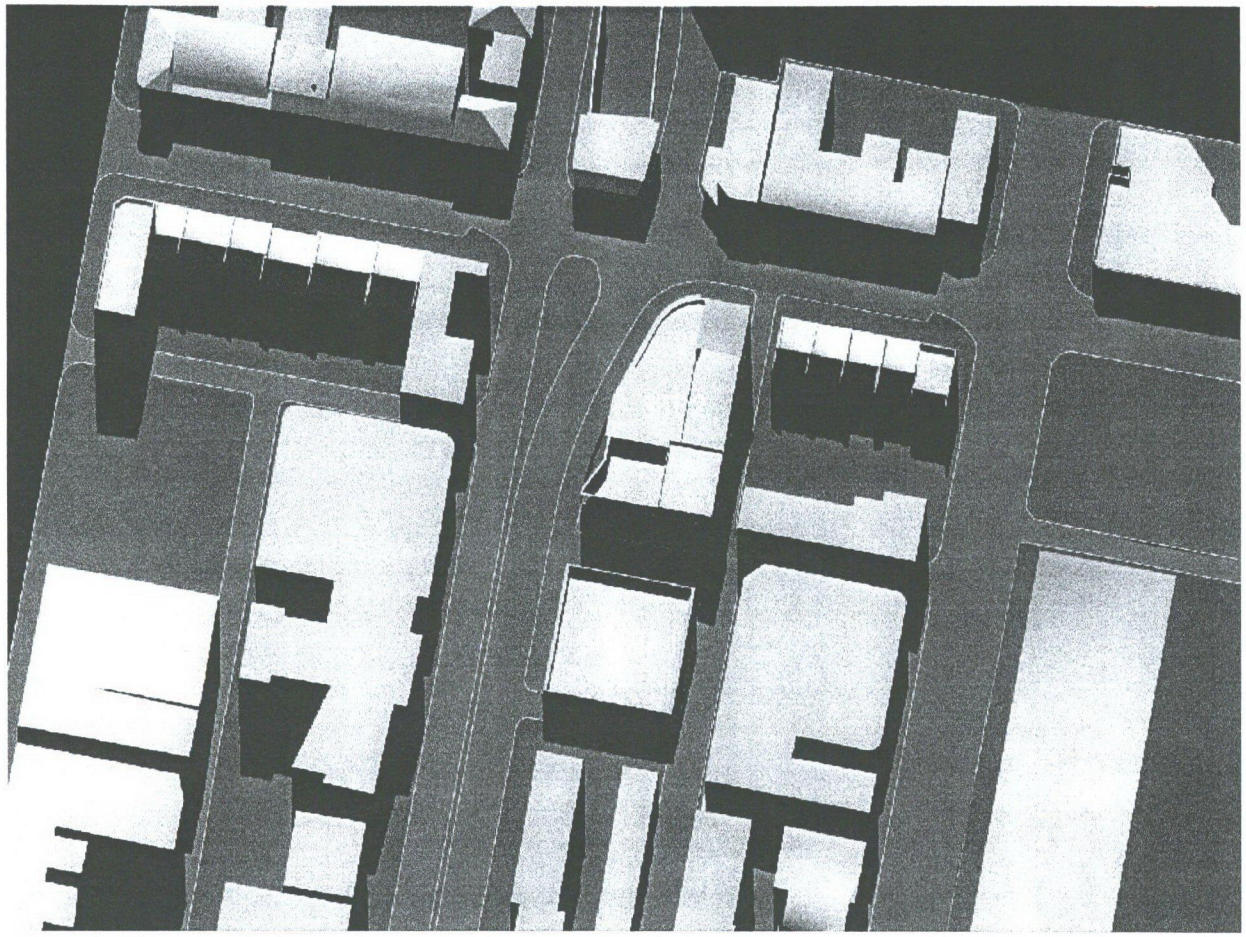

SHADOW CASTING DIAGRAM
12PM JUNE 22

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Verified	Signed	Date
Approved RD	Signed	Date

Drawing Title:
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DESIGN LOT UD 625
TUNNEL CONTROL CENTRE
SHADOW CASTING DIAGRAM 12PM

HASSELL Project No. PSA7191

Scale NTS NTS

Drawing No. G-UD625-REF511 Rev. 02

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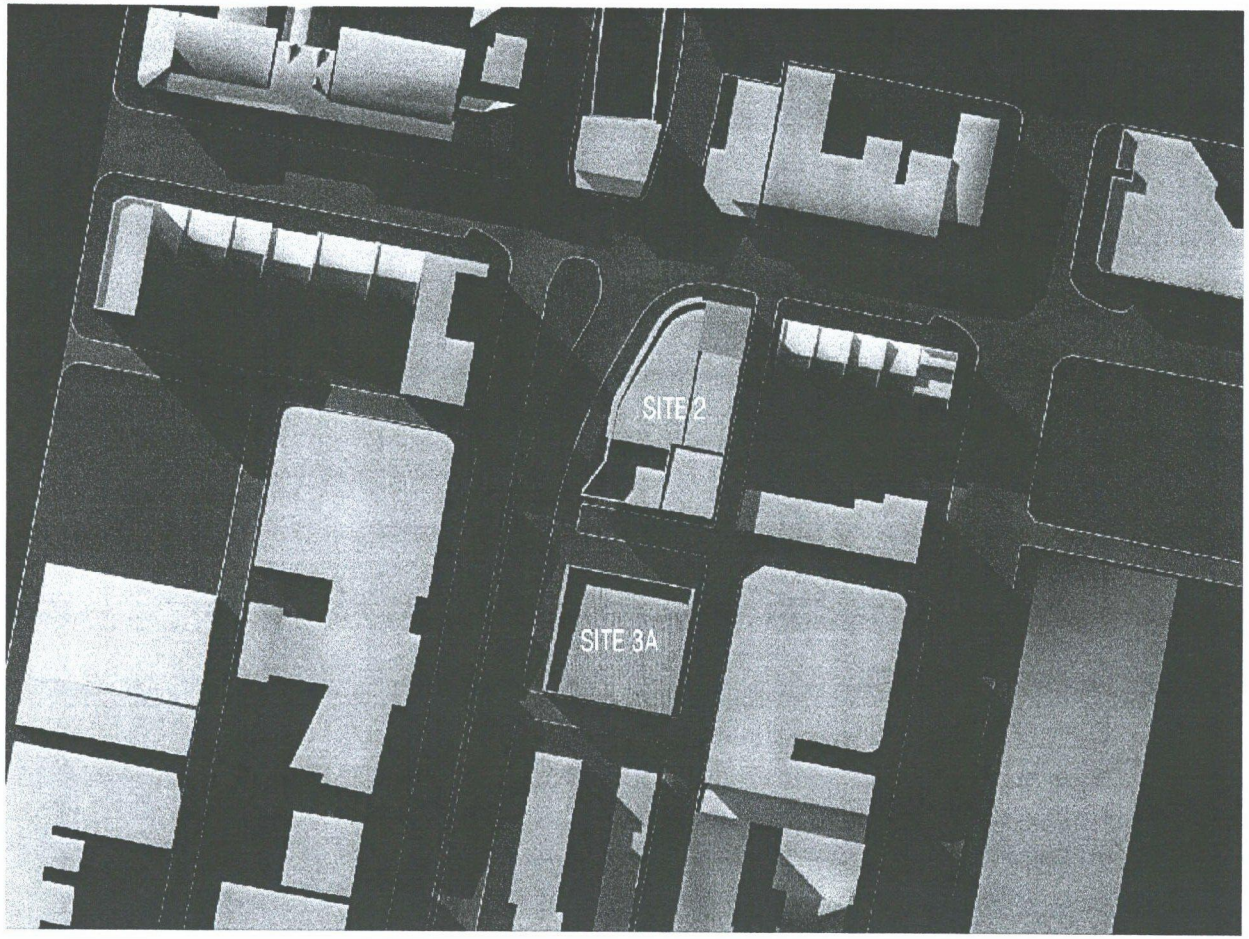

SHADOW CASTING DIAGRAM
3PM JUNE 22

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01	03.10.2003	REF - DRAFT ISSUE NO.2	YJW		

HASSELL

HASSELL PTY LTD ACN 007 711 465
LEVEL 2, 85 CAMBRIDGE ST SYDNEY NSW 2000 AUSTRALIA
SYDNEY@HASSELL.COM.AU
T 61 2 9373 2000 F 61 2 9373 2046

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Verified	Signed	Date
Approved RD	Signed	Date

Drawing Title:
CROSS CITY TUNNEL
DESIGN LOT UD 625
TUNNEL CONTROL CENTRE
SHADOW CASTING DIAGRAM 3PM

HASSELL Project No. PSA7191

Scale NTS

Drawing No. G-UD625-REF512 Rev. 02

Appendix K

Construction Noise and Vibration Impact Assessment

Report No 00176-CB-1
Final Version



APPENDIX K

PROPOSED MODIFICATIONS TO THE CROSS CITY TUNNEL TUNNEL CONTROL CENTRE CONSTRUCTION NOISE AND VIBRATION ASSESSMENT

OCTOBER 2003

DRAFT

APPENDIX K

MODIFICATIONS TO THE CROSS CITY TUNNEL TUNNEL CONTROL CENTRE CONSTRUCTION NOISE AND VIBRATION ASSESSMENT

Report No 00176-CB-1
Version B

October 2003

Prepared for

BHBB Cross City Tunnel Joint Venture
154 Sussex Street
SYDNEY NSW 2000

Prepared by

Wilkinson Murray Pty Limited
1st Floor, 123 Willoughby Road, Crows Nest, NSW 2065 Australia
Tel: (02) 9437 4611 Fax: (02) 9437 4393 email: acoustics@wmpl.com.au

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APPENDIX A - Noise Descriptors

APPENDIX B - Measured Ambient Noise Levels

1. INTRODUCTION

This Construction Noise and Vibration Assessment applies to the construction works at the Tunnel Control Centre for the Cross City Tunnel. It has been prepared to support the preparation of a Review of Environmental Factors and the proposed modifications to the Tunnel Control Centre.

The Report covers airborne noise and groundborne vibration likely to be generated by the proposed operations and addresses the effect upon nearby residences. Background noise levels have been measured in the area and noise and vibration levels have been predicted. The predicted noise levels have been compared with the objective set in Condition 123 of the MUAP Consent and the predicted vibration levels have been compared with the limits set in Conditions 146 and 147. Noise mitigation and management measures have then been considered to control the noise and vibration impacts.

2. PROPOSED CONSTRUCTION OPERATIONS & SURROUNDING AREA

2.1 Construction Operations

The Tunnel Control Centre site is bounded on the western side by Palmer Street, on the northern side by Cathedral Street and on the eastern side by Egan Place. To the south is a car parking area presently being used as site office for the Bourke Street Cross City Tunnel site.

The nearest residential areas (shown in Figure 1) are immediately to the east where residences facing Cathedral Street and Egan Place back on to the site. Farther to the south on Egan Place, 169 Bourke Street backs onto Egan Place and is potentially affected by construction activities at the site. There are also residential properties on the northern side of Cathedral Street and the western side of Palmer Street which are potentially affected by construction noise.

The following works are proposed at the site:

- Site establishment, including removal of existing site hoardings as the Tunnel Control Centre will be constructed right up to the site boundary.

- Removal of existing pavement. This will be achieved using a small excavator fitted with a hydraulic hammer. Subsequent to this fill presently on top of the eastern distributor tunnel would be removed by excavator and loaded into road trucks. This would involve a maximum of 100 trucks over a period of 3 days. These trucks would enter via William Street, Bourke Street and St Kilda Lane. They would then exit via St Kilda Lane into Bourke Street then via Cathedral Street into Riley Street.

- Subsequent to spoil removal, services will be installed. This will involve excavation of a trench along Egan Place from the southern end to the site. The surface of Egan Place will be cut using a concrete saw, concrete would be removed by a small excavator. Some trench boxing may be necessary.

- Concreting will take 3 months. This will involve concrete trucks, which will enter and leave via Palmer Street, a concrete pump, concrete vibrators and a trowelling machine. Blockwork and steel framing will occur in conjunction with concreting. This would involve a crane situated within a Palmer Street lane closure for approximately three weekends. A forklift, materials lift and cement mixer will also be required.

- Installation of external finishes such as Colorbond cladding to the truck parking building and roofing and glazing to the offices will involve a cherry picker.

- Internal fitout will be entirely within the building and will involve small hand tools. Noise levels will be minimal and have not been assessed in this report.

- Paving St Kilda Lane will involve an asphalt paver and rollers

Mostly, the construction works will be carried out during daytime hours of 7.00am - 6.00pm on Monday and 8.00am - 1.00pm on Saturday.

3. NOISE IMPACT ASSESSMENT

The noise impact has been determined by measuring background noise levels at residential premises, setting noise criteria at residential premises, predicting L_{A10} noise levels from the noisier periods of the works and assessing these noise levels against the criteria set. Noise mitigation measures have then been considered.

3.1 Residential Background Noise Levels

Background noise levels have been measured for the purposes of this assessment at three residential locations as follows:

- **Dept of Housing Block.** First floor balcony at the southern end of the building overlooking the Eastern Distributor (Unit 2, 169 Bourke Street).
- **Diplomat.** 4th floor balcony overlooking the ED (Unit 19, 113-125 Palmer Street).

The background noise levels were measured during the periods shown in Table 3-1. During the measurement it was fine with relatively still conditions, suitable for such noise measurements.

The noise monitoring equipment used for these measurements consisted of environmental noise loggers set to A-weighted, fast response, continuously monitoring over 15 minute sampling periods. This equipment is capable of remotely monitoring and storing noise level descriptors for later detailed analysis. The equipment calibration was checked before and after the survey and no significant drift occurred.

The logger determines L_{A1}, L_{A10}, L_{A90} and L_{Aeq} levels of the ambient noise. L_{A1}, L_{A10} and L_{A90} are the levels exceeded for 1%, 10% and 90% of the sample time respectively (see Appendix A for definitions). The L_{A1} is indicative of maximum noise levels due to individual noise events such as the occasional passby of a heavy vehicle. This is used for the assessment of sleep disturbance. The L_{A90} level is normally taken as the background noise level during the relevant period.

The noise descriptors measured and discussed in this report are defined in Appendix A.

The results of measurements are shown in graphical form in Appendix B.

The background noise levels measured during the daytime construction period of 7.00am – 6.00pm as defined in the *NSW Industrial Noise Policy (INP)* are the RBL values (Appendix A). These are shown in Table 3-1.

Table 3-1 Measured Background Noise Levels

Location	Measurement Period (dBA)	RBL (dBA)		
		Day (1)	Evening (1)	Night (1)
Dept of Housing block	28/08/02 - 05/09/02	60	59	53
Diplomat	27/08/02 - 05/09/02	62	59	52

Note (1) Day - 7.00am - 6.00pm Evening - 6.00pm - 10.00pm Night time - 10.00pm - 7.00am

These background noise levels were dominated by road traffic noise generated on the roads in the near vicinity.

3.2 Residential Noise Criteria

Condition 123 of the MUAP Consent sets a noise level objective of the background noise levels +5dBA, applying to the L_{A10} level. Taking the background level as the RBL the objective becomes:

- RBL +5dBA

The conditions require specific noise mitigation and noise management action to be taken where these objectives cannot be achieved.

Based on the measured RBL values, the residential objectives are shown in Table 3-2.

Table 3-2 Residential Noise Criteria

Location	L_{A10} Noise Criteria (dBA)		
	Day (1)	Evening (1)	Night (1)
Dept of Housing block	65	64	58
Diplomat	67	64	57

Note (1) Day - 7.00am - 6.00pm Evening - 6.00pm - 10.00pm Night time - 10.00pm - 7.00am

The noise criteria applying to the Dept of Housing block generally apply to residences at St Kilda Lane, Egan Place and Cathedral Street. The criteria at the Diplomat apply to this building and other buildings further to the north on Palmer Street.

3.3 Construction Site Noise Level Predictions

Noise levels from the site have been predicted in the surrounding area. Allowance has been made for the noise generation of each item of equipment, the attenuation with distance (including ground effects and air absorption) and any intervening noise shielding.

Assumptions have been made as to what activities are likely to occur simultaneously on the site. Calculations were then carried out for typical construction scenarios, as follows.

- **Scenario 1 – Excavation (3 days)**

  This scenario involves removal of the existing concrete pavement across the whole site and then excavation of fill down to the eastern distributor cut and cover roof.

  These works will involve the following equipment (sound power level in brackets):

  - One excavator (106dBA)
  - Road truck (109dBA)
  - One excavator with hydraulic hammer (122dBA) (rarely used)

- **Scenario 2 – Concreting (5 single days spread over duration of works)**

  This work involves the laying of footings, concrete floor slabs, casting columns and upper floor slabs. The following equipment will be used:

  - Concrete trucks (109dBA)
  - Concrete pump (109dBA)
  - Concrete vibrator (109dBA)
  - Trowelling machine (106dBA)

  This work will run simultaneously with blockwork and steel framing:

  - One crane(109dBA)
  - One forklift (106dBA)
  - One materials lift (111dBA)
  - One cement mixer (109dBA)

- **Scenario 3 - External finishes**

This scenario applying for an extended period of time involves the following equipment:

- Crane (109dBA)
- Cherry picker(106dBA)

- **Scenario 4 - Paving of St Kilda Lane**

This operation involves the use of:

- Asphalt paver (100dBA)
- Roller (109dBA)

The scenarios shown represent the noisiest periods of construction at the site.

3.4 Preliminary Assessment of Site Noise Impact

Without noise mitigation measures being applied to the construction site, the noise level objective in Condition 123 would not be complied with, consistent with the Approved Activity.

3.5 Noise Mitigation Measures

The proposed construction works and predicted noise impacts are typical of building construction within the Sydney metropolitan area. Accordingly, the implementation of site-specific noise mitigation measures is particularly difficult. However, the following measures will be put in place during the construction to minimise noise levels:

- Where practicable, no noise generating equipment servicing the construction will be located within Egan Place and will generally be located within the new western section of St Kilda Lane. This applies to concrete pumps, concrete trucks and cranes. This may not be practicable at all times.
- A hydraulic hammer will be fitted to the excavator for as little time as possible during breaking of the pavement on the site. Where possible, an excavator with bucket will be used to remove the pavement.

3.6 Predicted Noise Impacts

Noise levels have been calculated for the scenarios referred to above with the noise mitigation measures in place.

Table 3-3 summarises the noise levels to be expected at noise sensitive locations for still isothermal conditions.

Table 3-3 Predicted L_{A10} Noise Levels at the Tunnel Control Centre Site (with noise mitigation measures)

Scenario	Noise Sensitive Receiver	Typical Noise Levels (dBA)	Typical Max L_{A10} Noise Levels (dBA)
1 – Excavation (1) (3 days)	169 Bourke Street	67-75	79(2)
	St Kilda Lane	75-82	91(2)
	Cathedral Street	75-82	91(2)
	West side of Palmer Street	65-75	71(2)
2 – Concreting, Blockwork and Steelwork(5 days only)	169 Bourke Street	70-78	82(2)
	St Kilda Lane	75-82	89(2)
	Cathedral Street	75-82	94(2)
	West side of Palmer Street	60-67	66(2)
3 - External Finishes(6weeks)	169 Bourke Street	65-72	74(2)
	St Kilda Lane	70-77	86(2)
	Cathedral Street	70-77	86(2)
	West side of Palmer Street	55-62	58(2)
4 - Paving St Kilda Lane(1 week)	169 Bourke Street	67-72	72(2)
	St Kilda Lane	78-83	92(2)
	Cathedral Street	63-68	76(2)
	West side of Palmer Street	55-62	64(2)

Note: (1) Higher levels than shown may occur for brief periods only when a hydraulic hammer works close to the receiver location. This will be only in the region of a few hours in a month.

(2) Occurring intermittently approximately a quarter of the duration of this scenario.

Exceedance of the daytime noise criteria at the nearby residential premises is typical of construction sites in built up areas and consistent with the Approved Activity. Whilst some impact is likely to result, the degree of impact will be limited by the fact that there is a significant amount of road traffic in the surrounding area and some of the occupants of the nearby residential premises will not be at home during the daytime period.

Further noise mitigation measures (in addition to those discussed in Section 3.4 above) are not considered practicable for this site.

4. VIBRATION IMPACT ASSESSMENT

Vibration levels have been calculated at the nearest residential premises and have been assessed against the limits specified in Conditions 146 and 147 of the MUAP Consent.

4.1 Vibration Limits

Condition 146 sets vibration limits to protect normal buildings against damage and to protect human comfort within buildings. The human comfort limits are the more stringent limits.

British Standard BS6472:1992 sets the following vibration limits for human comfort (above 8Hz):

- 0.28mm/s peak velocity within residences during daytime
- 0.56mm/s peak velocity within offices during daytime

In regard to potential building damage, the German Standard DIN4150 suggests a limit of 10mm/s peak particle velocity (ppv) within any normal building and the British Standard BS7385:Part 2 - 1993 sets a limit within buildings which depends upon the vibration frequency and varies from 7.5mm/s ppv at 4Hz to 25mm/s at 40hz and above. Given that the bulk of the vibration energy from construction activity will fall in the range 10-100Hz, it is reasonable to adopt an overall vibration limit of 10mm/s ppv.

Condition 147 sets a vibration limit of 3mm/s (ppv) at the foundation of heritage buildings and sensitive structures.

4.2 Generated Vibration Levels

Groundborne vibration levels generated by typical construction activities associated with the site will depend upon the response of the ground at that site. Figure 4-1 shows the highest anticipated vibration levels from typical construction equipment. No vibratory rollers will be used at the Tunnel Control Centre site.

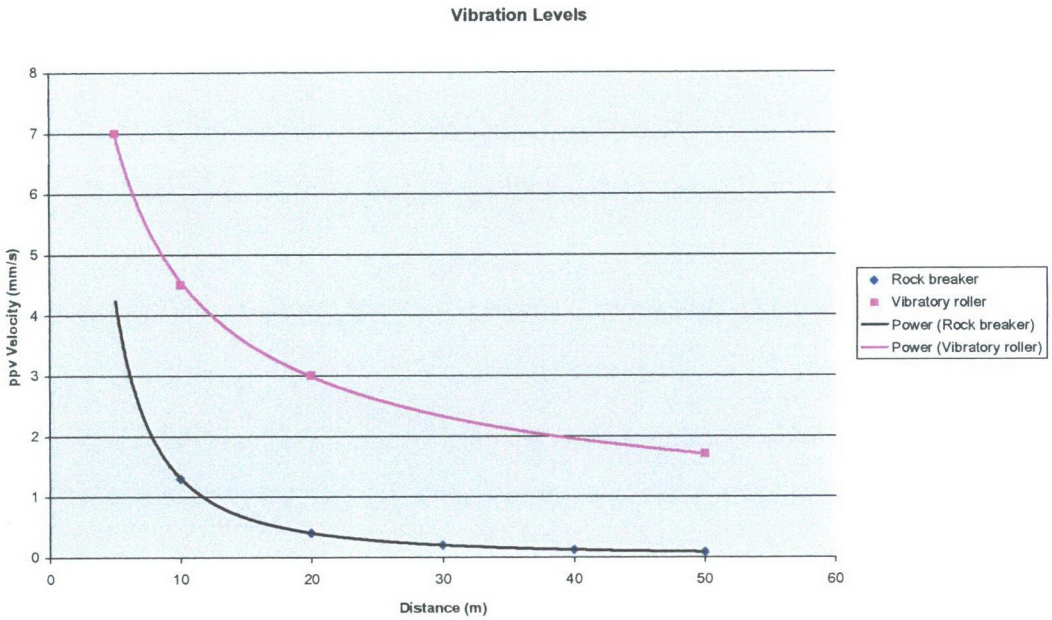


Figure 4-1 Typical Construction Vibration Levels

Excavators fitted with hydraulic hammers will generate the highest vibration levels on the site for a limited period and these hammers will, at times, work closer than 5m from the closest buildings. No vibratory roller is expected to be required as part of the works.

Only approximate predictions of vibration levels can be made, particularly at close distances, without tests being carried out on site. Table 4-1 gives an indication of the closest distances to the nearest buildings and the approximate vibration levels to be expected.

Table 4-1 Approximate Vibration Levels Expected at the Closest Buildings

Receiver Location	Min. Distance (m)	Peak Particle Velocity (mm/s)
		Rock Breaker
St Kilda Lane	5	3.5 mm/s
Cathedral Street	5	3.5 mm/s
Across Palmer Street	40	0.2mm/s

4.3 Vibration Impact

At St Kilda Lane and Cathedral Street the vibration limit of 3mm/s for sensitive structures may be marginally exceeded for brief periods during hydraulic hammering (if this occurs) at the nearest part of the site. This will be rare.

In regard to human comfort, the 0.28mm/s is likely to be exceeded, but for only periods at nearby residences during rock breaking.

Appendix 6 of the Original Representations Report did not contain an assessment of vibration impacts and therefore comparisons with the Approved Activity are not possible. However, as the construction activities resulting in exceedances of the vibration critiera are similar to those used elsewhere on the project under similar conditions, it is considered that such impacts are also consistent with the Approved Activity.

4.4 Vibration Mitigation Measures

Prior to hydraulic hammering on the site, trial rock breaking will be carried out and vibration levels will be monitored at a range of distances to establish the distance at which the vibration limits (0.28 and 3.0mm/s ppv) are likely to be exceeded. Buffer distances would then be set on the site.

Where rock breaking is to be carried out within the buffer areas, the potentially affected residents would be informed in advance and continuous vibration monitoring will be carried out near the building foundations.

5. ENVIRONMENTAL NOISE AND VIBRATION MANAGEMENT MITIGATION MEASURES

A Construction Noise & Vibration Management Sub Plan has been prepared for the Cross City Tunnel construction. This Sub Plan indicates a number of general management measures which will be used to minimise the effect of noise and vibration in the surrounding area. In addition, the Sub Plan addresses the following site-specific issues.

5.1 Noise and Vibration Mitigation Measures

Whilst vibration mitigation measures are not practicable for this site, the following noise mitigation measures will be adopted:

- Where practicable, no noise generating equipment will be located in Egan Place during construction. Generally, the new section of St Kilda Lane on the site will be the location of such equipment as concrete trucks, concrete pumps and cranes. This may at times be unavoidable.
- The use of a hydraulic hammer will be minimised during removal of the pavement and an excavator with bucket will be used wherever possible.

5.2 Noise and Vibration Monitoring

The following noise and vibration monitoring is proposed as part of the Sub Plan:

- Equipment noise levels will be measured at a distance of 7m when they are first brought to site to establish base line noise levels, which will be compared to goals determined by Wilkinson Murray. The measurements will be repeated on a 3-monthly basis. Where noise levels are found to exceed the goals, maintenance will be carried out on the equipment so as to reduce noise emission levels to an acceptable level.

- When each item of the vibration generating equipment is brought to the site, groundborne vibration levels will be measured to establish the minimum working separation between the equipment and nearby vibration sensitive receivers.

- Environmental noise and vibration monitoring will be carried out one week after commencement of each stage of the construction works and monthly thereafter. Noise monitoring will be carried out by a qualified and experienced Acoustician personally attending the site and using a calibrated sound level metre. The objective of the measurements is to determine the $L_{A10,15min}$ levels and this may require spot checks of maximum noise levels to make a reasonable estimate of the L_{A10} levels. Vibration levels will be monitored using a triaxial vibration monitoring system. Such monitoring is to be carried out at the following locations:

  - Egan Place - northern end of the Dept of Housing block;
  - St Kilda Lane – corner closest to site
  - Cathedral Street closest to site;
  - Western Side of Palmer Street adjacent to site;

6. CONCLUSION

As discussed above, a number of noise mitigation measures are proposed as part of the Tunnel Control Centre construction. As a result, the following conclusions have been reached:

- During daytime construction at the site, noise levels will exceed the objectives in Condition 123 at a number of residential locations close to the construction works, similar to the Approved Activity.

- Vibration levels from construction are expected to generally comply with damage criteria although some exceedances of the criteria may occur at the closest buildings on St Kilda Lane and Cathedral Street for brief periods. In addition, vibration levels are likely to exceed the appropriate comfort criteria at a number of nearby residential premises during rock breaking on the site. While a vibration assessment was not carried out for the Tunnel Control Centre construction contained in the Approved Activity, since the construction activities are typical of others being undertaken in similar circumstances, the predicted impacts are considered consistent to other occurences on the project.

Note:

All materials specified by Wilkinson Murray Pty Limited have been selected solely on the basis of acoustic performance. Any other properties of these materials, such as fire rating, chemical properties etc. should be checked with the suppliers or other specialised bodies for fitness for a given purpose.

Quality Assurance

Wilkinson Murray Pty Limited is committed to and has implemented AS/NZS ISO 9001 : 1994 "Quality Systems - Model for quality assurance in design, development, production, installation and servicing". This management system has been externally certified and Certificate No. QEC 13457 has been issued.

AAAC

This firm is a member firm of the Association of Australian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.

Version	Date	Status	Prepared by	Checked by
A	3 October 2003	Draft	Roger Roper	Barry Murray
B	3 October 2003	Draft	Roger Roper	Barry Murray

APPENDIX A

NOISE DESCRIPTORS

NOISE DESCRIPTORS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}). The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1}. The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10}. The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

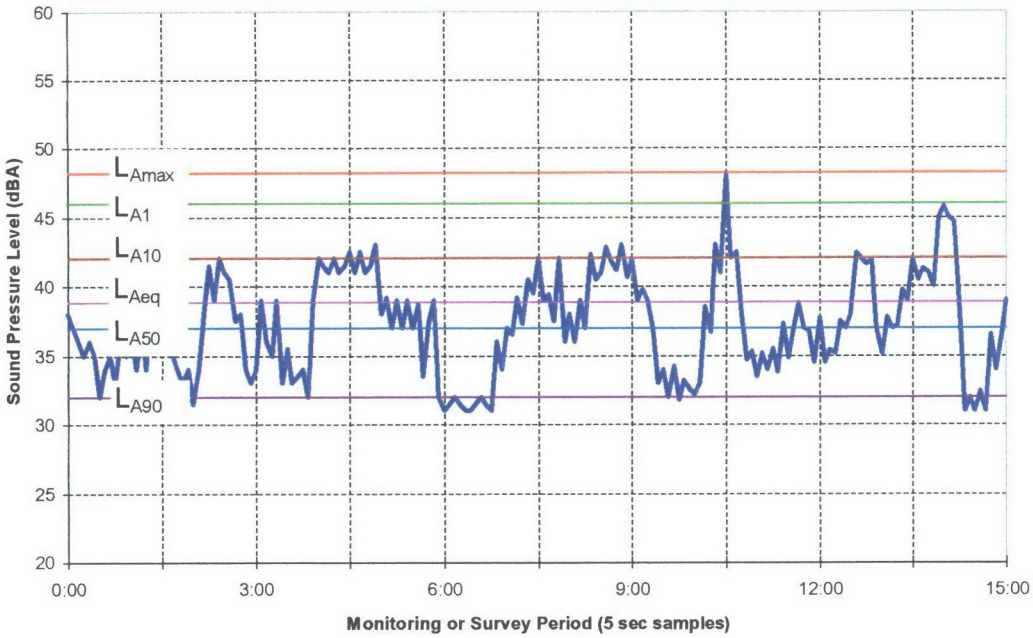
L_{Aeq}. The equivalent continuous sound level (L_{Acq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

L_{A50}. The L_{A50} level is the noise level which is exceeded for 50% of the sample period. During the sample period, the noise level is below the L_{A50} level for 50% of the time.

L_{A90}. The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

ABL. The Assessment Background Level is the single figure background level representing each assessment period (day, evening and night) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL. The Rating Background Level for each period is the medium value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period, day, evening and night.

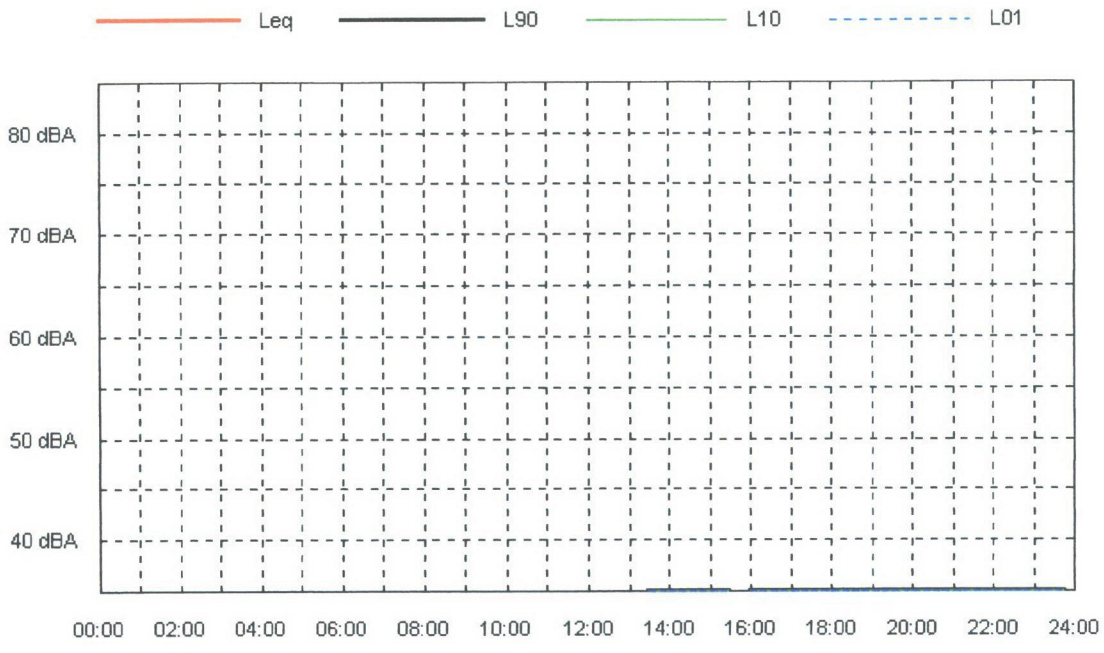

60
55
50
45
40
35
30
25
20
Sound Pressure Level (dBA)
LAmax
LA1
LA10
LAeq
LA50
LA90
0:00
3:00
6:00
9:00
12:00
15:00
Monitoring or Survey Period (5 sec samples)

APPENDIX B

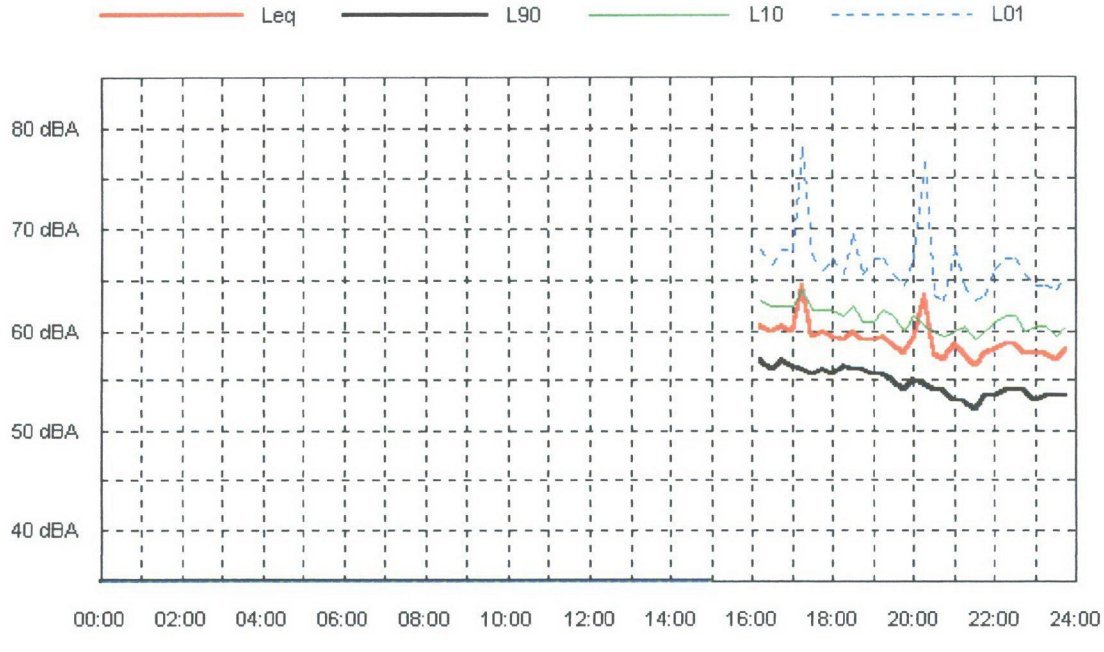
MEASURED AMBIENT NOISE LEVELS

Location: 175 Bourke Street

Thu 27 Jun 02



Fri 28 Jun 02



Location: 175 Bourke Street

Data shaded: Rain

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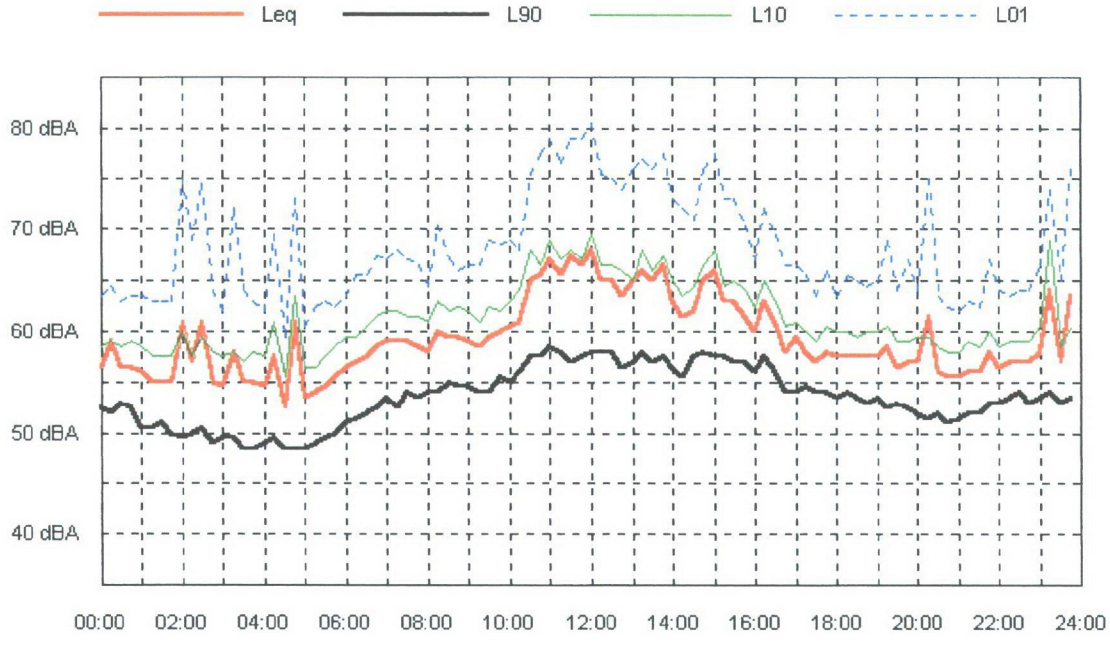

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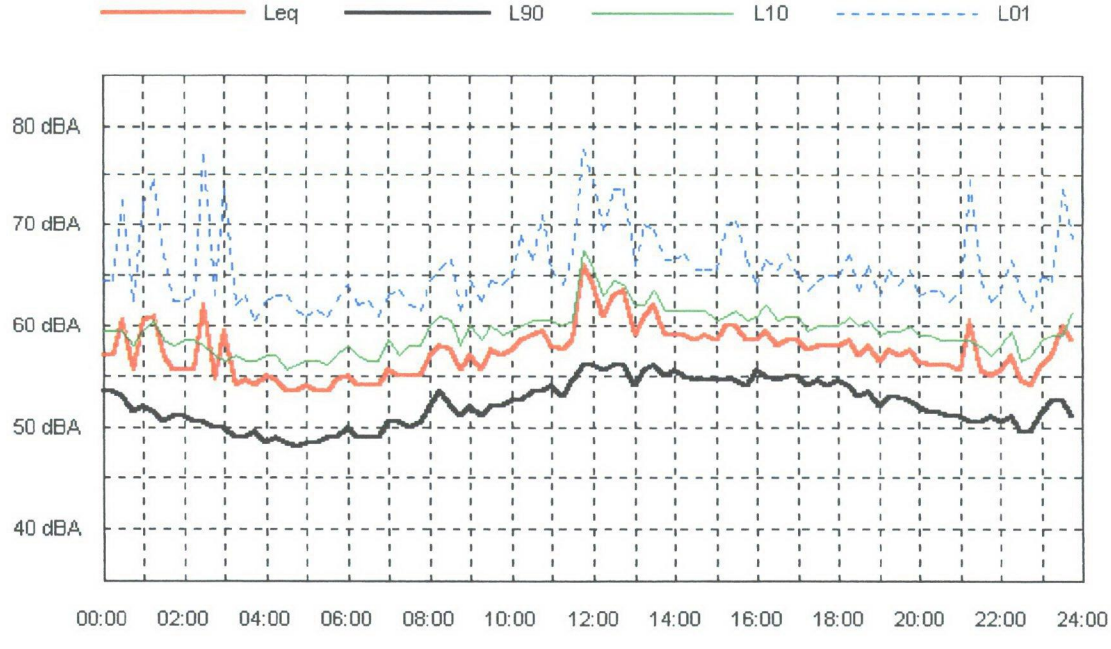
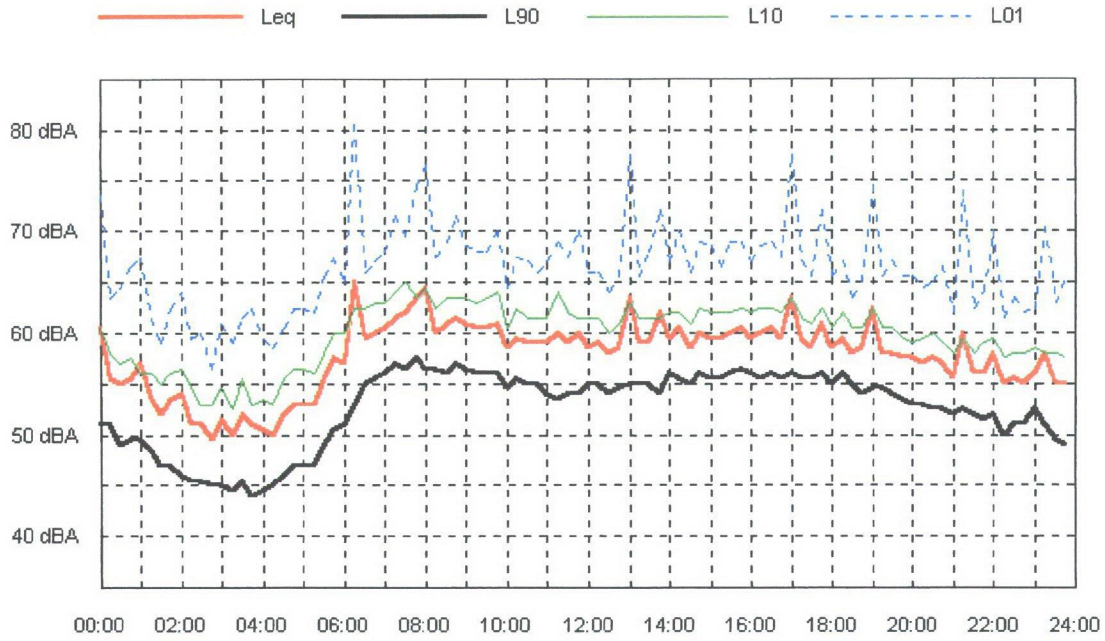


Location: 175 Bourke Street

Data shaded: Rain

Mon 01 Jul 02



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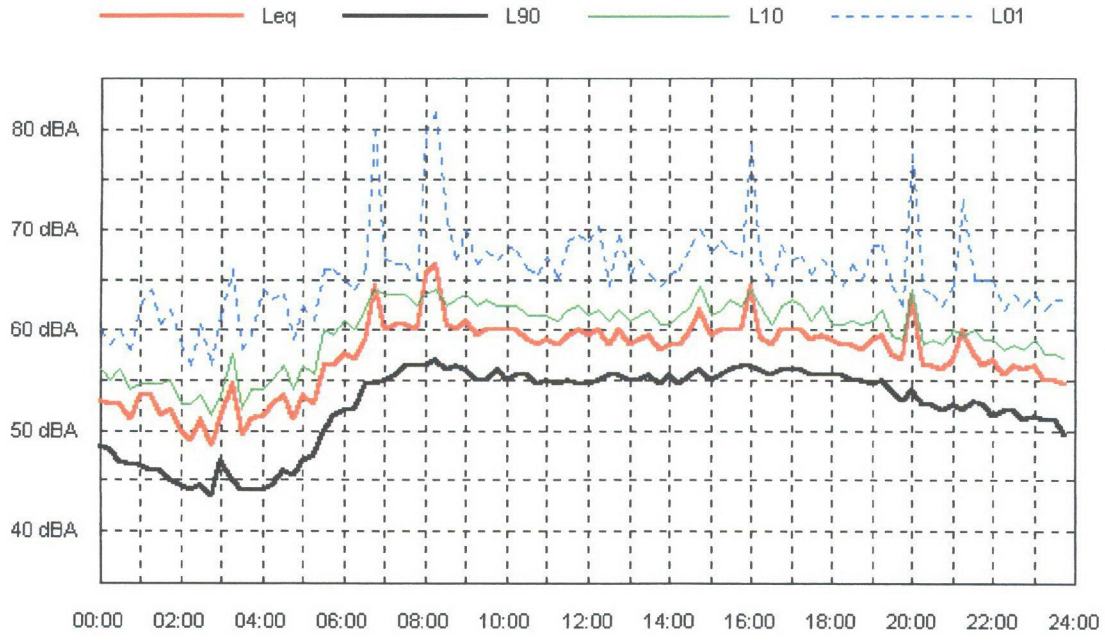
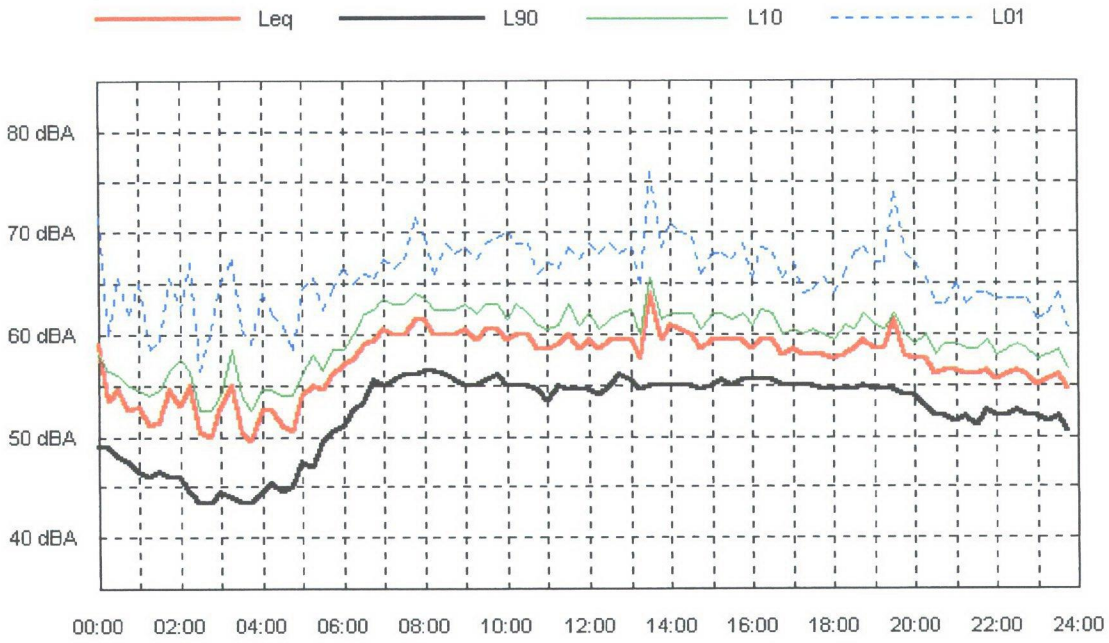


Location: 175 Bourke Street

Data shaded: Rain

Wed 03 Jul 02



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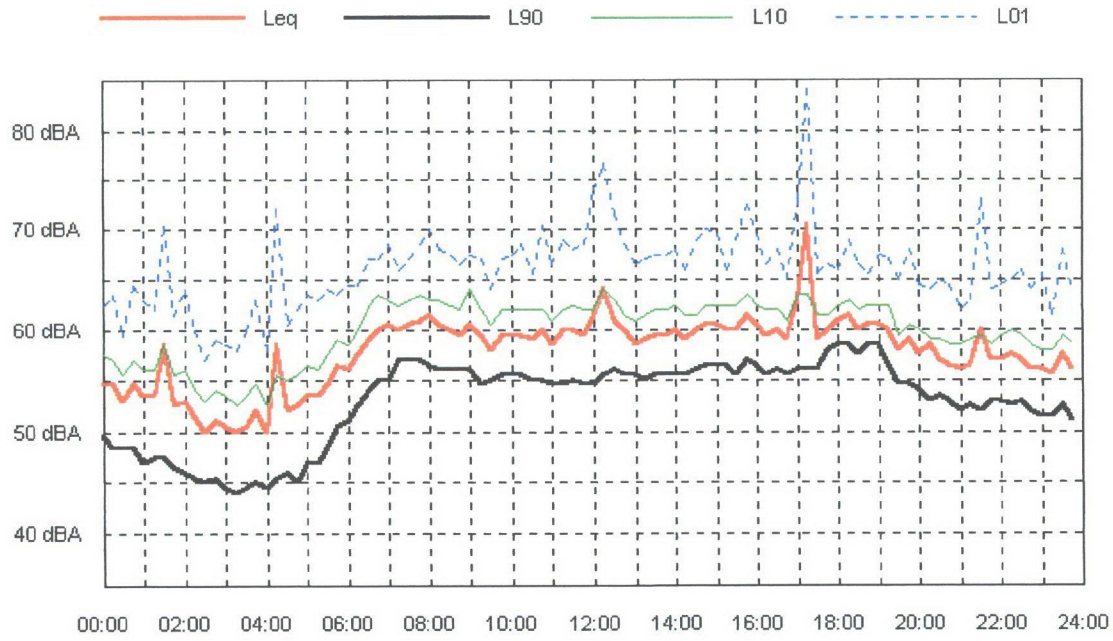

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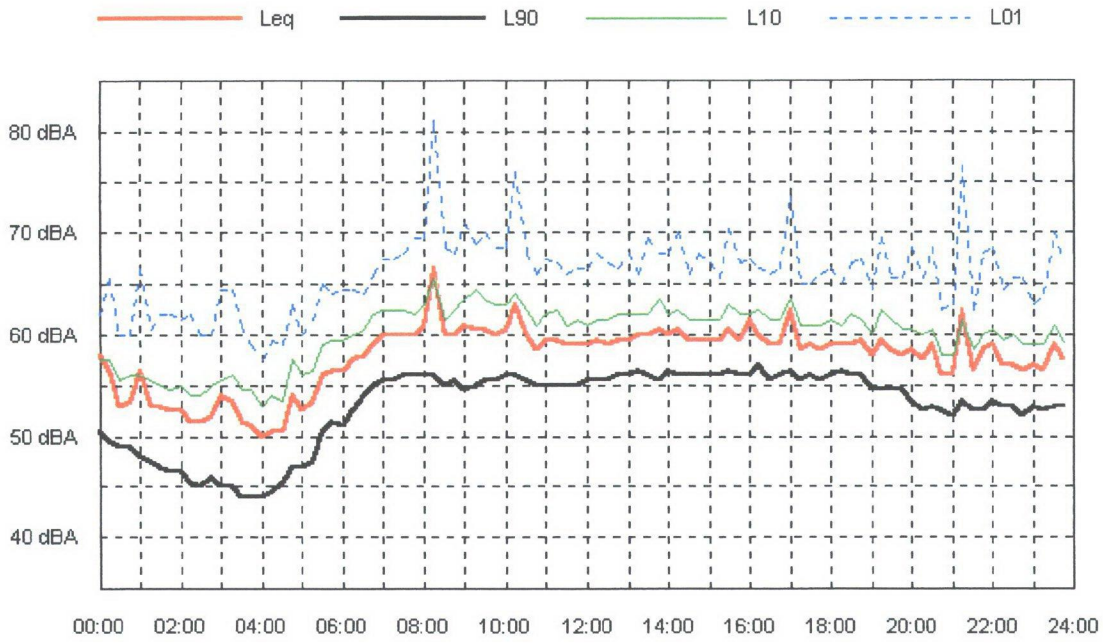

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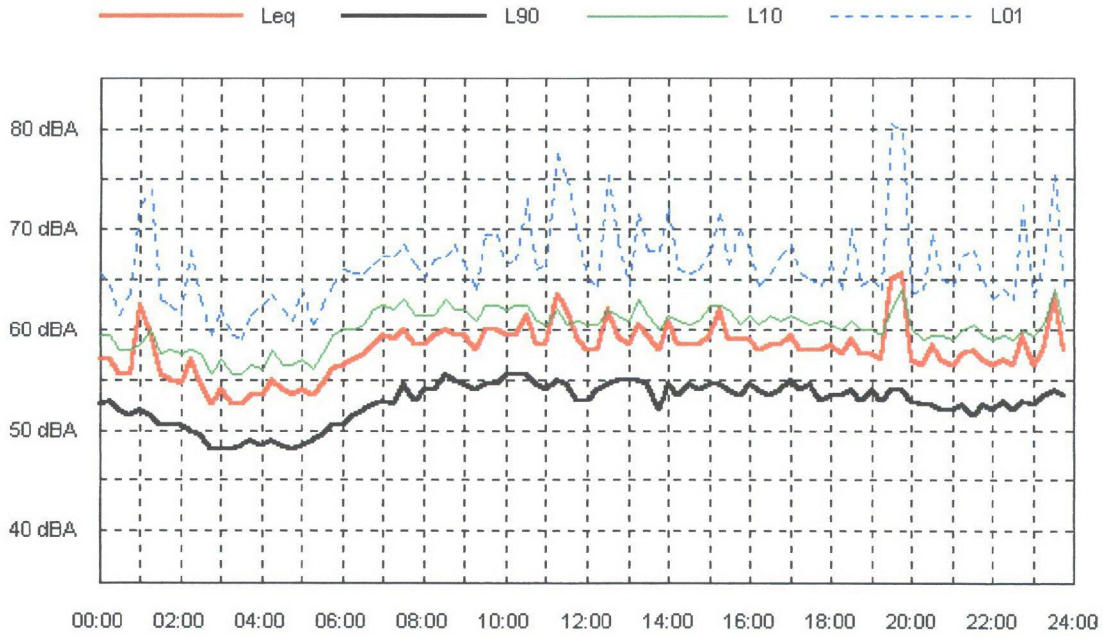

Location: 175 Bourke Street

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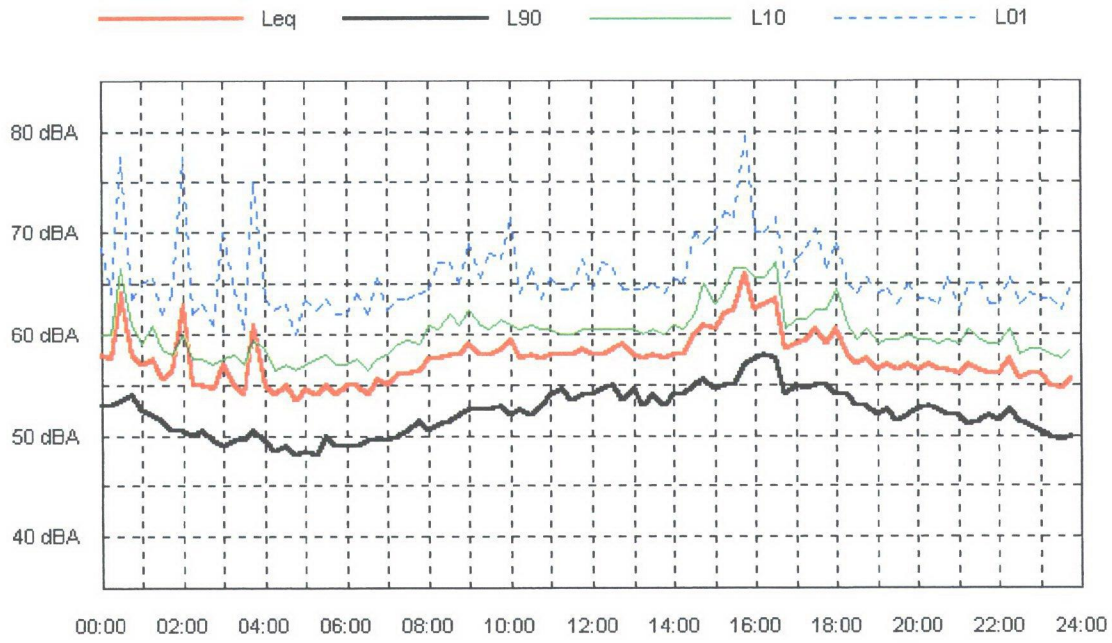

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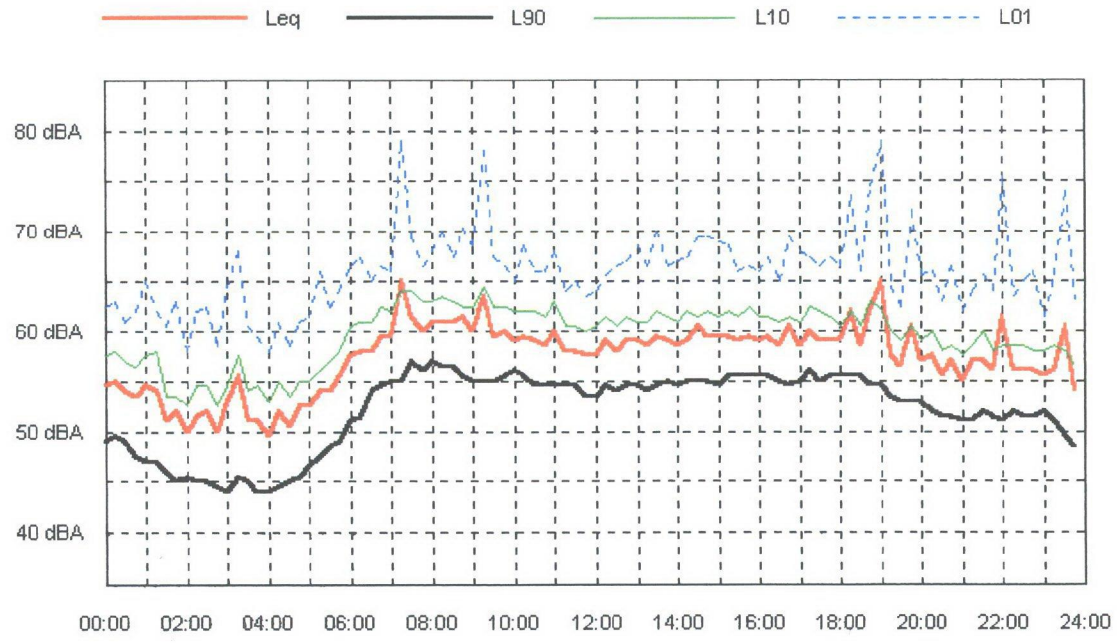

Location: 175 Bourke Street

Data shaded: Rain

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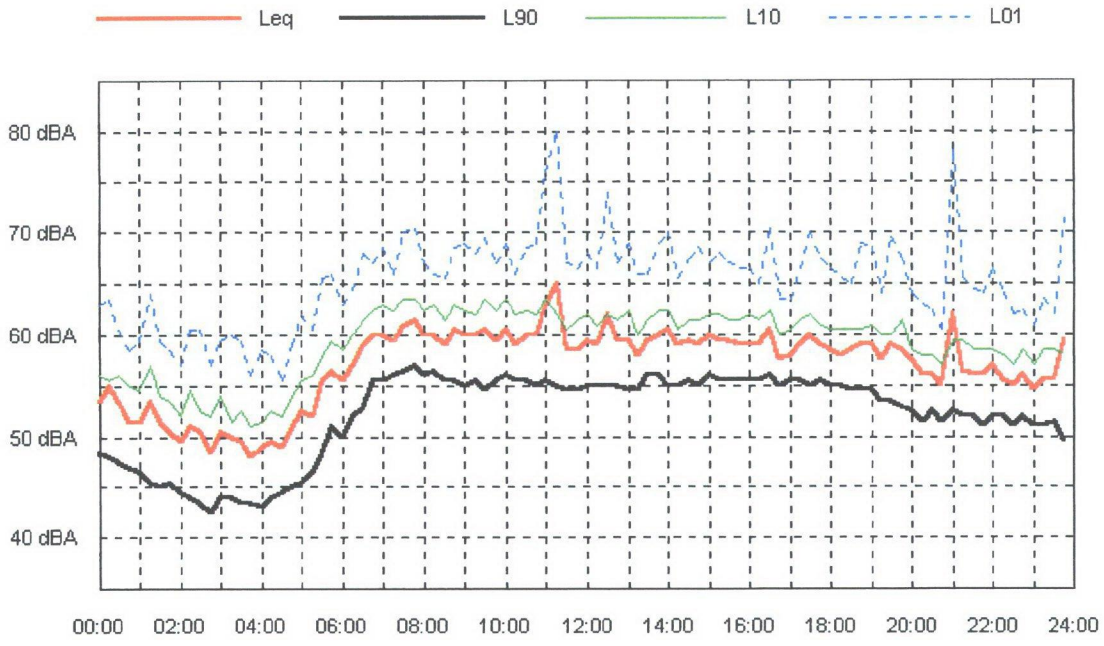

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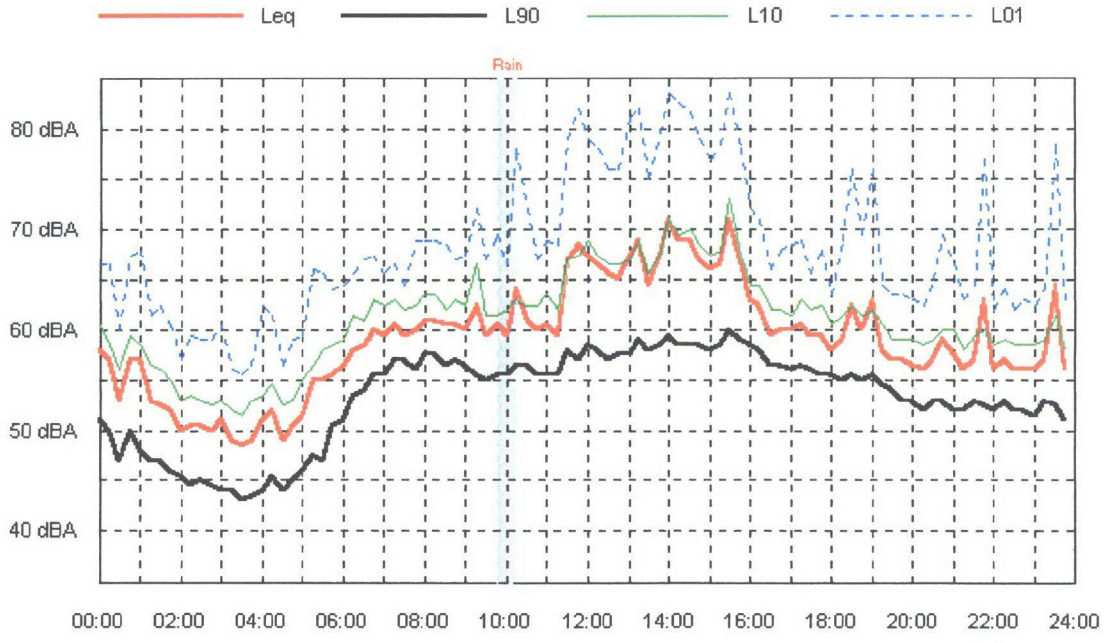

Location: 175 Bourke Street

Data shaded: Rain

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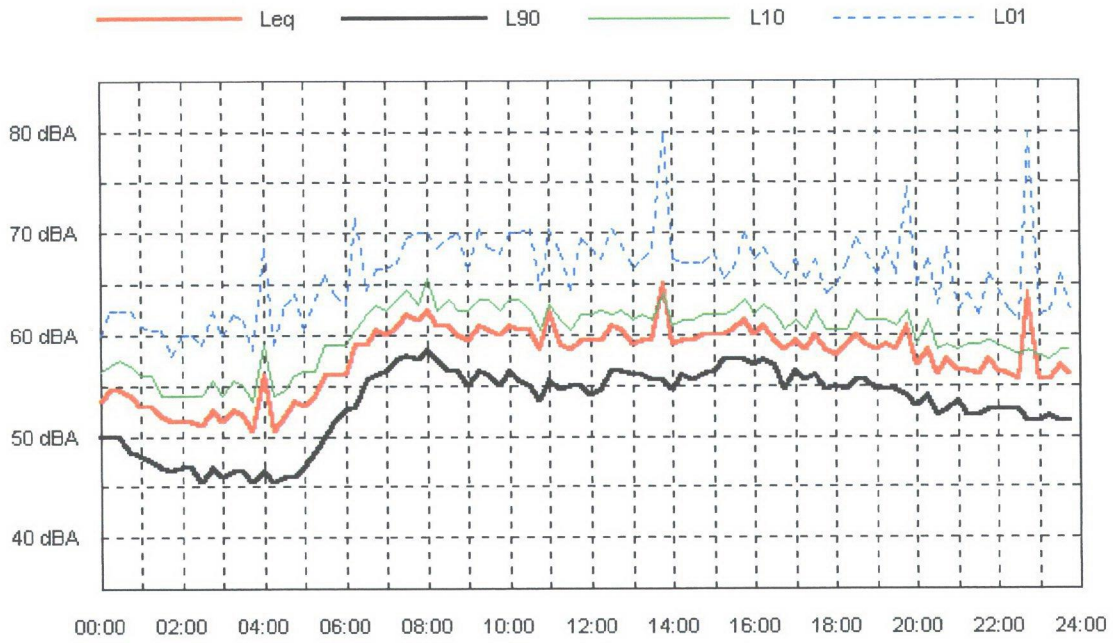

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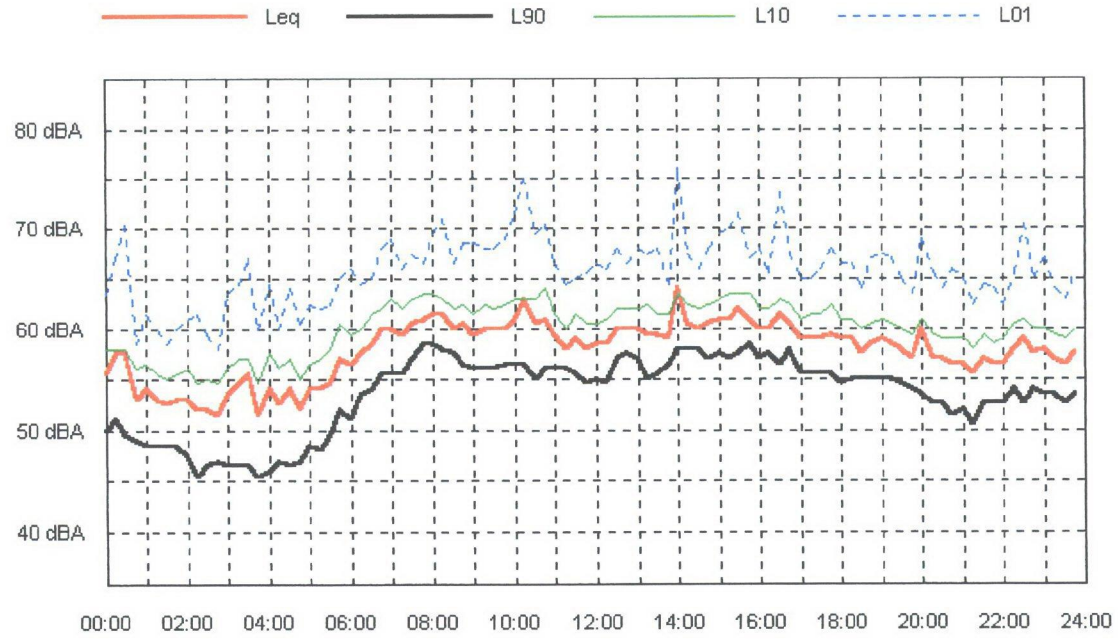

Location: 175 Bourke Street

Data shaded: Rain

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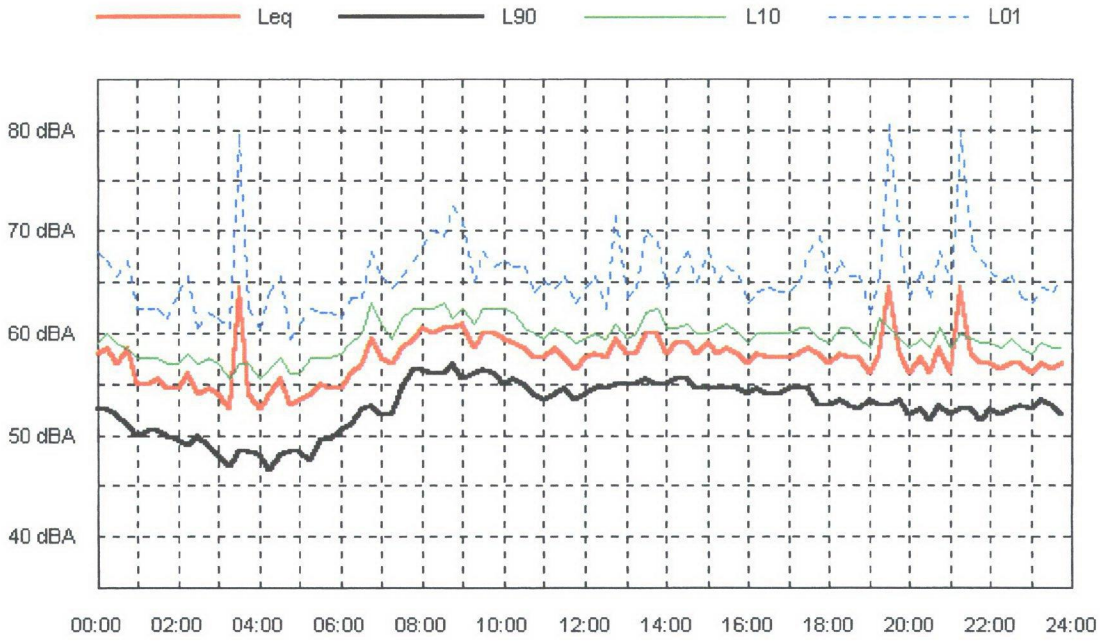

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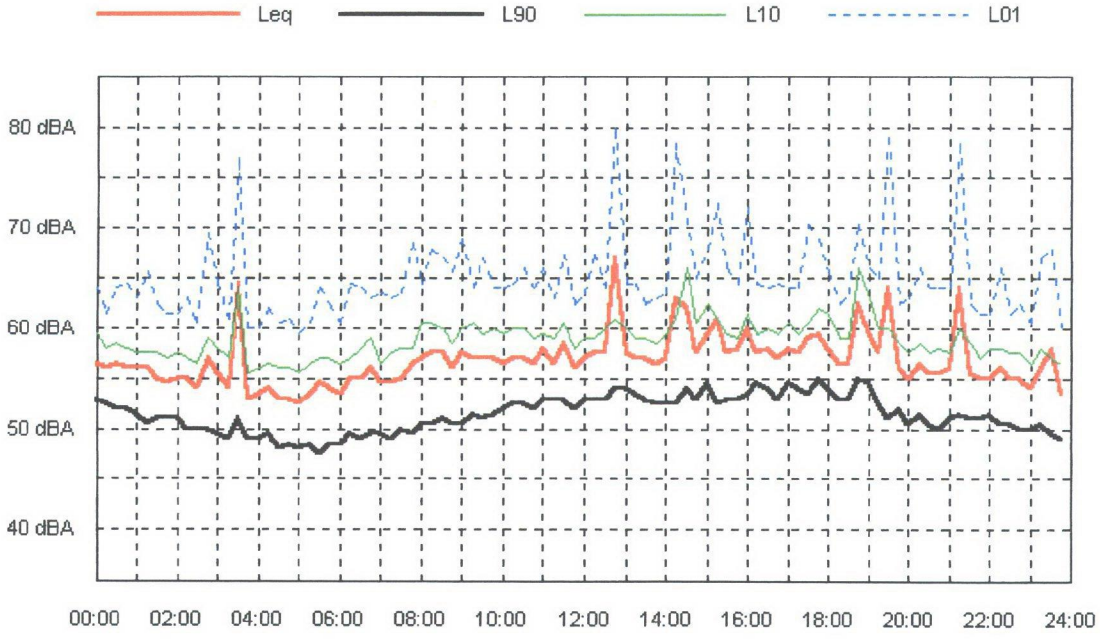

Location: 175 Bourke Street

Data shaded: Rain

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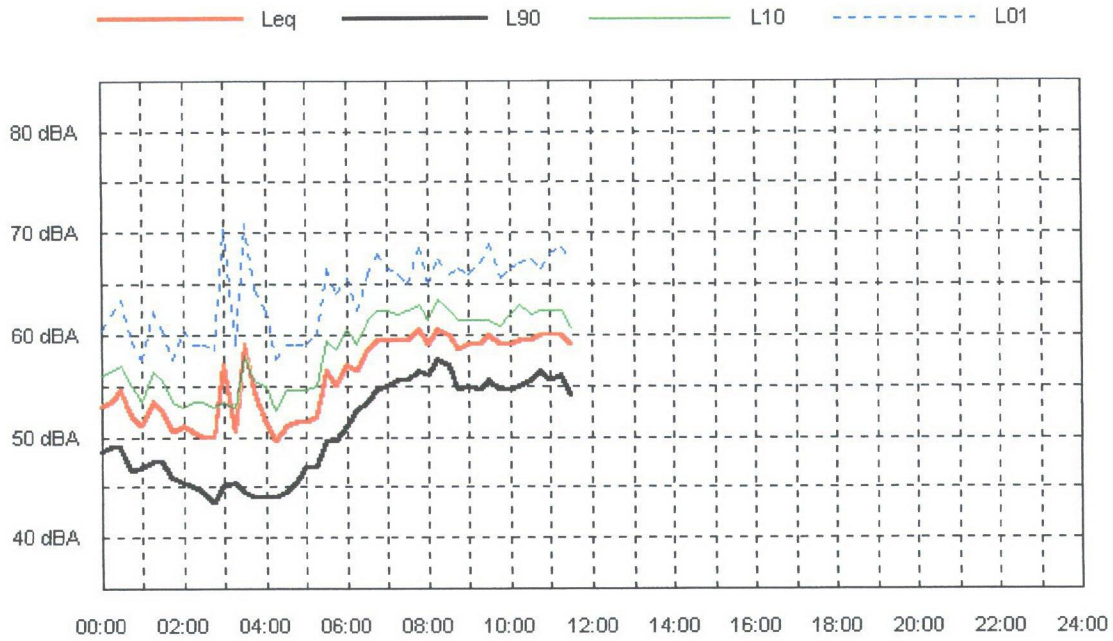

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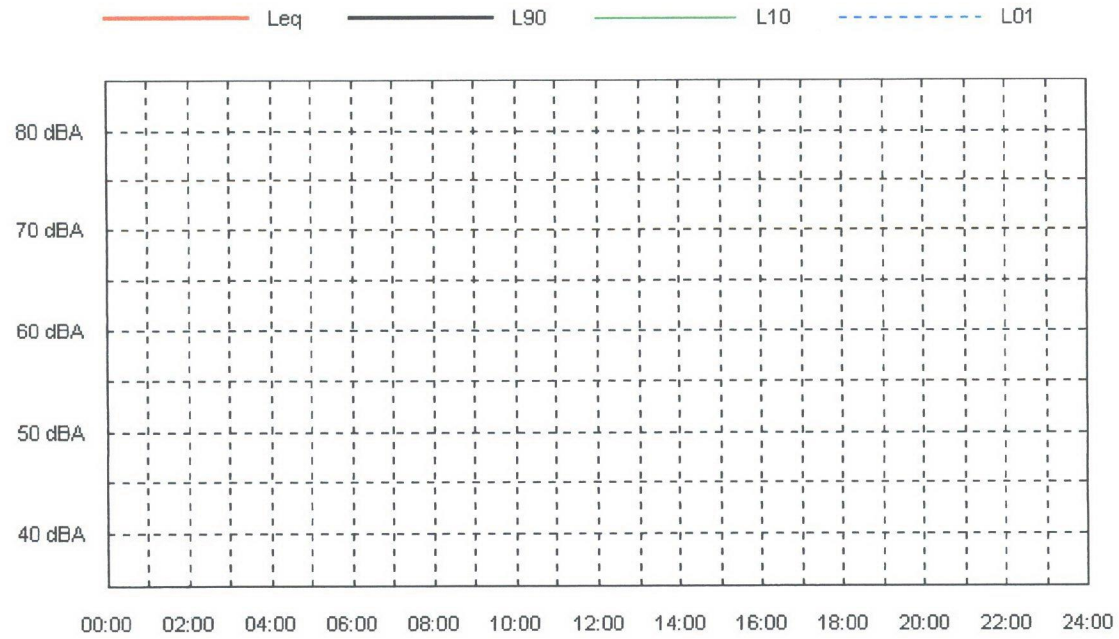
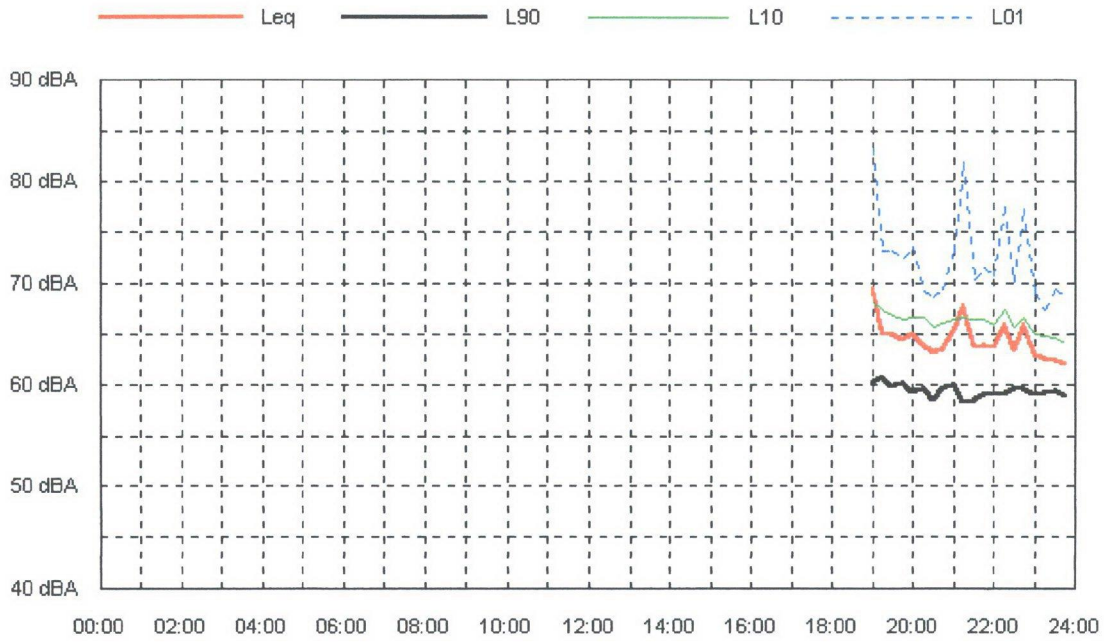


Location: Unit 2, 169 Bourke Street

Wed 28 Aug 02



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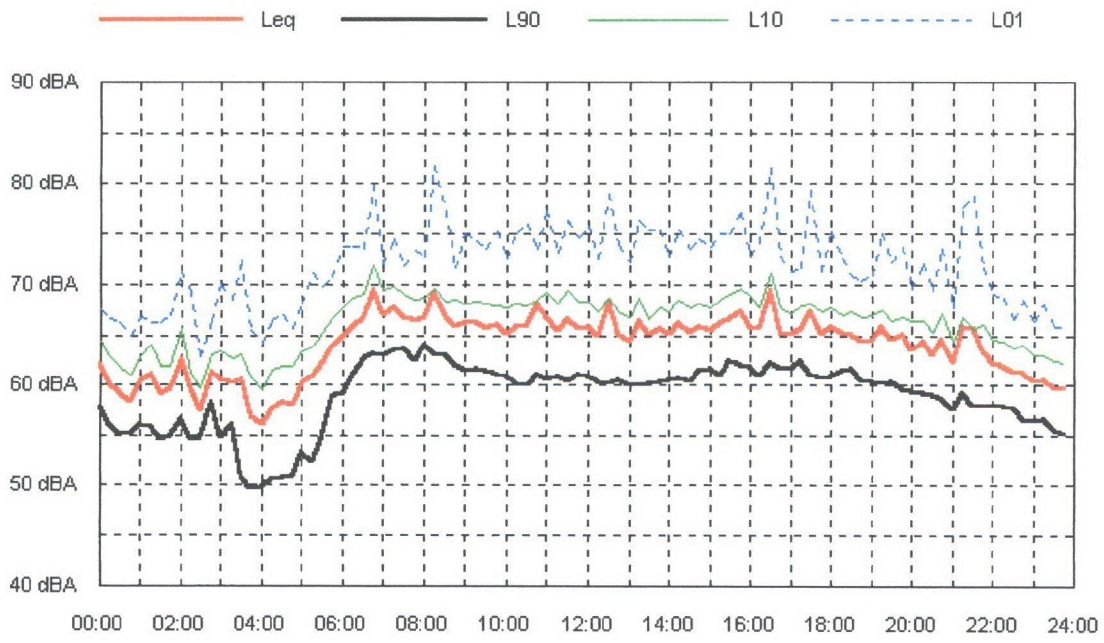

Location: Unit 2, 169 Bourke Street

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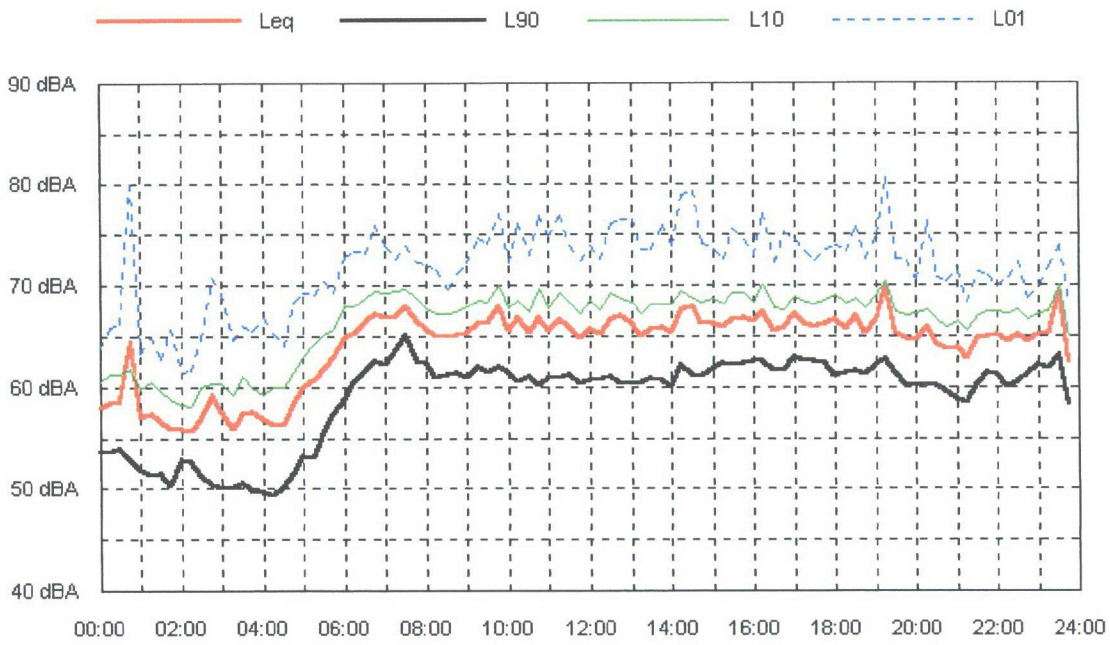
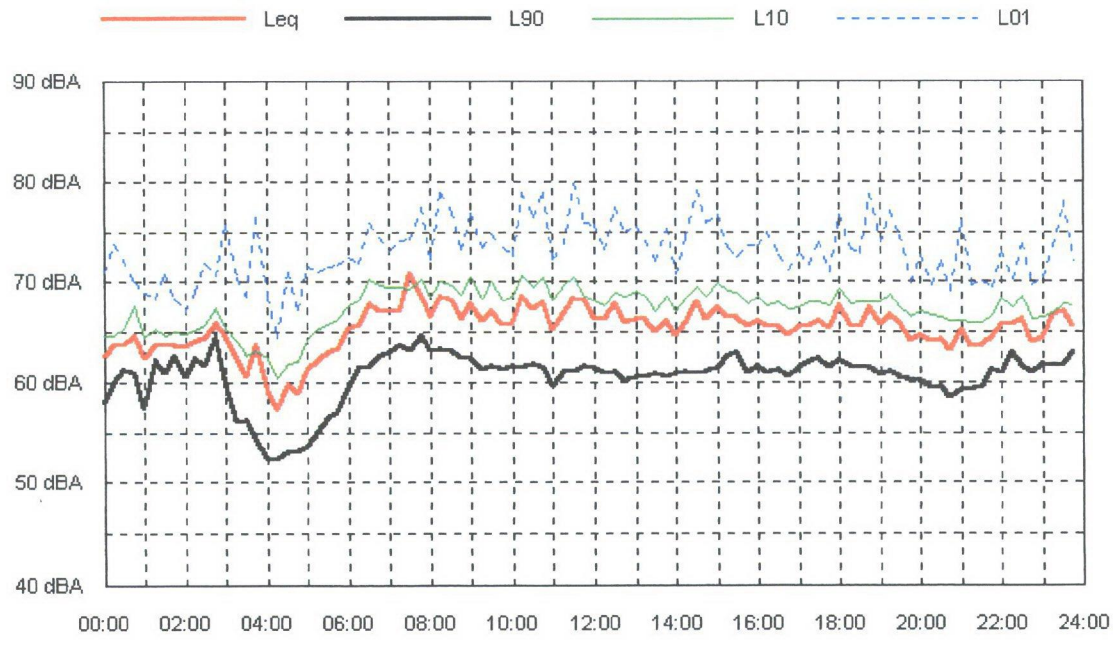
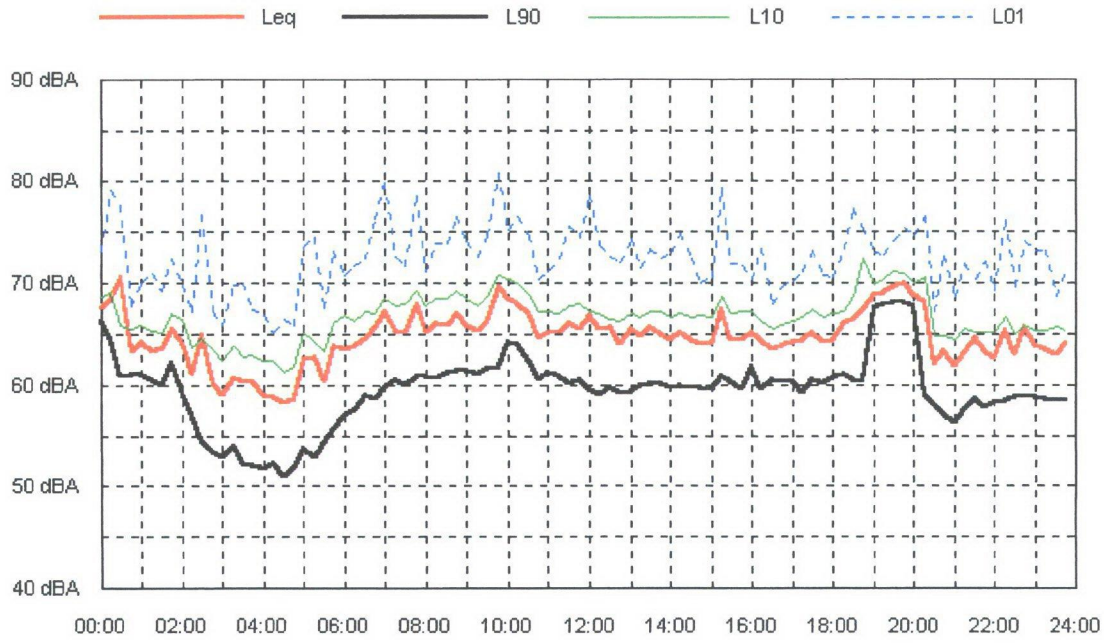


Sat 31 Aug 02



Location: Unit 2, 169 Bourke Street

Sun 01 Sep 02



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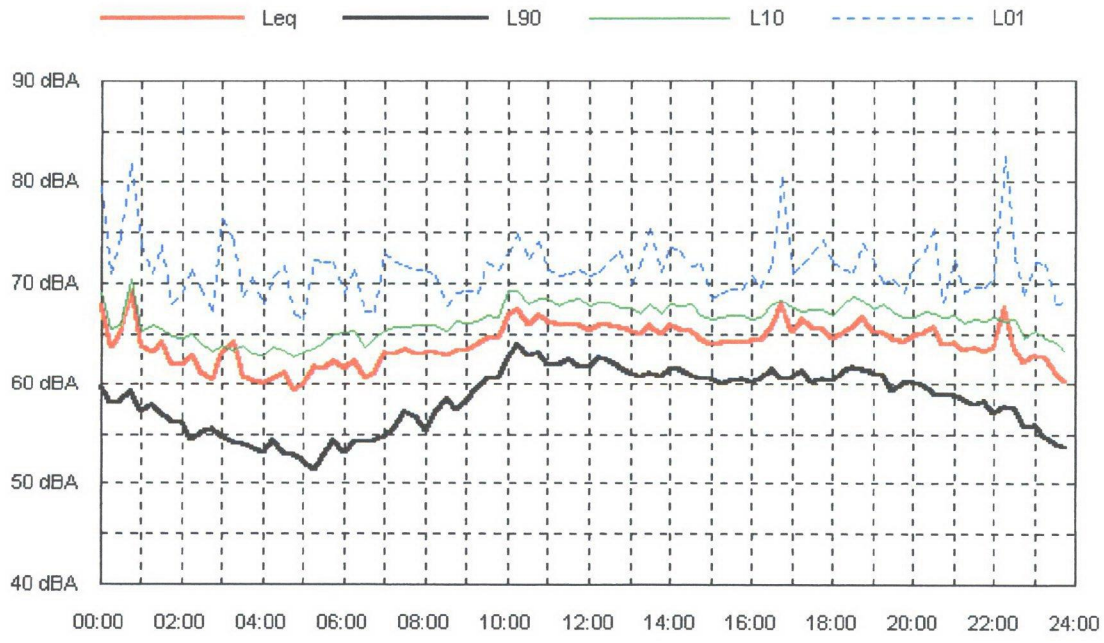
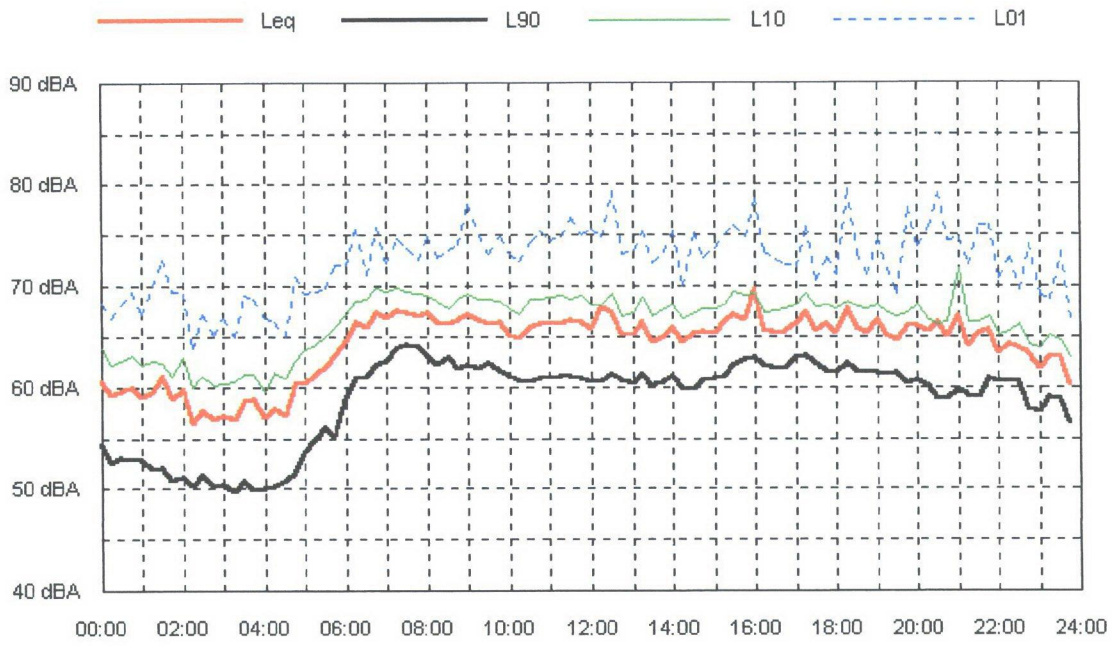


Location: Unit 2, 169 Bourke Street

Tue 03 Sep 02



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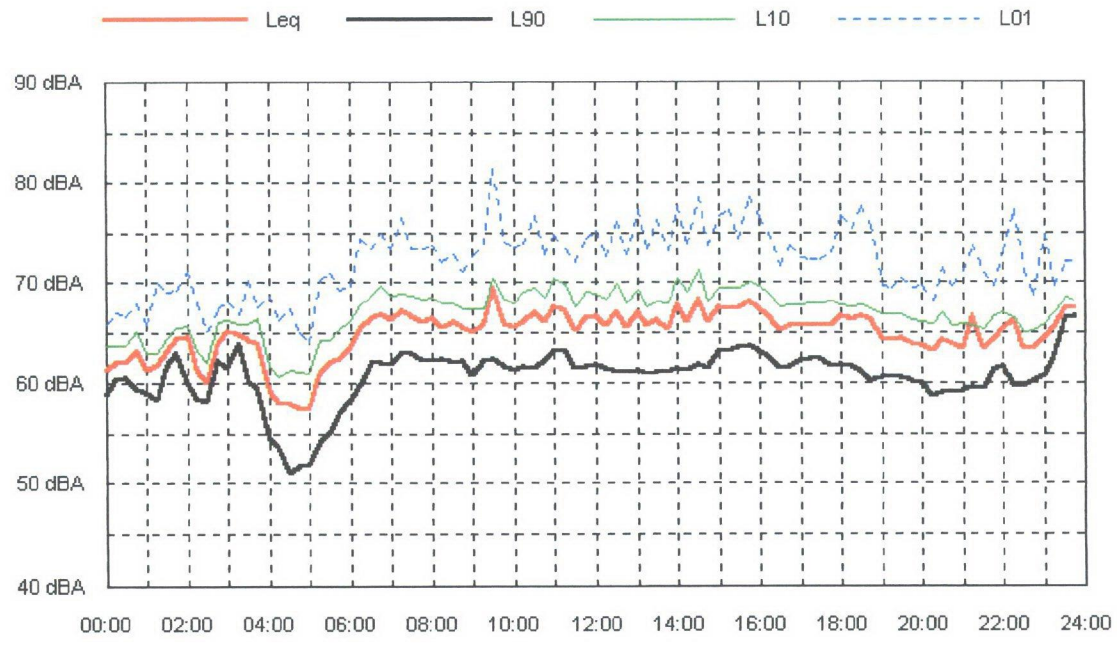
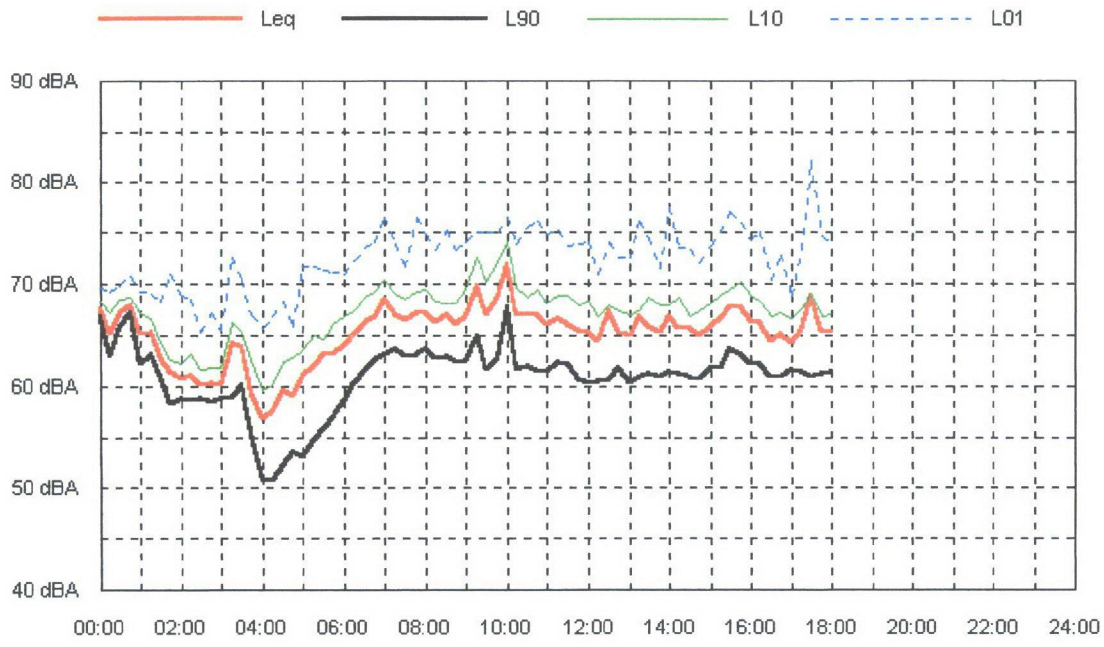


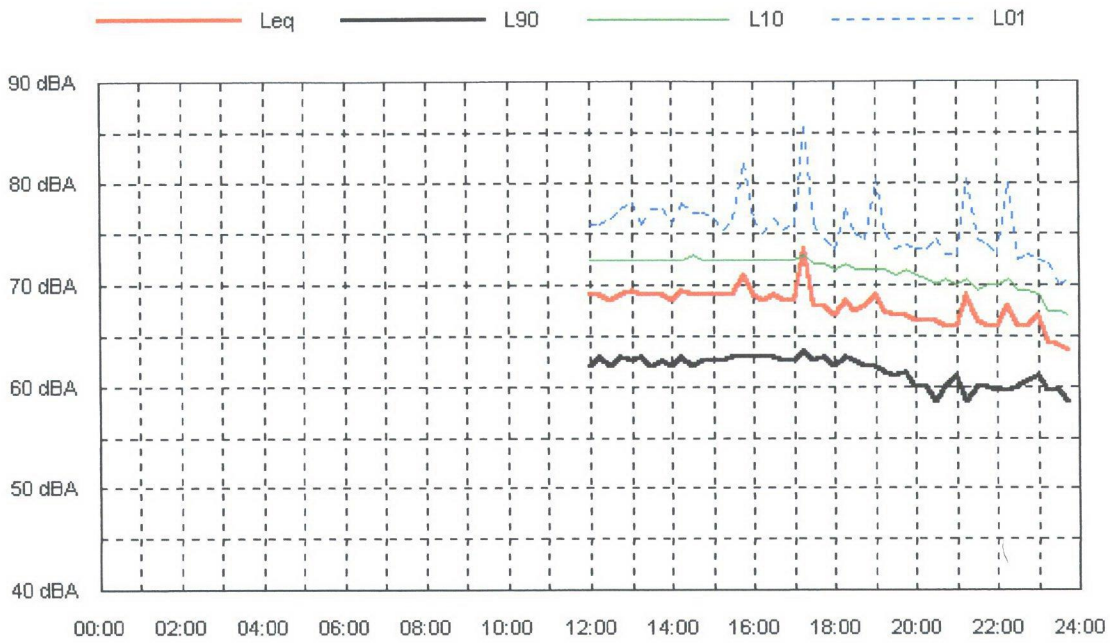
Location: Unit 2, 169 Bourke Street

Thu 05 Sep 02

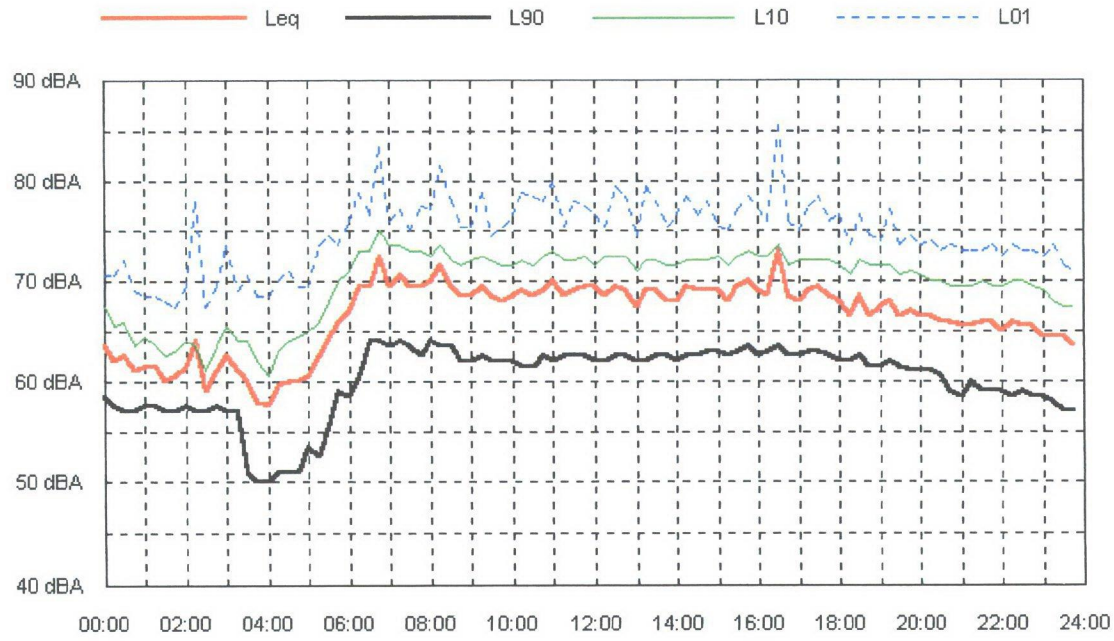


Location: Unit 19, Level 4, Diplomat Building

Tue 27 Aug 02



Wed 28 Aug 02



Location: Unit 19, Level 4, Diplomat Building

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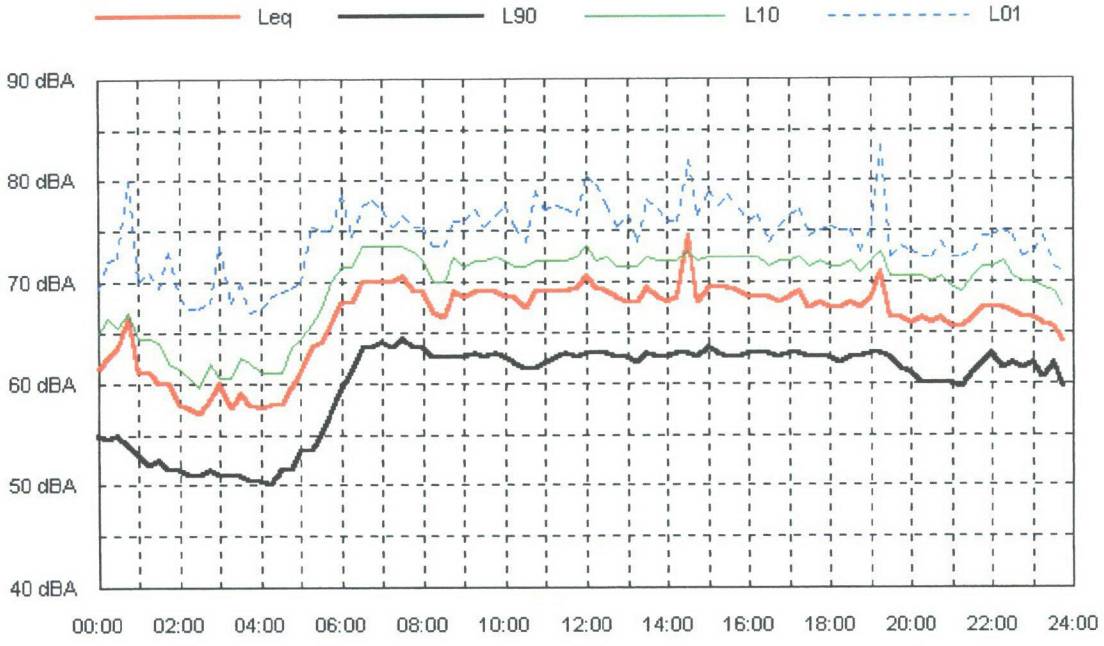

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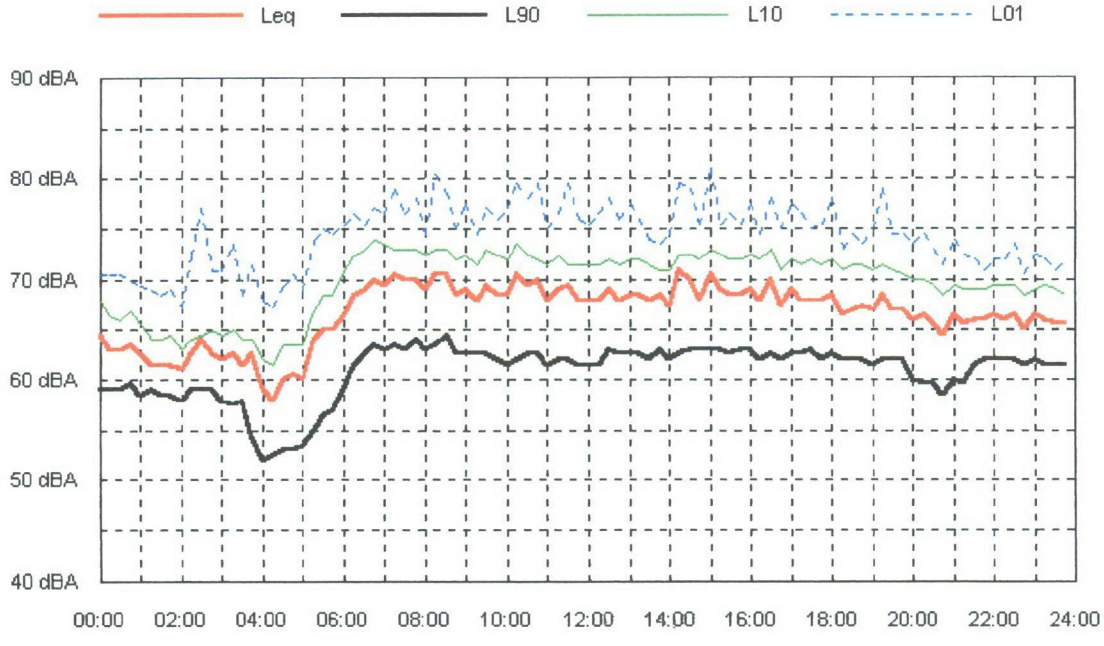
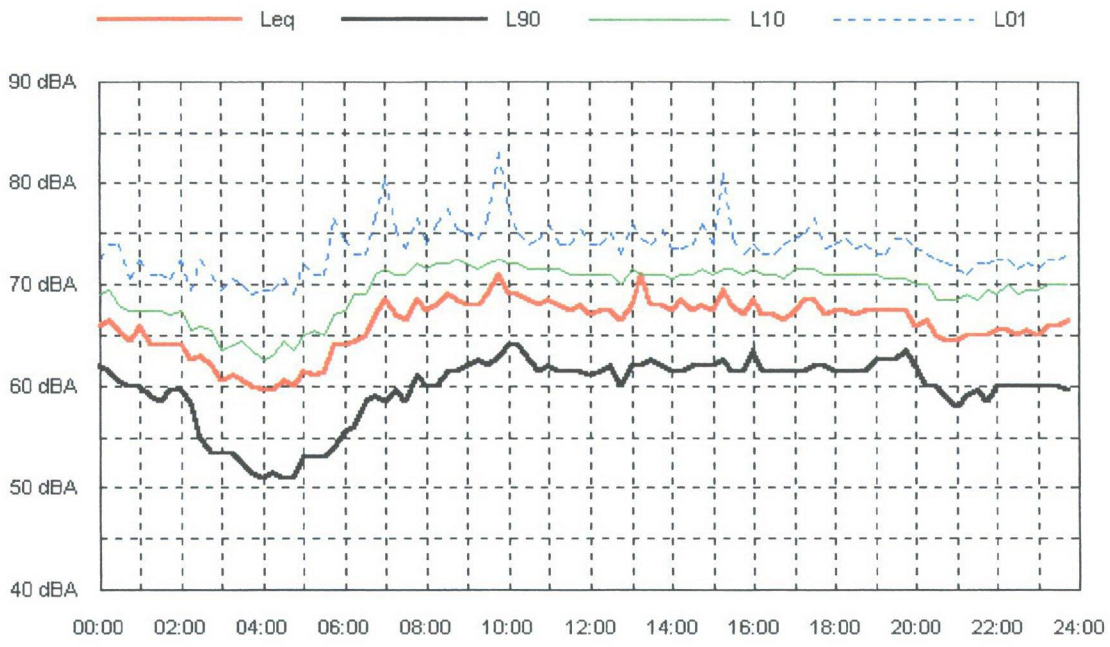


Location: Unit 19, Level 4, Diplomat Building

Sat 31 Aug 02



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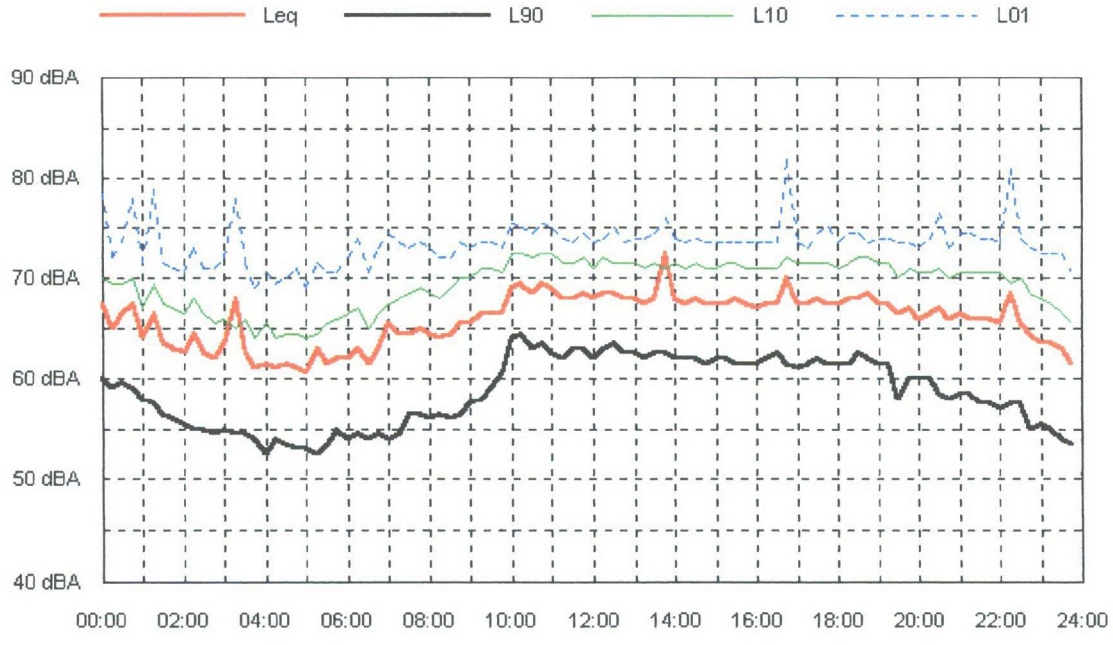
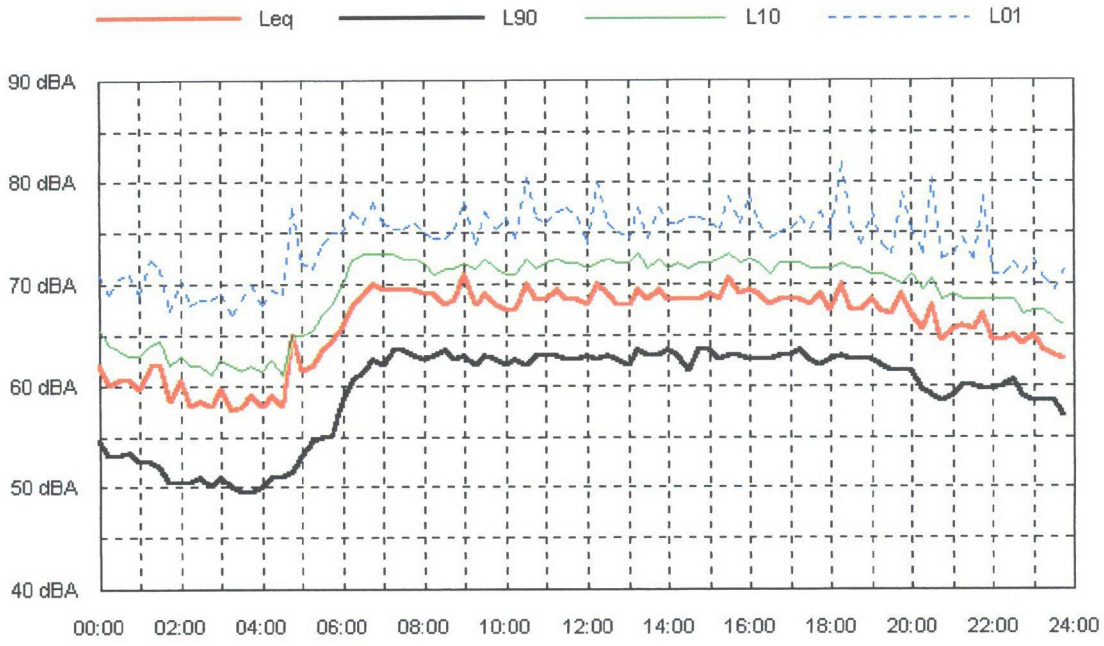


Location: Unit 19, Level 4, Diplomat Building

Mon 02 Sep 02



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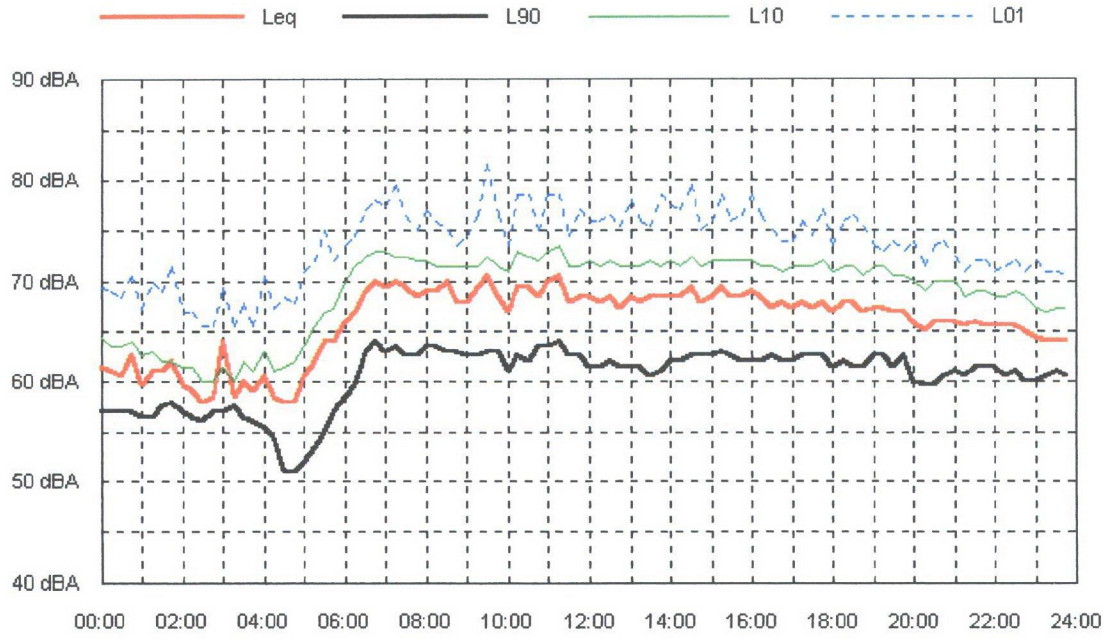
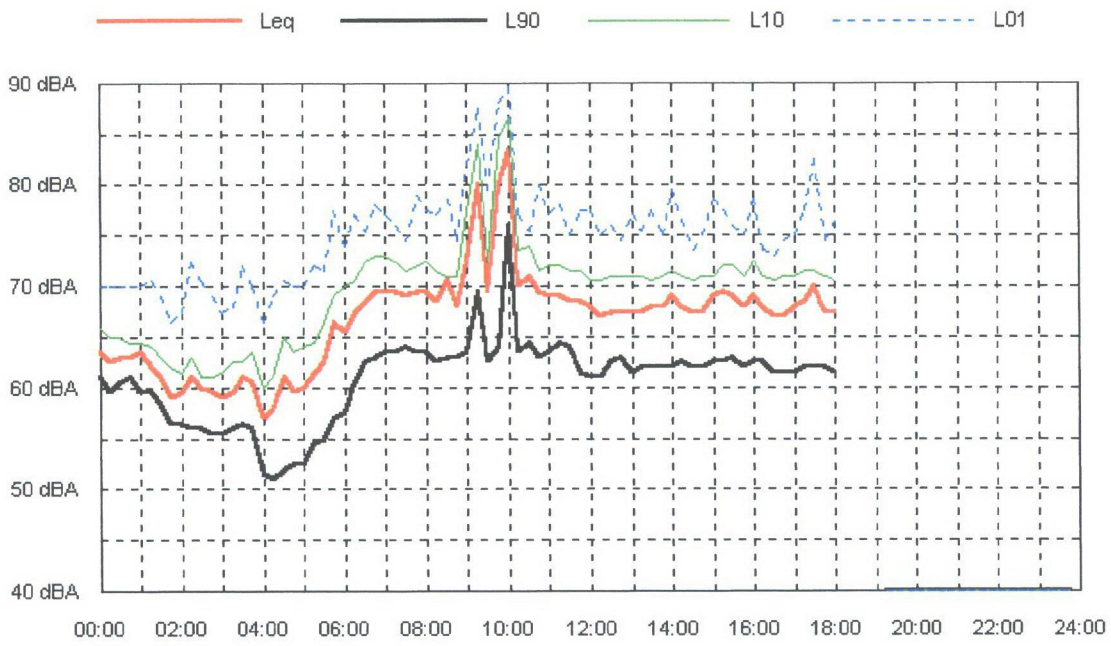


Location: Unit 19, Level 4, Diplomat Building

Wed 04 Sep 02



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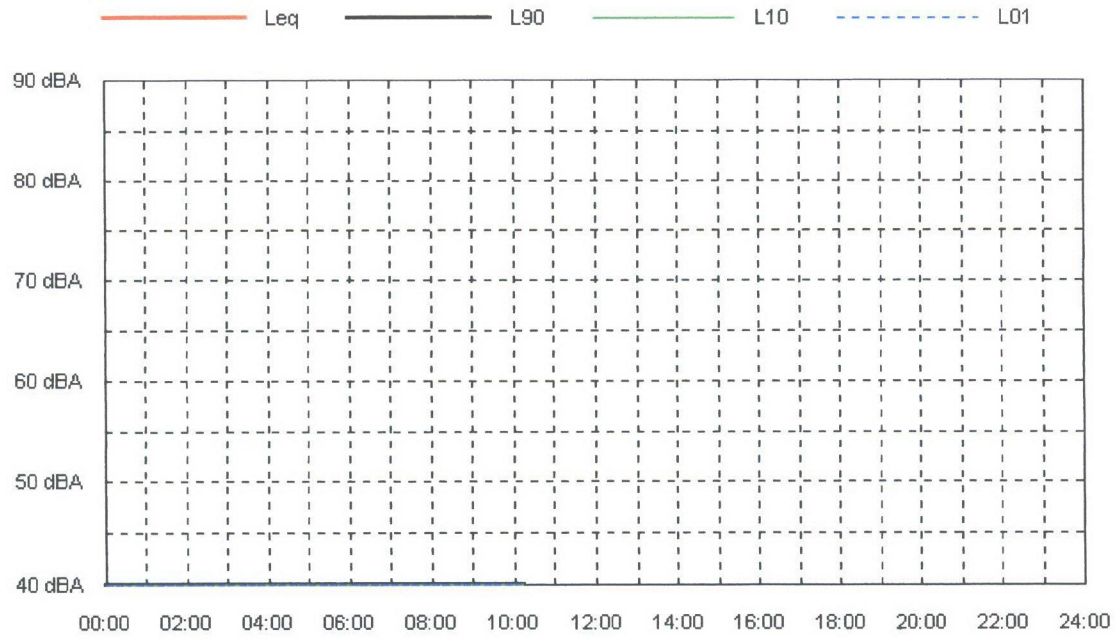

Appendix L

Comparison of Approved and Modified Buildings

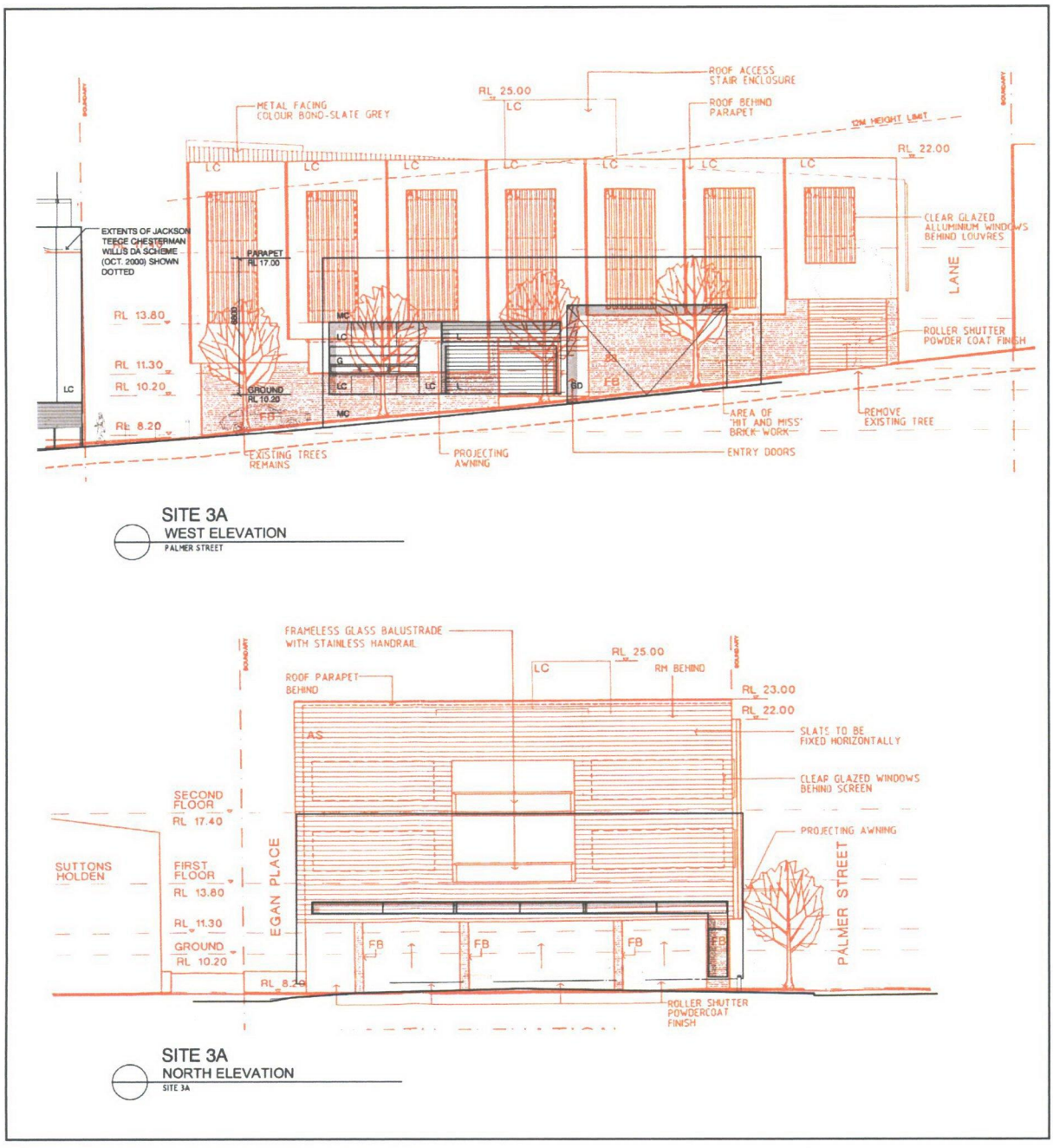

Figure L.1 **Site 3A North and West Elevation**

Approved Tunnel Control Centre shown in red. Modified Tunnel Control Centre shown in black.

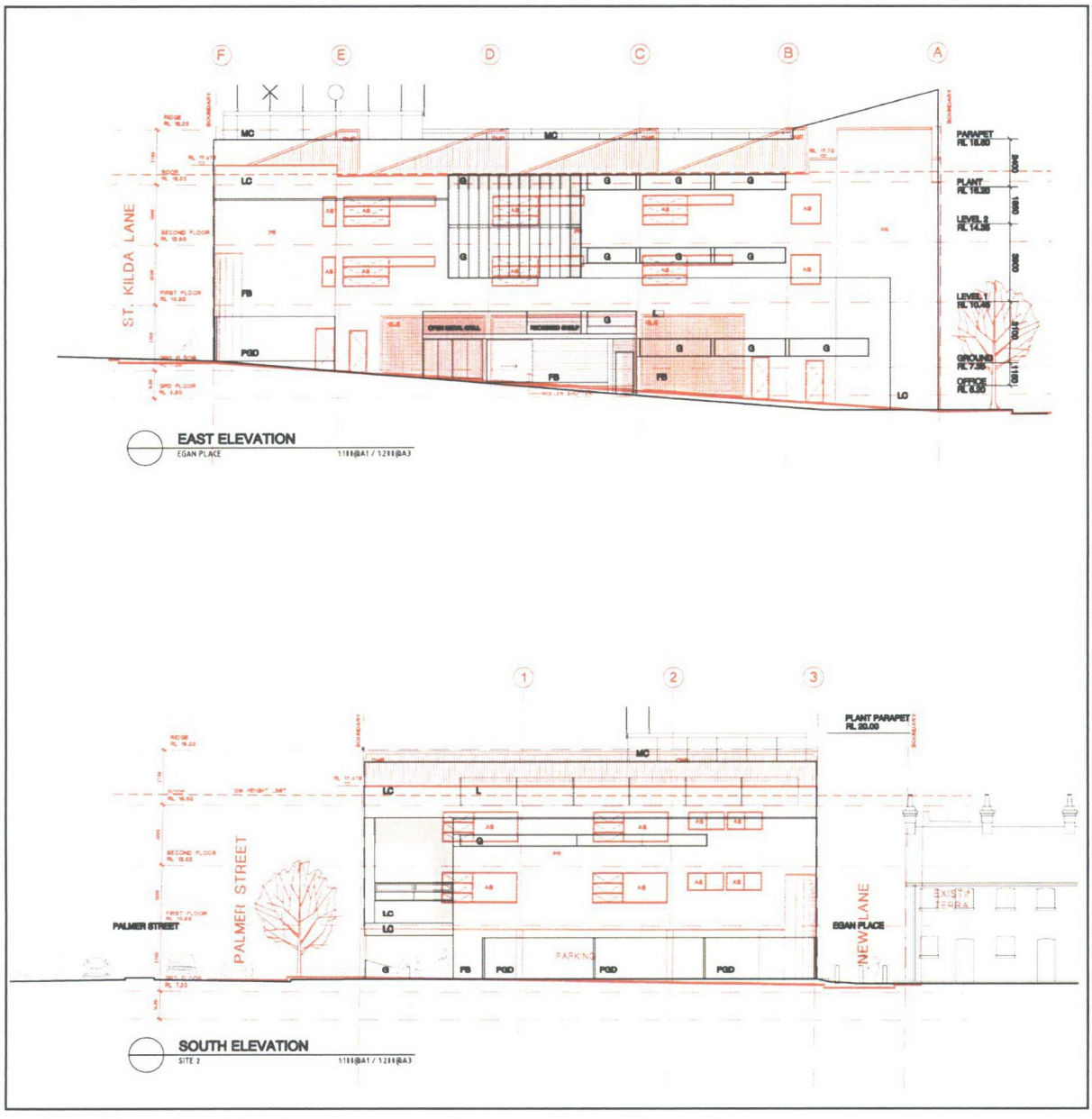

Figure L.2 **Site 3A East and South Elevation**

Approved Tunnel Control Centre shown in red. Modified Tunnel Control Centre shown in black.

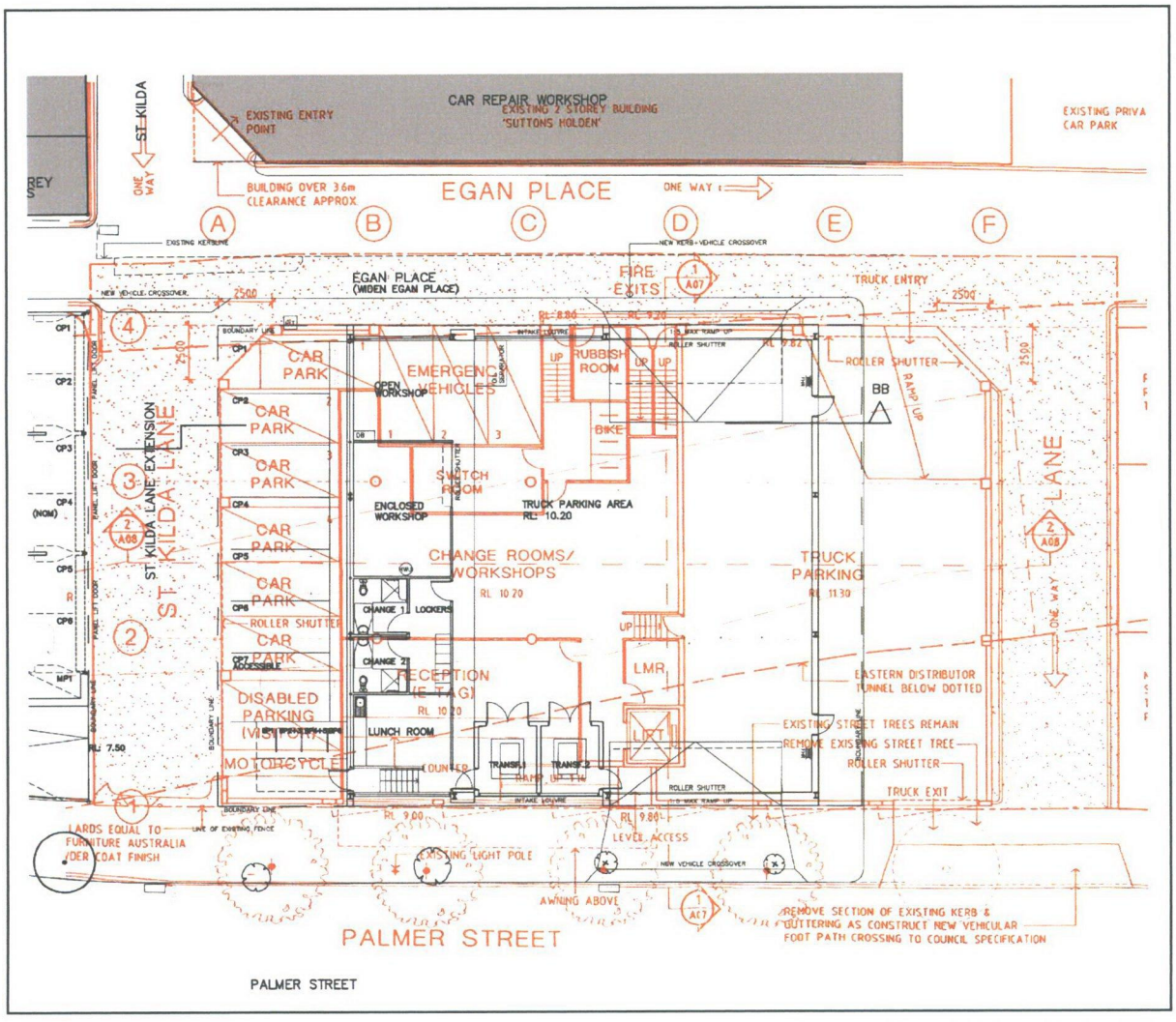

Figure L.3 **Site 3A Ground Floor Plan**

Approved Tunnel Control Centre shown in red. Modified Tunnel Control Centre shown in black.

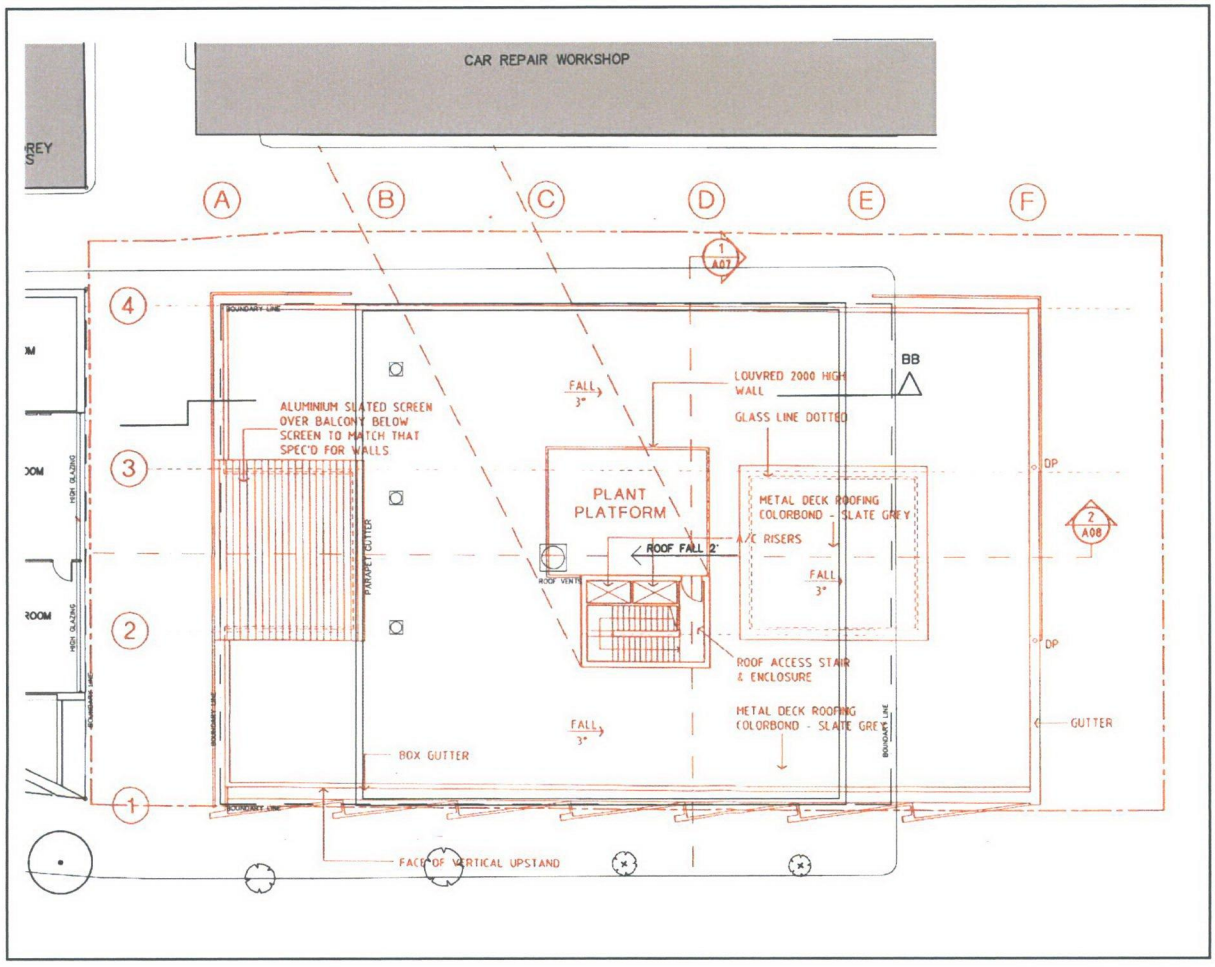

Figure L.4 **Site 3a Roof Plan**

Approved Tunnel Control Centre shown in red. Modified Tunnel Control Centre shown in black.

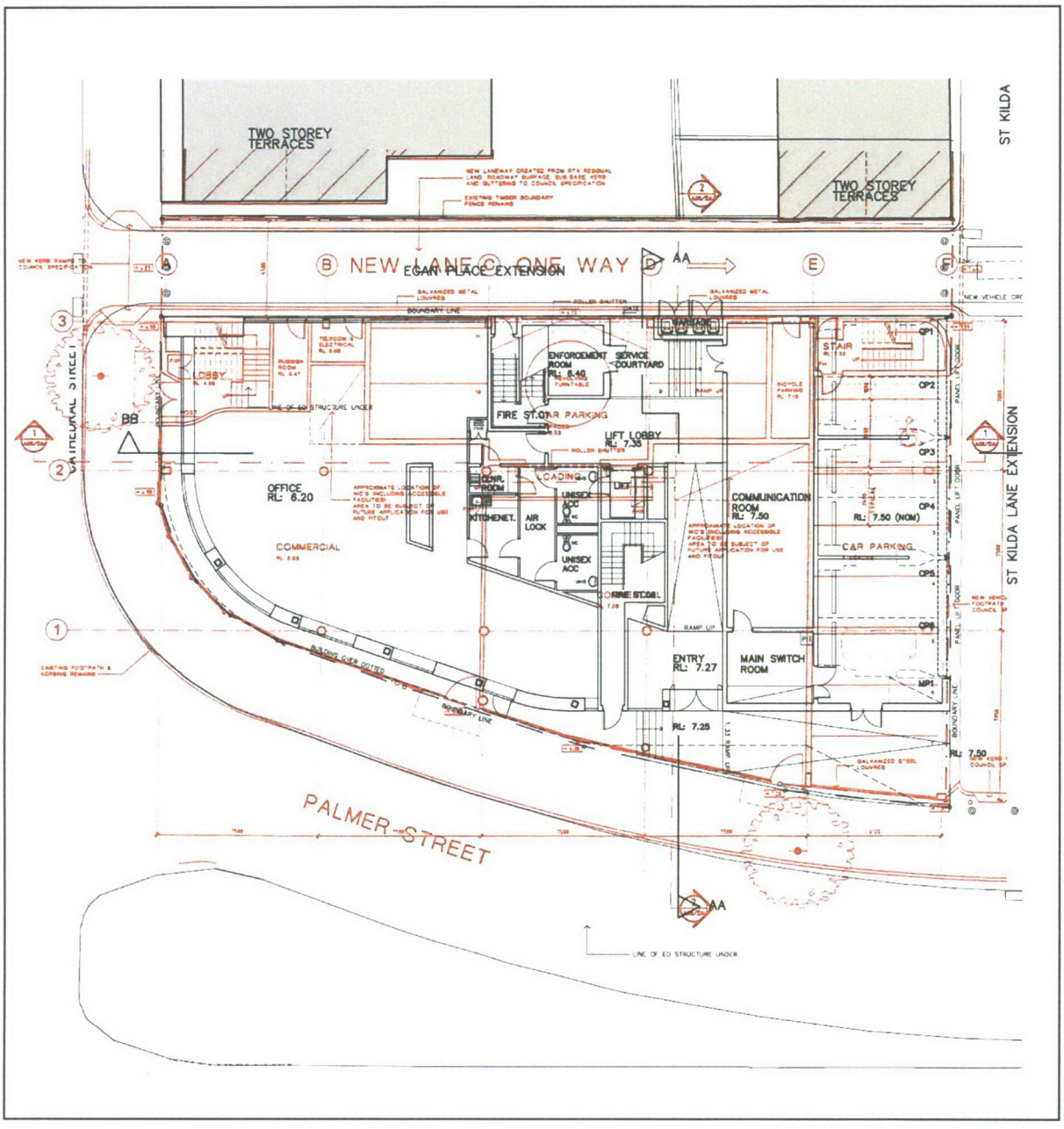

Figure L.5 **Ground Foor Plan**

Part 4 DA Approved Building shown in red. Modified Tunnel Control Centre shown in black.

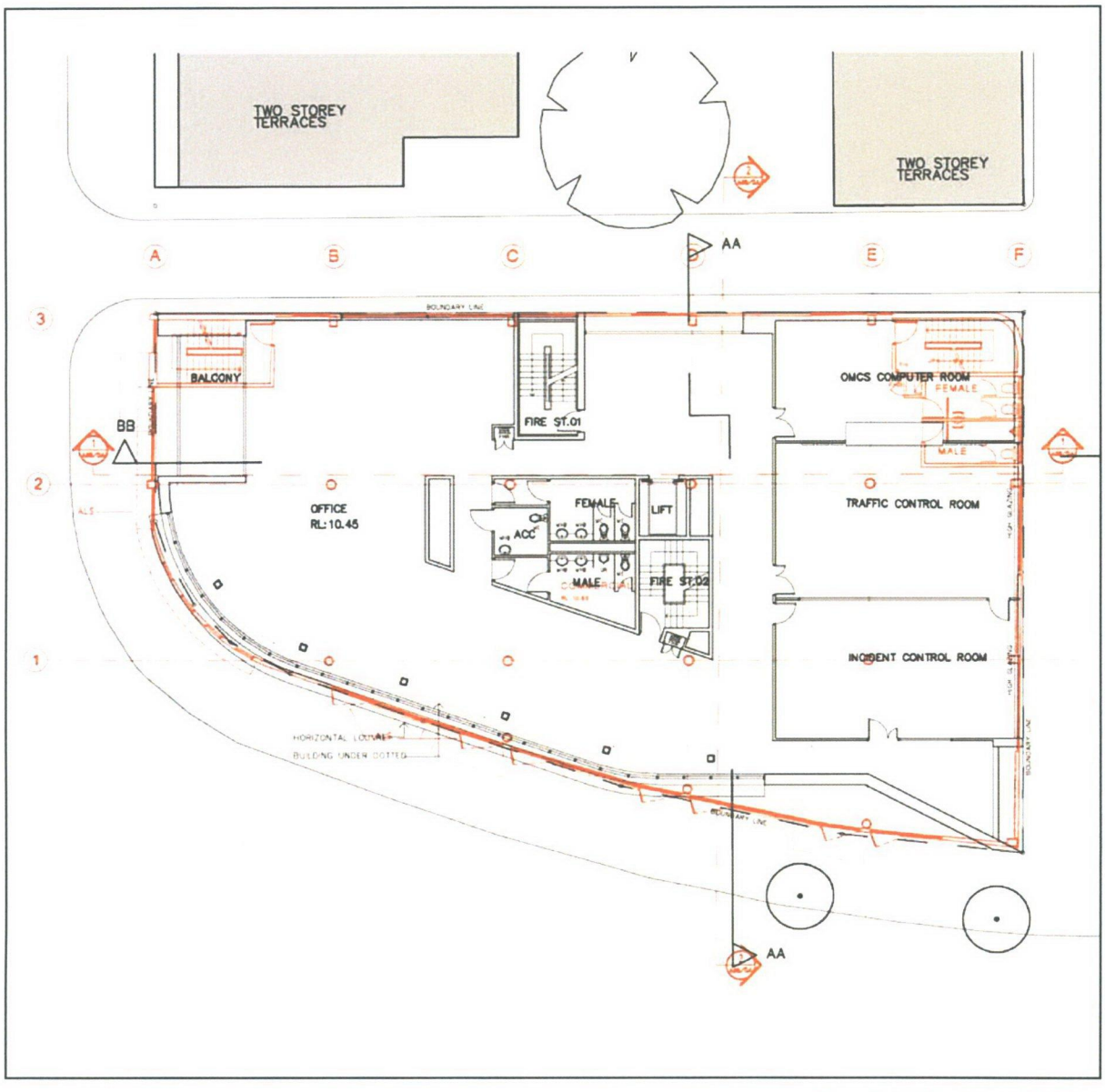

Figure L.6 **Site 2 Level 1 Plan**

Part 4 DA Approved Building shown in red. Modified Tunnel Control Centre shown in black.

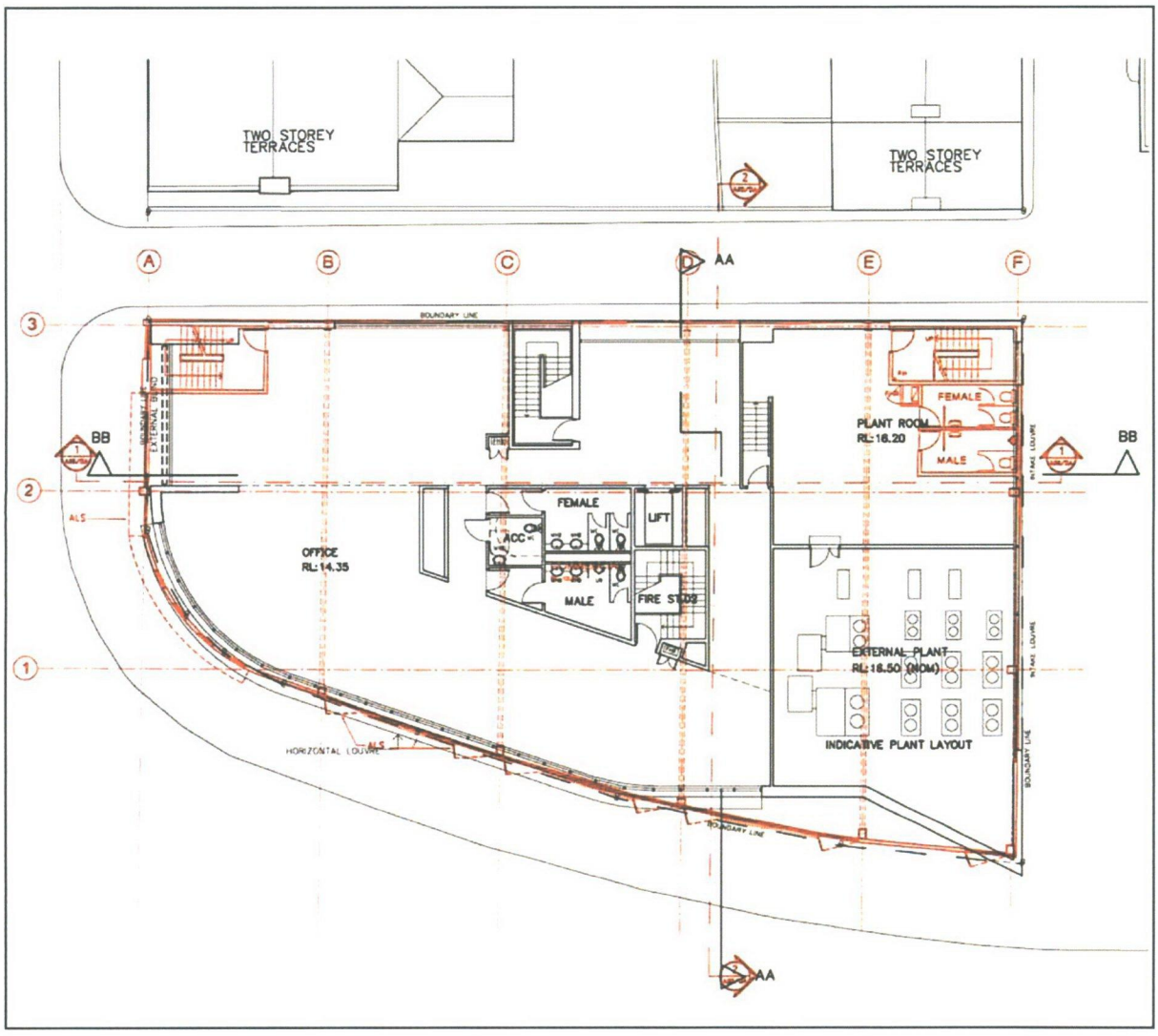

Figure L.7 **Site 2 Level 2 Plan**

Part 4 DA Approved Building shown in red. Modified Tunnel Control Centre shown in black.

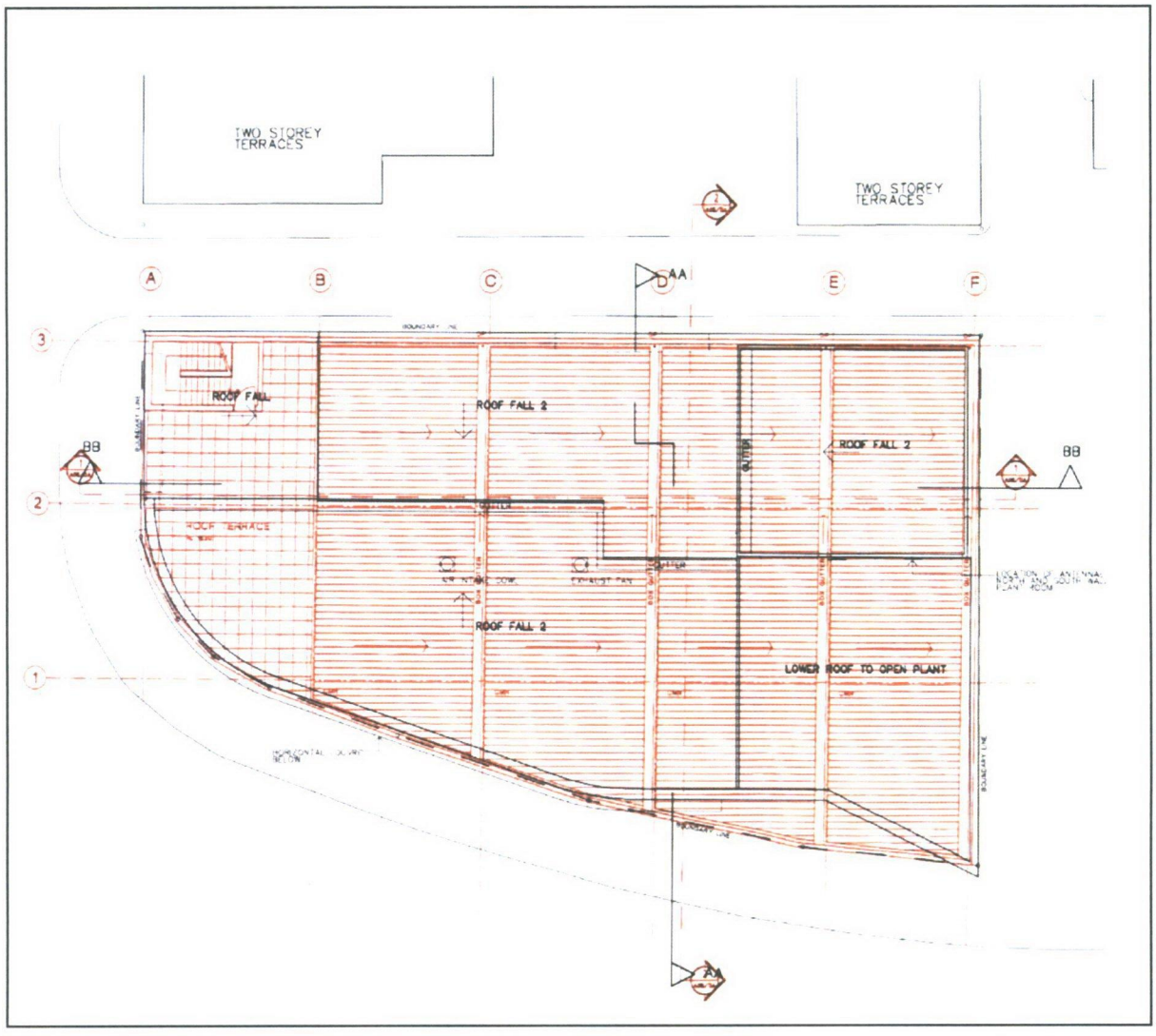

Figure L.8 **Site 2 Roof Plan**

Part 4 DA Approved Building shown in red. Modified Tunnel Control Centre shown in black.