BYRNES & ASSOCIATES PTY LTD

ARCHITECTURE
PLANNING AND
URBAN DESIGN

VEHICLE AND PEDESTRIAN SAFETY PROJECT

AT

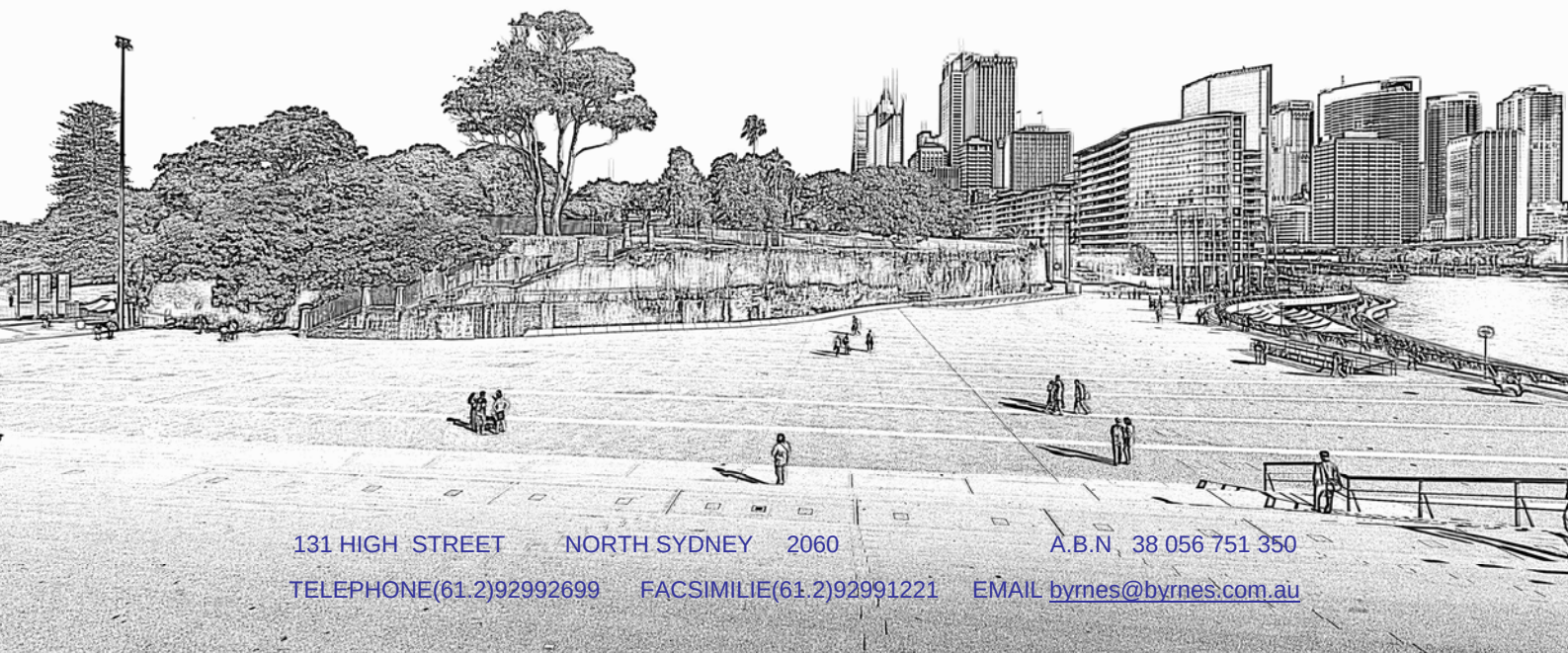
THE SYDNEY OPERA HOUSE

ENVIRONMENTAL ASSESSMENT

Prepared on behalf of

The Sydney Opera House Trust

July 2010



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List of Abbreviations

CMP 2003	Conservation Management Plan 2003 ("*Sydney Opera House: A Revised Plan for the Conservation of the Sydney Opera House and its Site*" (3rd edition 2003) by James Semple Kerr
DEWHA	Australian Government Department of Environment, Water, Heritage and the Arts
DGEARs	Director Generals Environmental Assessment Requirements
EA	Environmental Assessment
EPA Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environmental Protection and Biodiversity Conservation Act (CTH) 1999
Recap	Real Estate Capital Partners
SEPP	State Environmental Planning Policy
VAPS	Vehicle and Pedestrian Safety

Certification of Environmental Assessment

Proponent, Site and Project Details

Applicant:	Sydney Opera House Trust Sydney Opera House GPO Box 4274 Sydney NSW 20001
Site:	The Sydney Opera House Bennelong Point *Lot 5 in Deposited Plan 775888* *Lot 4 in Deposited Plan 787933* Lot 101 of DP828892
Proposal:	Vehicle and Pedestrian Safety Project As described in this report and including new underground loading dock, access ramp and associated changes to the Forecourt and Interior of The Sydney Opera House

Authorship

This Summary report has been prepared by

Terence P Byrnes Principal Byrnes and Associates 131 High Street North Sydney ASTC Arch (NSW), MCP Hons (Yale), FRAIA, FPIA	assisted by Natasha Harras Senior Consultant Planner BA; Grad Dip URP; MPIA

Declaration

We certify that the contents of the Environmental Assessment to the best of our knowledge, has been prepared in accordance with the requirements of Part 3A of the Environmental Planning and Assessment Act 1979 and that to the best of our knowledge the information contained in this report is neither false nor misleading.

Terence P Byrnes
21/07/2010

Natasha Harras
21/07/2010

Executive Summary

Overview of the Proposal

The proposal relates to construction of an underground loading dock to be located below the Sydney Opera House building and Forecourt. A ramped access tunnel to the dock would be located near the existing Macquarie Street entrance and adjacent to the cliff face identified as the Tarpeian Wall at the southern side of the Forecourt and the existing sunken kerbed roadway across the Forecourt will be made level with the surrounding Forecourt paving. Otherwise the majority of the development will be located underground with only limited minor changes visible above ground or within the interior of the Opera House itself. The constituent parts of the proposal are summarised under Section 3.1 and detailed in Section 3.4.

Prompted by a need for improvement to pedestrian safety within the Sydney Opera House Forecourt, and the need to rationalise the back-of-house servicing by commercial vehicles of all kinds, the design response under the proposal is simple and direct. Access to the loading area has been located to the extreme south of the forecourt and diverted underground. What flows from that is a measurable improvement to pedestrian amenity within the balance of the Forecourt and an opportunity to better coordinate related ancillary aspects, such as the location and design of the gatehouse. Thereby sustaining a guiding principle of the building's designer, Jørn Utzon, to avoid any sense of clutter through the accretion of any future changes. Beneath the Forecourt as anticipated by him to be a logical location for additional back-of-house services and other essential infrastructure.

In those respects the proposal can be seen as a logical response to fundamental operational needs provided in a manner generally anticipated to best avoid intrusion on the view lines of the Opera House and its primary approach by pedestrians.

The proposal is preceded by and reliant upon a separate application for diversion of the Bennelong Stormwater Drain which currently traverses the areas for the proposed development. At the time of writing that application is under consideration by the Minister for Planning.

Consultation

As documented in Chapter 5, the form of consultation has followed the previous protocols that have been adopted: they having proven to be an effective means of communication and for eliciting opportunities response from key stakeholders in the community.

No specific objections have been raised at this stage and all requests for additional information or assessment have been answered through the consultation process or through the information provided by this assessment report.

Potential neighbour concerns have been anticipated and along with the safeguards advanced as part of the proposal in Chapter 7. Primary concerns are likely to be the impacts of the disruption due to the construction process. The source of any impacts is identified in the Environmental Impact Assessment chapter along with specified details of management control:

Environmental Impact Assessment

The proposal is designed to meet the multiple expectations that arise from a very wide array of documented controls that have been identified in Section 4. However, as an item of World Heritage significance, the high level of scrutiny of any proposed changes is no less than might be expected and has been rigorously applied to the subject development proposal.

In this assessment, the outcome of the proposal has been measured against the primary sources of expectations and control: From international and national heritage planning obligations to the requirements to be addressed under the State Legislature, as well as site specific considerations which include those of Utzon himself .

Having established a context in which the proposed changes will operate, in terms of both the measures under the controls and the physical restraints, the detailed assessments in Chapter 6 of the assessment are summarised as follows:

Heritage

The Heritage Impact Statement at Appendix C makes a detailed assessment of the impacts of the proposal in terms of World Heritage Values, National Heritage Values and State Heritage Values and it is found that the proposal will retain and potentially enhance those values by improving the functionality of the Sydney Opera House and improving pedestrians' experience on and off the Forecourt. An Archaeological Management Plan and Archaeological Impact Assessment at Annexure D finds that there is some potential for Archaeological Impacts given the varied history of the site and that these impacts can be appropriately managed though appropriate testing, monitoring and recording. An Aboriginal Cultural Values Assessment at Appendix E identifies Aboriginal cultural values associated with the place and an assessment of the impacts of the proposal on those values and makes a number of recommendations for the mitigation of both physical impacts and for the ongoing management of broader Aboriginal cultural values associated with the Sydney Opera House. The proposal is also assessed for compliance with the Conservation Management Plan – 3rd Edition and shown to be entirely consistent with the relevant policies of that document.

Urban Design and Visual Impacts

The detailed Architect's Statement is enclosed as Appendix B and the findings are summarised under Section 6.2 of the Assessment. Fundamental to the proposal is the determination that it conforms to the Utzon Design Principles the details of which are fully tabulated in the Architect's Statement. Visual impacts of the entry ramp above ground have been kept to a minimum by locating it as close as possible

to the Tarpeian Wall and to the Macquarie Street boundary, as well as by minimising the height of the pavement upstand and incorporating materials to match existing Forecourt materials and finishes. The visual impact of the structure is more than off-set by the improved visual impacts arising form the removal of heavy service vehicles from the Forecourt which currently add visual clutter to the site. The visual impacts of all other associated minor changes are also assessed and found to result in a positive impact overall.

Traffic and Vehicular Access

Section 6.3 considers the traffic related issues contained in the Traffic Report at Appendix F under two basic scenarios, firstly the operational traffic impacts and secondly the Construction Traffic Impacts. As no change to the overall use of the Sydney Opera House as a performing arts venue is proposed, vehicle movements will remain unchanged by the proposal and therefore the final operational outcome for traffic will be a net positive impact with existing traffic movements separated from pedestrian areas and more efficient loading capabilities .

The construction traffic impacts anticipated have been identified but precisely how they will be addressed is a management issue that is to be resolved with the appointed contractor and before work commences. Conformity with the voluntary commitments that have been identified should assure that on balance the level of temporary inconvenience to be experienced would be outweighed by the long term improvements that are otherwise a fundamental objective of the whole undertaking.

Noise and Vibration

Section 6.4 similarly divides the impacts of noise between long and short term considerations under the headings of Operational and Construction Noise.

The eventual outcome for noise will be no more than under the existing circumstances. The only change to noise emitters on the site will be the change in traffic noise arising from movement of vehicles down the ramp into the loading dock rather than across the Forecourt. The change is minimal with no net adverse impacts. There will be no changes external to the site that affect the current Macquarie Street operations or number of vehicle movements of either mode of public or private transport.

The measures to mitigate the inevitable construction noise to reduce the level of impact on the surrounding area of the site have been identified and will be detailed under the future Construction Management Plan. They include provisions for noise control; the measures of best practice; the continuous monitoring arrangements; and the means of communication involving any complaints.

Some activities will potentially translate into vibration impacts and those too will be monitored. The scheduling of work will be influenced by the activities on site including performances, restaurants, bars, and functions as well as the greater sensitivities of residential occupation. The management of the construction is intended to comply with the limits specified by the City of Sydney standards and identified in Table 11 of the consultant report prepared by the Acoustic Studio.

Geotechnical and Structural Stability Impacts

The essential examination of all aspects of structural stability arising out of the proposal relies upon an initial geotechnical investigation and satisfaction with the engineering measures to be imposed that affect the existing structures, identified in detail in Appendix G and Appendix L.

Under Section 6.5 it is established that reliance will be placed on further detailed geotechnical investigation beyond the current levels of information, but the available information is quite sufficient to satisfy the Engineer's conclusion that the proposal is feasible and should proceed to the next stage of documentation.

Excavation and Construction Impacts

Apart from the excavation and construction consequences anticipated in respect to the preceeding sections related to traffic, noise and geotechnical investigation, the remaining associated impacts are grouped and the responses identified within Section 6.7 of the Assessment

The potential for acid sulfate soils and contamination was investigated arising from potential construction measures that would be required if such contaminants were detected. Soil analysis to date lead to the conclusion that the generally low levels of contaminants that have been encountered to date would mean that there is no impediment to the construction anticipated on the site.

A waste management plan will be detailed in accordance with the documented measures under the "NSW Waster Avoidance and Resource Recovery Strategy'. The classification of the waste to be disposed of is anticipated to be 'general solid waste' and tested under the guidelines identified within this assessment.

Potential emission issues including air quality impacts erosion and sediment control and are also identified. Detailed measures to monitor and minimise soil erosion and the discharge of sediments and other pollutants will be incorporated into a detailed Construction Management Plan for authorisation prior to commencement of works, as will a dust management plan.

As the Sydney Opera House is to continue operating as normal during the construction period and as access to the Royal Botanical Gardens will also be maintained, appropriate hoardings, access gates and signage will be utilised to ensure public safety.

Finally measures to protect existing heritage fabric will also be incorporated into a Safe Work Method Statement explaining the delivery and installation of the project whilst ensuring protection of the surrounding heritage fabric.

Infrastructure

Long term infrastructure impacts such as additional site servicing, impacts to local road networks or public transport requirements are not expected as the proposal does not anticipate any intensification of the use of the site. However Section 6.7 assesses that there will be short term impacts due to

adjustments within the site to existing in-ground services. Not to mention the separate, but related requirement for diversion of the Bennelong Drain.

Remaining Director General's Considerations

The assessment of impacts concludes with the remaining group of three considerations required to be addressed under the list of the Director Generals Environmental Assessment Requirements including air and odour impacts, water quality impacts and sea level rise. Having already considered specific environmental impacts of the construction phase in earlier sections, it is demonstrated that no further impacts in relation to air and odour impacts arise from the proposal. The only issues in relation to sea level rise and water quality are the impacts of ground water flows that may penetrate the access tunnel and loading dock. Further geotechnical investigations and the final design of the loading dock structure will determine if ground water captured needs to be treated beyond the proposed gross pollutant traps to ensure no water quality impacts arise to the receiving waters of Sydney Harbour. Further treatment will be included in the design if found to be necessary.

Draft Statement of Commitments

Where impacts have been identified, measures to minimise or mitigate those impacts have been provided. The sum total of those measures are tabulated as a Draft Statement of Commitments in Chapter 7.

The principal commitment is the provision of a detailed Construction Management Plan. The Construction Management Plan will detail the construction process and include a wide range of measures to manage the construction process. Processes to control, measure, and report impacts associated with the construction phase of the development, for example, noise control, traffic management, sediment or particulate emissions, heritage protection and safety will all be included in the Detailed Construction Management Plan.

Other commitments relate to further investigations (such as geotechnical investigations) or further design analysis (such as forecourt lighting studies).

Finally, it is acknowledged that the Commitments can be formalised into requirements through the imposition of an appropriate condition on any approval granted for the sake of completeness of the fore going analysis.

Chapter 1: Introduction

1.1 Purpose of this Report

This Environmental Assessment has been prepared on behalf of the Sydney Opera House Trust to accompany an application to the Minister for Planning for the development of an underground loading dock and associated works, known as the Vehicle and Pedestrian Safety (VAPS) Project at the Sydney Opera House.

Part 3A of the Environmental Planning and Assessment Act (EPA Act) applies to the project, as the site is identified in Schedule 3 of *State Environmental Planning Policy 2005 (Major Development)* as one of a number of State Significant sites where certain types of development would require approval under Part 3A.

In accordance with the provisions of Part 3A, an outline of the proposal including indicative plans and a preliminary assessment was submitted to the Minister in October 2009, requesting that the Director General of the Department of Planning advise of his requirements for the Environmental Assessment of a formal application.

On 17 December 2009 the Director General wrote to the proponent and advised of his requirements for the Environmental Assessment. A copy of the correspondence is included at Appendix A.

This Environmental Assessment has been prepared in accordance with the Director General's Environmental Assessment Requirements (DGEARs) as well as all other relevant statutory requirements that apply to the assessment of this development proposal. Compliance with the DGEARS is set out in Table 2 in Section 1.7 below.

This report will describe the site and locality (Chapter 2); detail the proposed development (Chapter 3); outline the applicable statutory and planning policy considerations (Chapter 4); outline the consultation already undertaken with key stakeholders (Chapter 5); carry out an assessment of any potential environmental impacts and describe measures to minimise or mitigate impacts where necessary (Chapter 6); formalise those mitigation measures through a draft statement of commitments (Chapter 7); and on the basis of the above assessment, provide a conclusion as to whether or no the project is in the public interest (Chapter 8).

1.2 The Proposal

The Vehicle and Pedestrian Safety (VAPS) Project has been designed to address the long standing objectives of separating heavy vehicles from pedestrian traffic on the Forecourt of the Sydney Opera House thereby improving public safety; improving the visitor's experience and views to the Sydney Opera

House; as well as improving the functioning of the site as a performing arts venue. A detailed description of the proposal and its objectives is set out in Chapter 3, but can be summarised as:

- Construction of an underground loading dock to be located below the Sydney Opera House building and Forecourt;
- Alteration of existing lifts and stairs and construction of new lift services and underground corridors to link the new underground loading dock with the performance areas and back-of-house facilities of the Sydney Opera House;
- Construction of a new opening on the southern side of the Forecourt to create a new vehicle access ramp providing service vehicle access from the existing Macquarie Street roundabout down to the new underground loading dock;
- Removal of the recessed vehicle access path flanked by kerbs across the Forecourt, and replacement with a surface that is level with the surrounding paving in same material as existing;
- Removal of the existing guardhouse and construction of a new smaller guardhouse re-located in line with the new loading dock entry;
- Associated minor changes to the Forecourt including improvements to Forecourt lighting; Removal of existing planter boxes on the southern side of the Forecourt; reconfiguration of the grille to the existing car park air shaft vents against the Tarpeian wall and investigation of regrading of the curved steps opposite the 'Aria Restaurant' to improve patron safety.; and
- Relocation of various below ground site services and modifications to the roof of the pedestrian tunnel to the existing adjoining car park where it opens onto the lower concourse level.

As demonstrated by the following photo / photomontage, above-ground changes are only minor in scope:

Figure 1: The Forecourt today

Figure 2: The Forecourt on completion of the project

1.3 Project Cost

A Quantity Surveyors Certificate is included at Appendix N. The estimated capital value of the works is approximately $117,000,000.

1.4 The Proponent

The proponent for the project is the Sydney Opera House Trust. The Trust is constituted under the *Sydney Opera House Trust Act 1961* and carries out the following functions on behalf of the NSW Government:

(a) the administration, care, control, management and maintenance of the Opera House,
(b) the management and administration of the Opera House as a theatre, concert hall and place of assembly to be used as a place for the presentation of any of the branches of the musical, operatic, dramatic, terpsichorean, visual or auditory arts or as a meeting place in respect of matters of international, national or local significance,
(c) the promotion of artistic taste and achievement in any of the branches of the arts referred to in the foregoing provisions of this subsection,
(d) scientific research into, and the encouragement of, new and improved forms of entertainment and methods of presentation of entertainment.

1.5 The Project Team

This Environmental Assessment has been prepared by comprehensive consultant team including:

• Savills Australia	Project Manager
• Johnson Pilton Walker	Architecture and Urban Design
• Byrnes and Associates	Urban Planning
• Design 5	Heritage
• Godden Mackay Logan	Archaeology and Aboriginal Cultural Values
• Halcrow	Traffic
• Acoustic Studio	Acoustic
• Douglas Partners	Geotechnical, Contamination, Acid Sulfate Soils
• Arup	Structural Engineers
• Warren Smith & Partners	Hydrological, Civil, Fire
• Steensen Varming	Electrical, Mechanical
• Rider Levett Bucknall	Quantity Surveyor
• Hard and Forester	Surveyor

1.6 Plans and Supporting Documentation

1.6.1 Plans

The VAPS project is fully depicted on the plans, elevations, section and montages prepared by Johnson Pilton Walker accompanying this application including:

Drawing No/ Revision	Title
EA-010 00	Locality Plan
EA-050 00	Site Plan Existing
EA-055 00	Site Plan Proposed
EA-100 00	Basement 4 (Level -0.38')
EA-130 00	Basement 1 (Level +/-001')
EA-140 00	Ground (Level +012')
EA-200 00	Basement 4 (Level -038') Reflected Ceiling Plan
EA-300 00	Section X70_N
EA-305 00	Section X48_N
EA-310 00	Section X38_N
EA-315 00	Section X30_N
EA-320 00	Section X09_N
EA-325 00	Section Y21_E
EA-330 00	Section Y25_E
EA-335 00	Section Y29_E
EA-340 00	Section Y34_E & Proposed Vehicle Ramp
EA-406 00	Vehicle Ramp Section B Proposed
EA-415 00	Vehicle Ramp Section D
EA-420 00	Vehicle Ramp Section E
EA-440 00	Section JJ Vehicle Ramp and Pedestrian Tunnel
EA-450 00	Delivery Dock_Elevation North
EA-455 00	Delivery Dock_Elevation East
EA-460 00	Delivery Dock_Elevation South
EA-465 00	Delivery Dock_Elevation West
EA-900 00	Existing Image 01 – From Macquarie St Roundabout
EA-905 00	Proposed Image 01 – From Macquarie St Roundabout
EA-910 00	Existing Image 02 – From Monumental Stairs
EA-915 00	Proposed Image 02 – From Monumental Stairs
EA-920 00	Existing Image 03 – From Monumental Stairs Detail
EA-925 00	Proposed Image 03 – From Monumental Stairs Detail

Table 1: Index of Architects Plans

Other Plans which also accompany this application include:

- EA-000 00 Existing Site Survey Plan (Sheets 1 & 2) by Hard & Forester dated 05/05/2010
- EA-102 01 – EA108 Stormwater Concept Plan by Warren Smith & Partners dated 04/06/2010

1.6.2 Supporting Documentation

This summary report relies upon, and should be read in conjunction with the following specialist discipline reports included in the appendices as follows:

- *Sydney Opera House Vehicle and Pedestrian Safety Project Architects Statement* Issue 00 by Johnson Pilton Walker dated 02 June 2010 ("Architects Statement') (Appendix B)
- *Sydney Opera House Vehicle and Pedestrian Safety Project (MP09_0200) Heritage Impact Statement* by Design 5 Architects Pty Ltd dated 15 July 2010 ("Heritage Impact Statement") (Appendix C)
- *Sydney Opera House: Vehicle and Pedestrian Safety Project (VAPS): Archaeological Management Plan and Archaeological Impact Assessment* by Godden Mackay Logan Heritage Consultants dated February 2010. ("Archaeological Impact Assessment") (Appendix D)
- *Sydney Opera House: Vehicle and Pedestrian Safety Project (VAPS): Aboriginal Cultural Values Assessment* by Godden Mackay Logan Heritage Consultants dated July 2010. ("Aboriginal Cultural Values Assessment") (Appendix E)
- *Sydney Opera House Vehicle and Pedestrian Safety Project Environmental Assessment Traffic Report* by Halcrow dated 20 July 2010 ("Traffic Report") (Appendix F)
- *Report on Preliminary Geotechnical Investigation and Waste Classification Assessment Proposed Vehicle and Pedestrian Safety (VAPS) Project Sydney Opera House Bennelong Point* by Douglas Partners dated February 2010 ("Geotechnical Assessment") (Appendix G)
- *Report on Preliminary Acid Sulphate Soil Assessment Vehicle and Pedestrian Safety (VAPS) Project Sydney Opera House Bennelong Point* by Douglas Partners dated June 2010 ("Acid Sulfate Soil Assessment") (Appendix H)
- *Report on Preliminary Contamination Assessment Vehicle and Pedestrian Safety (VAPS) Project Sydney Opera House Bennelong Point* by Douglas Partners dated June 2010 ("Contamination Assessment") (Appendix I)
- *Sydney Opera House Vehicle and Pedestrian Safety Project Environmental Assessment Construction Management Plan* by Savills Project Management dated 15 July 2010 ("Construction Management Plan") (Appendix J)
- *Sydney Opera House Vehicle and Pedestrian Safety* Operational and Construction Noise Assessment by Acoustic Studio dated 14 July 2010 ("Noise and Vibration Assessment") (Appendix K)
- *Sydney Opera House Trust Sydney Opera House Vehicle Access and Pedestrian Safety Project Structural Engineers Report* by Arup dated June 2010 ("Structural Engineers Report") (Appendix L)
- *Sydney Opera House VAPS Hydraulic Services Stormwater Concept Report* by Warren Smith & Partners dated 4 June 2010 ("Stormwater Concept Report") (Appendix M)
- *Sydney Opera House VAPS Project Quantity Surveyor Certificate of Cost* by Rider Levett Bucknall dated 25 June 2010 (Revision 1) ("Quantity Surveyors Certificate") (Appendix N)

1.7 Director-General's Environmental Assessment Requirements

The following table provides a summary of the Director-General's Environmental Assessment Requirements issued on 17 December 2009. The table also identifies where each requirement has been addressed within the Environmental Assessment report. A copy of the Director-General's Requirements is attached as Appendix A.

Environmental Assessment Requirement	EA Report Reference
Key Issues	
1. Legislation, Statutory Controls, Policies and Guidelines	Section 4
2. Heritage and Archaeology	Section 6.1; Appendix C, D, E
3. Visual Impact	Section 6.2; Appendix B
4. Noise, Vibration, Odour, Air	Sections 6.4; 6.6.6; 6.8.1; Appendix J, K
5. Traffic and Vehicular Access	Section 6.3, Appendix F
6. Excavation and Waste	Section 6.6
7. Geotechnical	Section 6.5
8. Water Quality	Section 6.6.5;6.8.2
9. Infrastructure Provision	Section 6.7
10. Climate Change and Sea Level Rise	Section 6.8.3
11. Structural Engineers Report	Section 6.5 ; Appendix L
12. Safe Work Method Statement	Refer Section 6.6.7; Appendix J
13 Consultation	Chapter 5
EA Requirements	
1. Executive Summary	Page 4
2. Site Analysis	Chapter 2
3. Description of Proposed Development	Chapter 3
4. Assessment of Key Issues +Table of Assessment	Chapter 6 + this table
5. Draft Statement of Commitments	Chapter 7
6. Plans and Documents	As below
7. Certification of Statement	Page 5
8. Certificate of Cost	Appendix N
9. Conclusion	Chapter 8
Plans and Documents	
1. Existing Site Survey Plan	EA-000 00
2. Site Analysis Plan	Chapter 2 + EA-050 00
3. A Locality / Context Plan	EA-010 00

4.	Architectural Drawings	EA-010 00 - EA-465 00
5.	Stormwater Concept Plan	EA-102 01 +Appendix M
6.	Erosion and Sediment Control Plan	Refer to Section 6.6.5
7.	Geotechnical Report	Appendix G
8.	View Analysis	EA-900 00 - EA-925 00
9.	Landscape Plan	N/A: No landscaping proposed
10.	Shadow Diagrams	N/A: No material shadows

Table 2: Compliance with DGEARs

Chapter 2:
The Site and Surrounds

2.1 Site Description, Location and Importance

The Sydney Opera House is located at the northern end of the Sydney CBD, immediately adjoining Sydney Harbour and between Sydney Cove and Farm Cove as depicted on the following map:

Figure 3: Site Location

The site of The Sydney Opera House has the real property reference of *Lot 5 in Deposited Plan 775888* and *Lot 4 in Deposited Plan 787933*. The location of the building is usually referred to as Bennelong Point. The boundary of The Sydney Opera House under the Sydney Opera House Trust Act 1961 is shown in the following plan:

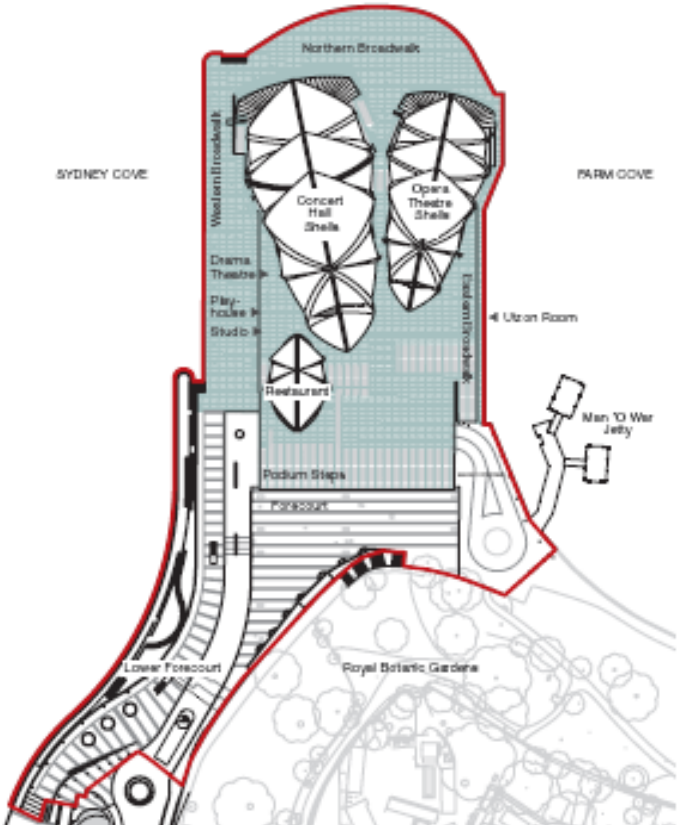


Figure 4: The Sydney Opera House Site Boundary

The Sydney Opera House serves as one of the visual buttresses beside the principal entry to central Sydney via Circular Quay with the other being the Sydney Harbour Bridge. In addition, because of its location on a promontory, The Sydney Opera House constitutes an exceptionally visible and obvious component of the Sydney Harbour panorama with a background provided by the towers of the city itself

The Sydney Opera House is a State, National and World Heritage listed national icon and Australia's premier tourist destination attracting around 7.4 million visitors each year. In addition the Sydney Opera House has become one of the world's busiest performing arts centres with the various venues hosting 1,677 performances in 2008 / 2009 which were enjoyed by over 1.2 million patrons.

The project in this case relates primarily to the southern section of the site. More specifically, to around half of the area occupied by the vehicle concourse and to parts of the forecourt and the unexcavated area below, from the Monumental stairs to the site's southern boundary at the Botanic Gardens Gate, along the Tarpeian Wall to Macquarie Street and East Circular Quay. It also relates some limited areas within and below the House interior .

In addition, the proposed works will encroach over the pedestrian access tunnel that runs below the site from the Sydney Opera House Car Park to the Lower Concourse of the Sydney Opera House. That

tunnel is under separate title with real property reference Lot 101 of DP828892. The landowner is the State Property Authority and the leased to Trust Company of Australia. The location of the proposed works within the site is depicted in the following aerial photo:

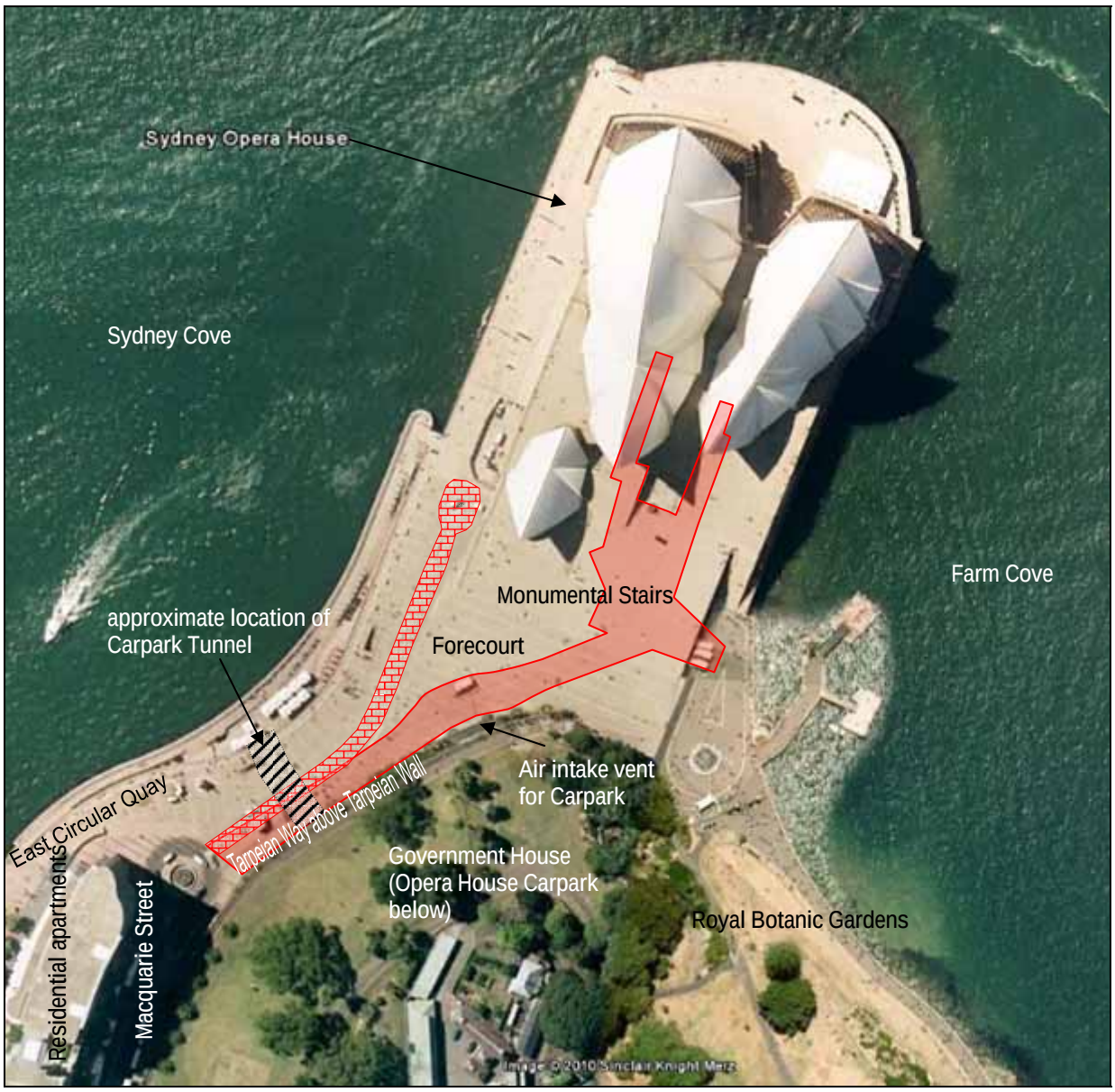


Figure 5: Location of Works within site and adjoining properties
Below Ground Works
Above Ground Works

2.2 The Locality

The Immediate locality is characterised by a range of open and civic spaces, including East Circular Quay to the South East; Royal Botanic Gardens to the south and southeast; Government House, also to the south.

East Circular Quay includes a wide pedestrian boulevard linking the subject site with Circular Quay and the CBD. This is the main approach for pedestrians visiting the site.

The Royal Botanic Gardens adjoins the site to the south and south-east. A number of gates provide pedestrian access to the Gardens. Immediately to the south of the Forecourt, the Botanic Gardens are elevated above the Sydney Opera House forecourt level, by the Tarpeian Wall, a sandstone cliff that separates the Royal Botanic Gardens and the Sydney Opera House site. The pathway that extends along the top of the wall is known as Tarpeian Way. It connects with the site by a set of stairs at the Tarpeian Gate

The Sydney Opera House Carpark is a separate commercial entity and despite its name, is not owned by or associated with the Sydney Opera House. It is located underground generally below Government House. Vehicular access to the carpark is from the roundabout at the end of Macquarie Street and pedestrian access is via an underground tunnel from the Lower Concourse as depicted in the above map. An air intake vent for the car park is located adjacent to the Tarpeian wall.

The nearest residential premises are the Bennelong apartments on Macquarie Street / East Circular Quay.

2.3 Site History

The history of Bennelong Point has been well documented. The Conservation Management Plan, Entitled " *Sydney Opera House—A Revised Plan for the Conservation of the Sydney Opera House and its Site* (3rd Edition) by James Semple Kerr provides a detailed analysis. A summary of the historical phases of the site are as follows:

- 1788–1795: The earliest period of European settlement in Sydney Cove when Bennelong Point was the location of Bennelong's brick hut and, a short while later, a saltworks and windmill.
- 1788–1802: A period of anxiety for the early settlers when the defensive value of Bennelong Point was realised through the construction of a redoubt (1789), later falling out of use, to be replaced with a 'half moon' battery (1798).
- 1810–1843: Work commenced on the construction of a fort at the northern tip of the peninsula (Fort Macquarie) in 1817, while large parts of the rest of Bennelong Point and the surrounding area were reserved for parks and public space.
- 1817–1901: A period in which Fort Macquarie's gothic towers dominated the area, notwithstanding its flaws as a defensive facility. The fort was augmented with new gun batteries in the 1860s and at this time an esplanade was built around the fort by creating an encircling seawall and steam ferries began operating from points along the shore. In the late nineteenth century, the eastern side of Sydney Cove (the western shore of Bennelong Point) was converted to use by trading companies for major longshore wool, mail and passenger wharves. In the 1890s the western rampart of the fort was demolished to make way for facilities associated with the P&O operation that dominated the western shore.
- 1901–1958: The early twentieth century saw Bennelong Point accommodate a number of jetties for use by the public, serviced by a tramline to a new 'tram-car house' which came to be known as 'the shed' in spite of its Neo-Gothic design. The shed was built on the site of Fort Macquarie and was large enough to house 72 trams on 12 parallel tracks. The shed became redundant in the 1950s.
- 1955–present: This period saw the conception of Sydney Opera House, which was completed over the next two decades amid ongoing controversy and opened in 1973.

2.4 The Existing Environment

2.4.1 Forecourt Fabric and Elements

The Sydney Opera House sits raised above a large forecourt area, paved mainly with cobblestones or precast and etched pink reconstituted granite. The Monumental Steps provide a grand entrance and access to the building from the Forecourt. The Forecourt is divided into the main area in front of the steps and the Western Forecourt area by a sunken roadway which runs from the roundabout at the end of Macquarie Street to the vehicle concourse under the Monumental Steps. A Guardhouse is located adjacent to the roadway at the Macquarie Street Entrance. Adjacent to the Tarpeian Wall below the level of the Botanical Gardens are a number of constructed landscape planters as well as the air intake shaft for the Opera House Carpark. (See Figures 6 and 7).

Figure 6: Site as viewed from Macquarie Street roundabout including existing guardhouse, sunken roadway and Tarpean Wall

Figure 7: Site as viewed from Monumental Steps including existing guardhouse, sunken roadway and Tarpean Wall

2.4.2 Visual Environment

Bennelong Point is a most significant and highly visible landmark within Sydney Harbour. The southern section of the site is highly visible for visitors approaching from East Circular Quay, Macquarie Street or the Royal Botanic Gardens and is their first experience of the site.

The site is also visible from parts of Sydney Harbour, particularly from Farm Cove to the East, the Tapeian Way in the Botanic Gardens and Sydney Cove to the West.

Views would also be available from the commercial offices and apartments located at East Circular Quay. Distant views of the site are also provided from the western side of Circular Quay, from the Sydney Harbour Bridge and from some points on the foreshores of the northern side of the Harbour.

2.4.3 Heritage and Archaeology

Cultural Heritage

The Sydney Opera House is listed on the following statutory registers:

- World Heritage List (UNESCO)
- National Heritage List (Australian Government)
- Register of the National Estate (Australian Heritage Council)
- State Heritage Register (NSW Government)
- Sydney Local Environmental Plan 2005 (City of Sydney Council)

The Sydney Opera House is also listed on the following non-statutory heritage registers:

- National Trust of Australia (NSW) register
- National Register of Significant 20th Century Buildings (Australian Institute of Architects)

The heritage significance of the Sydney Opera House is derived from many factors, including its spectacular quality as sculpture; the picturesque quality of the peninsula setting; its status as a cultural icon; its example of and contribution to twentieth century architecture; its function as a performing arts centre of world renown; the majestic quality of its public spaces; and the association of Aboriginal and European contact (Bennelong and his house). A detailed discussion of the Heritage Significance of the site is set out in Section 6.1 and in The Heritage Impact Statement at Appendix C.

Aboriginal Heritage

The site does not contain any known Aboriginal sites and is considered to be of low potential to contain any Aboriginal sites. Nevertheless, there are a range of Aboriginal Cultural Values associated with the site. The Aboriginal Cultural Values Assessment at Appendix E provides a more detailed assessment of the existing values of the place.

Archaeology

The site's potential archaeological remains are unlikely to have any direct association with Sydney Opera House itself. Rather, any potential remains would be associated with various significant phases in the site's historical development that have influenced its current form. In particular, with the modification of Bennelong Point's shoreline, Fort Macquarie, nineteenth- and twentieth-century wharf and harbour facilities and the twentieth-century tram operations. The Archaeological Impact Assessment at Appendix D provides more detailed information with respect to likely archaeological remains.

2.4.4 Pedestrian Access

Regardless of whether pedestrians come to the site from Circular Quay, Macquarie Street or the Royal Botanic Gardens, they access it via the Forecourt. Large volumes of pedestrians cross the forecourt everyday in order to access the Monumental Stairs, the interior of the Sydney Opera House (including the western foyer, stage door, concert hall entry or opera theatre entry), the Man 'O war Jetty or en-route to the Botanical Gardens. Those pedestrians are required in turn to cross the driveway used by all vehicles which make deliveries to or collections from the Opera House. Safety for pedestrians sharing the area with vehicles is further exacerbated by a continuous step in the paving that is dangerous for the unwary. While there are some strong pedestrian "desire lines" the entire Forecourt is publicly accessible space and pedestrians can be observed walking in each and every direction. The ad hoc nature of these pedestrian flows exacerbates the extent and likelihood of the pedestrian / vehicle conflicts: the location of the potential conflict is not limited to a few isolated locations but across the entire Forecourt wherever there are vehicle movements

2.4.5 Current Traffic Access and Loading Arrangements

A full description of current traffic movements on the site is set out in the Traffic Assessment at Annexure J. The following is a summary:

Access
All vehicles accessing the Forecourt do so via a driveway from the Macquarie Street roundabout. The access driveway is controlled via a security gatehouse. General traffic is not allowed to access the site. Taxi's and hire vehicles are allowed to drop off people at the vehicle concourse bollard point using the existing forecourt road. Delivery vehicles are described below. No vehicles are permitted entry onto the vehicle concourse area proper (under the Monumental Stairs) except for fire brigade, ambulance and pre-booked special delivery vehicles. Vehicles not permitted to enter reverse back into the roundabout and leave via Macquarie Street. It is noted that the existing level of incidents requiring vehicles to be turned around at the gatehouse is negligible.

Delivery Type and Vehicle Generation
There are generally three main types of delivery and service vehicle activities which generate heavy vehicle movements to, from and within the Sydney Opera House site. Each has different characteristics:

- Performing Arts deliveries: These deliveries are characterised by "bump in" and "bump out" peak periods where stage sets, costumes and materials used in a particular production are trucked in at the start and end of a production series. These periods typically occur over a continuous two to three day period (subject to curfews) and is an intense period of heavy vehicle movements. A range of vehicles are used but are typically large trucks, including articulated vehicles (semi-trailers) and heavy rigid trucks. The volume of trucks generated during a "bump in" and "bump out" vary significantly depending upon the number of productions and the materials for each production. Typical end of season peak of up to 20 heavy vehicles over a two day period. Due to the limited space within the central passage, the timing of delivery vehicles arrival to the site is managed such that there is a steady arrival rate rather than all vehicles arriving at once.

- General deliveries: These deliveries occur on a daily basis and are associated with the delivery of fresh products and beverages as well as waste collection and deliveries of other goods for the general operation of the House. Deliveries occur each day of the week between the hours of 6am and 5pm. Deliveries are relatively evenly spread across the day and are typically undertaken with

small delivery vans and medium rigid vehicles. The average of about 90 delivery vehicles trucks per day is generally standard except for peak events where the volume of deliveries is generally double that of typical periods. The dock doesn't have a lot of control over arrival times but works with security to hold trucks back if the dock full. Deliveries generally take 5 minutes to occur.

- Other Deliveries: Other deliveries include couriers and office supplies and service vehicles such as maintenance vehicles. These deliveries are received either at the Western Broadwalk dock with the food and beverage deliveries or at the Stage Door reception if outside of dock hours. Approximately 40-50 service and courier vehicles access the site daily.

In summary with the above loading dock operation and other deliveries, approximately some 150 delivery and service vehicles arrive at the Sydney Opera House on a typical day. This generates some 300 vehicle movements per day across the Forecourt and through the pedestrian flow

Loading Facilities and Vehicle Access Routes
The different delivery types take place at different locations:

- Central Passage
  The Central Passage is utilised for the "bump in" and "bump out" of production equipment and materials. Vehicles generally undertake a one way loop by driving around the Western Broadwalk to enter the central passage between the Opera Theatre and Concert Hall buildings at the northern end. Vehicles then exit the Central Passage by driving out to the vehicle concourse near the Stage Door and then back across the Forecourt to the Macquarie Street access (refer to figure 8). However some vehicles only fit through the north doors and therefore must reverse back out of the north doors, while other vehicles may enter by the south doors depending on which theatre they are bumping in and out. Therefore, despite the depiction on Figure 8, there are no clearly organised arrangements for vehicle paths of travel. The Central Passage is an at grade area which requires all equipment to be unloaded to the floor level via fork lifts, truck mounted hydraulic lifts or be hand for being loaded onto trolleys for distribution to the appropriate storage location. Within the central passage there is effectively space to park and unload two trucks in a stacked arrangement.

- Western Broadwalk Loading Dock
  The Western Broadwalk loading dock is utilised by the food, beverage and other deliveries. This dock is also an at grade dock (ie. no loading platform) and goods are unloaded to the ground level and loaded onto to trolleys / fork lifts for distribution to the appropriate on site storage area. Truck parking for the purpose of unloading occurs on the Forecourt with an area barricaded off with temporary fencing to provide some separation between the loading dock and the pedestrian area.

- Stage Door
  Some limited deliveries such as flowers etc may be made to the vehicle drop off area located at the Stage Door if it is outside of loading dock hours. Parking occurs in the designated spaces under the Monumental Stairs.

Existing Curfew Restrictions
Curfew restrictions are placed on delivery vehicles during performances. Particularly, the use of the Central Passage for trucks is not permitted during performances due to emergency exit egress implications. Given the number of performances that occurs at the Sydney Opera House, this significantly restricts the loading and unloading operations.

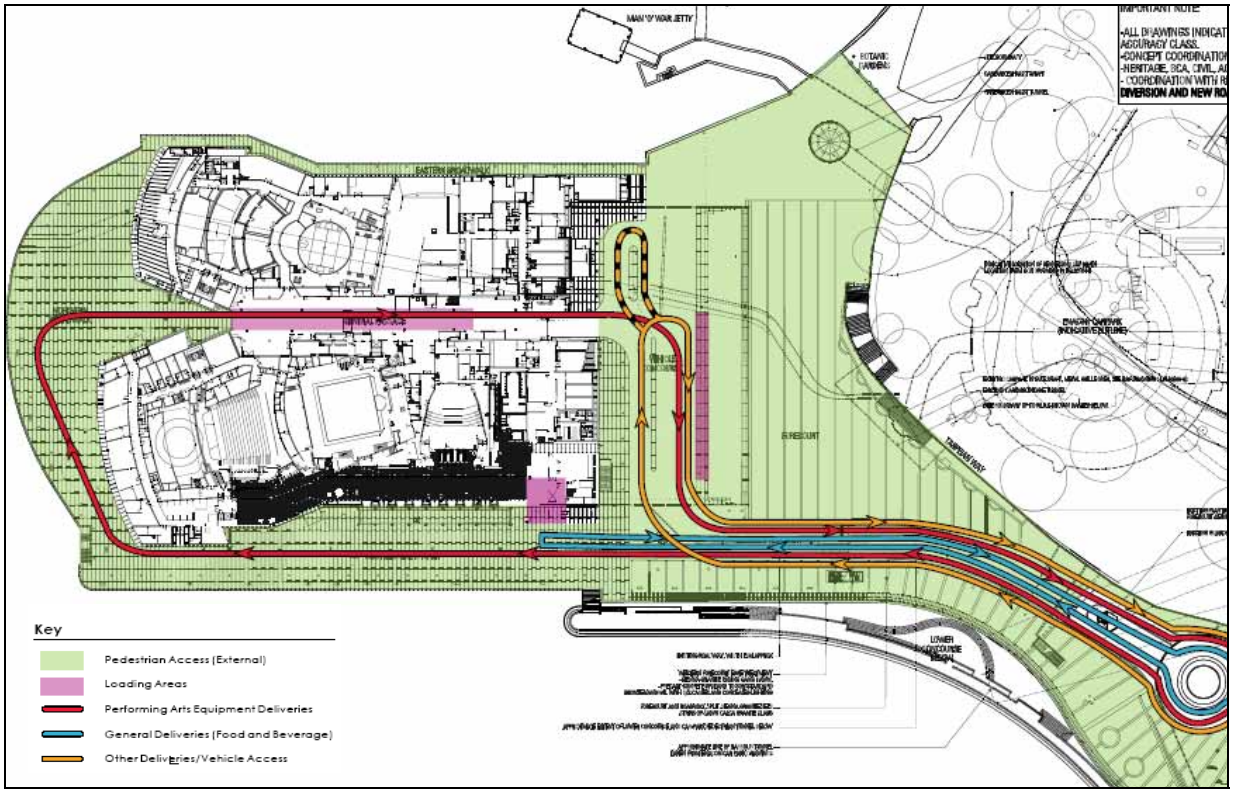


Figure 8: Existing Vehicle Access routes (Extracted from Traffic Report by Halcrow at Appendix F)

2.4.6 Existing Noise Environment

A survey of the existing noise environment around the project site was conducted to establish the range of ambient noise levels around the SOH site and surrounding residential properties. The details of the findings are set out in the Noise Assessment report by Acoustic Studio at Appendix K. The closest sensitive receptors to any noise from the site would be the residences at 1 Macquarie Street. Background and ambient noise levels for the residences facing the eastern side of the building were dominated by continuous noise from mechanical plant associated with commercial / residential developments located at Macquarie Street and intermittent traffic on the same road. Background and ambient noise levels for the residences facing the northern side of the building were dominated by a general urban hum at and intermittent traffic on Macquarie Street. Background and ambient noise levels for the residences facing the western side of the building were dominated by continuous noise from plant associated with the Circular Quay Ferry Wharf.

2.4.7 Topography and Soils

The site is relatively flat due to the past development on the site. In general, rock depths are indicated to be between 1 m and 2 m over the proposed development area, increasing to about 5 metres at the eastern side. Some irregularities are, however, anticipated due to previous land-uses of the site, which probably included quarrying the sandstone to build Fort Macquarie. The overburden materials typically included sand, gravel and rubble (rock) filling. Previous investigations have also indicated the presence of minor amounts of organic clays and natural sands beneath the filling. A preliminary investigation indicates the filling material could be classified as General Solid Waste and is not unduly contaminated. A preliminary investigation also found no evidence of Acid Sulfate Soils or potential Acid Sulfate Soils.

Chapter 3:
The Proposal

3.1 Summary Of the Proposed Development

The proposed development is known as the Vehicle and Pedestrian Safety (VAPS) Project and includes the following key elements:

- Construction of an underground loading dock to be located below the Sydney Opera House building and Forecourt;
- Alteration of existing lifts and stairs and construction of new lift services and underground corridors to link the new underground loading dock with the performance areas and back-of-house facilities of the Sydney Opera House;
- Construction of a new opening on the southern side of the Forecourt to create a new vehicle access ramp providing service vehicle access from the existing Macquarie Street roundabout down to the new underground loading dock;
- Removal of the recessed vehicle access path flanked by kerbs across the Forecourt, and replacement with a surface that is level with the surrounding paving in same material as existing;
- Removal of the existing guardhouse and construction of a new smaller guardhouse re-located in line with the new loading dock entry;
- Improvements to Forecourt lighting;
- Removal of existing planter boxes on the southern side of the Forecourt:
- Reconfiguration of the grille to the existing car park air intake shaft against the Tarpeian wall;
- Modifications to the roof of the pedestrian tunnel to the existing adjoining car park where it opens onto the lower concourse level;
- Relocation of various below ground site services; and
- Relocation of existing at-grade Forecourt loading facilities to the new underground loading dock facility;

A Quantity Surveyors Certificate is included at Appendix N. The estimated capital value of the works is approximately $117,000,000, based on a Gross Floor Area of 4,343m².

The proposal is fully depicted on architectural plans EA-010 - EA-925 Revision 00 by Architects Johnson Pilton Walker. A detailed schedule of materials and finishes is included in the Architects Statement at Appendix B. Figures 9 and 10 below provide an overview of the proposed structures as viewed from above ground and below.

Figure 9: Photomontage showing Access Ramp entry, level roadway and new Guardhouse

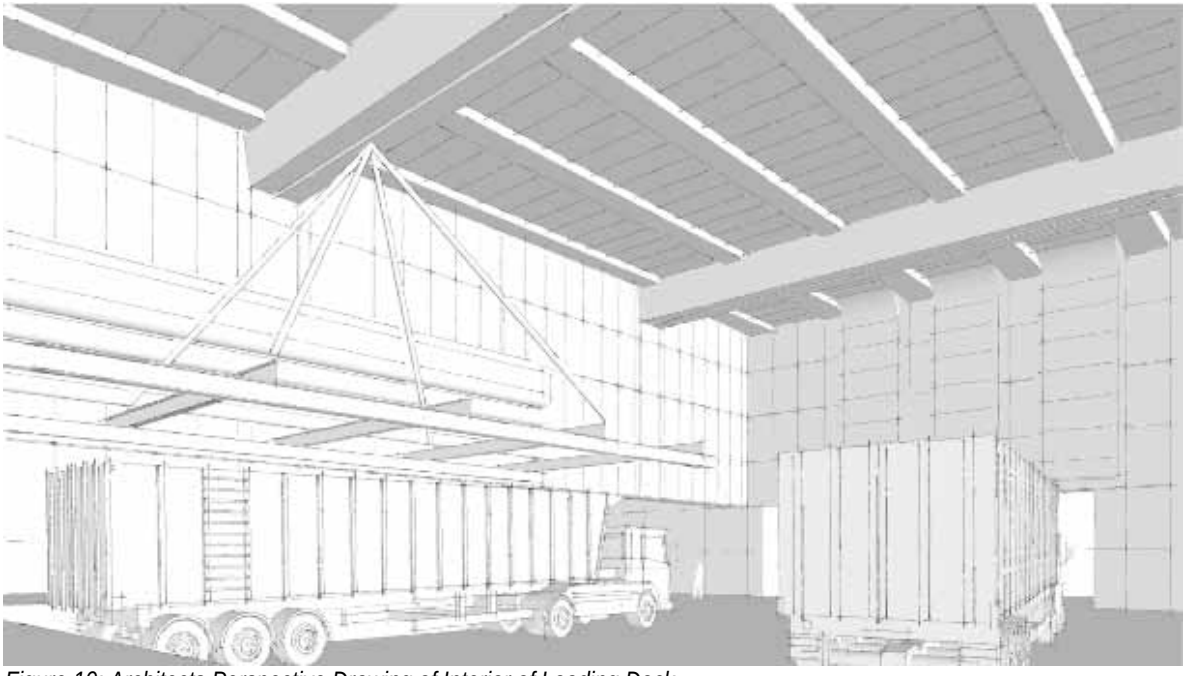


Figure 10: Architects Perspective Drawing of Interior of Loading Dock.

3.2 Reason for the Development & Proposal Objectives

The site has extremely high visitation levels both as a tourist icon and performance venue and also has specific and demanding delivery requirements for the use as a performance centre. As such the potential for pedestrian –vehicle conflicts is high. The visitor experience, so essential to Utzon's vision, is presently compromised by the presence of the kerb separated roadway and vehicles traversing the Forecourt.

At the time of the building's design, Utzon had intended that all deliveries would be via the Central Passage. Height limitations within the Vehicle concourse mean that large trucks must now enter the passage from the northern Broadwalk, traversing western and northern pedestrian areas, as well as

placing heavy loadings on the structure supporting the broadwalk paving. Such loadings were not envisaged at the time of design and additional temporary supports have been placed in these areas to accommodate them. In addition, fire egress issues prevent any loading or unloading activities in the Central Passage during a performance in any of the five main venues.

The need to separate vehicles and pedestrians and the need for improved loading facilities was first identified in the Utzon Design Principles in 2002 and subsequently incorporated into the Conservation Management Plan in 2003. The CMP 2003 considered that an alternative arrangement was important to the future safe and efficient use of the Sydney Opera House

A major revision of the vehicle access and loading dock arrangements to achieve the following objectives is therefore considered essential to the continued operation of the Sydney Opera House into the future:

1. Separation of heavy vehicles from pedestrian traffic and thus reducing vehicle / pedestrian conflict and improving public safety;
2. To improve the visitor's experience as well as external views of the site from the surrounding foreshores and the Harbour by minimising intrusion of vehicles creating visual clutter;
3. To improve the visitor's experience and pedestrian movement on the site by removal of the roadway kerb and sharp differences in level and thereby creating a seamless uninterrupted pavement level for the pedestrian approach over the Forecourt.
4. To provide a new loading dock facility and improved vertical circulation that is acoustically separate from the performance venues and therefore able be used at any time day or night.

3.3 Alternative Solutions Considered

As part of the development of the present design for the VAPS project, a number of alternative solutions were explored to test which one would have the least impact on the forecourt, and thus on the setting and use of this area and Sydney Opera House itself. A collaborative process involved firstly the Sydney Opera House and Concept Design team. The design options were then further informed by more detailed client functional and technical briefs, stakeholder consultation and working sessions with the Project Team and Engineering and Services Consultants.

3.3.1 Alternative Access Points

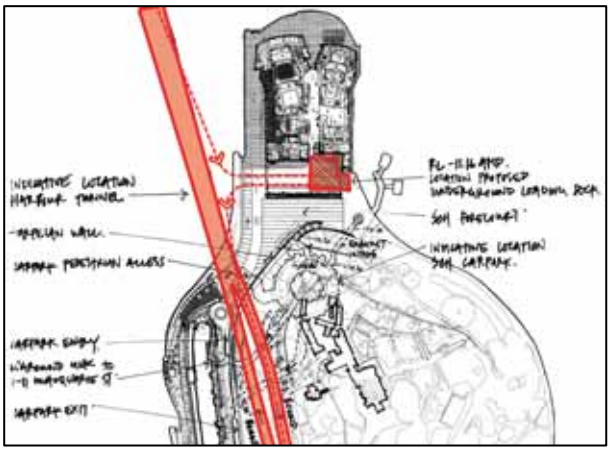
Broad and extensive options studies were carried out, particularly in relation to options for the vehicle entrance point, including:

- Access from Forecourt
- Access from Harbour Tunnel
- Access from within Sydney Opera House Carpark
- Access from Macquarie Street

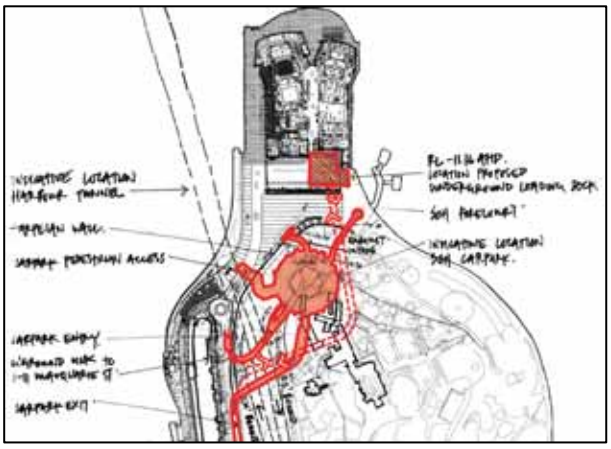
The main issues with each option considered for access to the loading dock included:

- *Access from Forecourt :*
  The length of tunnel required is minimal; allows for management and security control over access wholly within Sydney Opera House site; cost is reduced

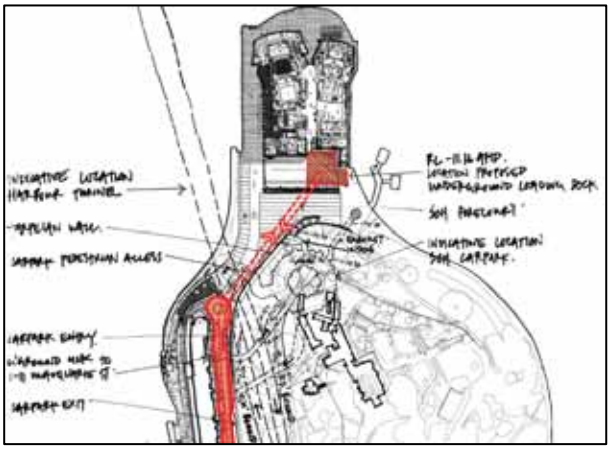
- *Access from Harbour Tunnel:*
  Additional slip lane required in northbound tunnel – safety and traffic concerns and cost not acceptable



- *Access from within Sydney Opera House Carpark :*
  The present carpark access cannot accommodate 19m articulated trucks



- *Access from Macquarie Street:*
  Entry to Loading Dock tunnel would need to be at a distance which allowed it to avoid the Harbour Tunnel – cost not acceptable. In addition this option would also require the route to traverse across Royal Botanical Gardens lands which would not be acceptable to the gardens.



Figures 11 -13: Examples from the Option Studies.

Considering the above options and their associated issues and limitations, the decision was made to keep the access to the loading dock wholly within the Sydney Opera House Site.

3.3.2 Alternative Internal Arrangements and Design

It then became a process of exploring locations and refining them so that the impact on the forecourt and setting of the Sydney Opera House was minimised. Around 15 broad and extensive options studies were carried out in relation to:

- Access Ramp location and alignment within the Forecourt
- Dock Location and arrangement of associated turning space for 19M Articulated Vehicles
- Circulation arrangements linking the dock with the remote lift locations and associated dock alignment

This was made more difficult by the complex arrangement of existing tunnels and services, (including the air intake shaft for the underground carpark) in the area close to the site entry off Macquarie Street. The aim was to maximise the open paved area of the forecourt between the Monumental Stairs and the Tarpeian Wall, and to minimise the visual impact of the entry point on the setting of the Sydney Opera House and its forecourt.

The final option selected finely balances these objectives and achieves an increased width of the paved forecourt area between the Monumental Stairs and the Tarpeian Wall, and a security post and ramp entry as close as possible to Macquarie Street site entry, without having to completely divert and rebuild the underground pedestrian access to the carpark. Locating the entry closer to Macquarie Street would also result in traffic implications as there would be insufficient room for a rigid truck to stand at grade at the security gatehouse without the rear of the vehicle protruding into the roundabout. In addition, moving the entry closer to Macquarie Street would result in conflicts with the Sydney Harbour Tunnel.

3.4 Project Area

The proposed works relate to the following areas of the site:

- The majority of the Sydney Opera House Forecourt, the unexcavated area below, from the Monumental Stairs to the site's southern boundary at the Botanic Gardens Gate, along the Tarpeian Wall to Macquarie Street and East Circular Quay
- Approximately half of the Vehicle concourse and the unexcavated areas below;
- Selected areas within and below the Opera House interior to provide vertical connections with the new Loading Dock;
- Areas within and around the ceiling space of the Pedestrian Access Tunnel to the Sydney Opera House Carpark

3.5 Detailed Description of Elements

3.5.1 Vehicle Access Ramp

A new vehicle access ramp is proposed to be constructed connecting the Macquarie Street vehicle access with the new underground loading dock. The proposed ramp has been developed with the following design principles:

- The ramp alignment is to maximise the width of the forecourt area available to pedestrians approaching the Sydney Opera House from Circular Quay by pushing the ramp as close as possible to the Tarpeian Wall;
- The Ramp is to minimise visual impact on the Forecourt;
- Ramp excavation to avoid Sydney Harbour Tunnel; Sydney Opera House car park site and infrastructure; Bennelong Drain (as diverted – refer to Section Check); Other services located within the area;
- The ramp is to accommodate two way vehicle flow for Articulated vehicles; and
- The ramp design to comply with AS2890.2 with regard to ramp gradients, headroom clearances etc.

The ramp is about 140m long of which about 40m is open drive structure. The ramp commences about 20m east of the Macquarie Street roundabout directly adjacent the Tarpeian Wall rock face and ends essentially at the foot of the main forecourt stairs at a depth of about 16m.

Important aspects of the design include:

- Alignment of the ramp with the curve of the Tarpian Wall reflects the line of Wall, the opposing line of the western Forecourt edge; and larger outline of the Boardwalk and Forecourt;
- Ramp grade maximised to shorten the opening;
- Sloping wall up-stand constructed of precast granite to match exiting podium cladding and western parapet edge of the Forecourt; as with angled parapet and bronze handrail and balustrade detail
- Ramp paving will be constructed of granite or similar material to complement existing Boardwalk and Podium paving
- A single row of granite slabs laid below the upstand and ramp parapet will mirror the double row against the western edge of the Forecourt.

3.5.2 Underground Loading Dock, including Truck Turning Area and Access Tunnels to Lifts and Stairs

A new underground loading dock will be constructed to house the relocated Western Broadwalk loading dock and the existing Central Passage. This is the major component of the project and will include:

- Capacity to unload / load 2 semi trailers and 2 Medium Rigid Vehicles simultaneously (4 truck bays);
- Raised loading platform with rear and side loading capacity;
- Overhead gantry system;
- Temporary parking for outside broadcast vehicles for major events;
- Separate waste handling facilities; amd
- Vehicle manoeuvring area.

Two tunnels will provide access from the loading dock to two existing lifts which will be extended down to the level of the loading dock, as well as to a new scenery lift and stairs.

The following excerpts from the Architects Statement highlight the salient architectural features of the Loading Dock:

"A series of beams spanning north-south will be formed at vehicle concourse level between existing in-ground tie beams which rest in the foot of the concourse beams. To avoid undermining the existing in-ground tie beams, the beams will be shaped horizontally and vertically at the end spans to follow the changing profiles of the tie beams and to maintain appropriate strength and will be cast in integrated precast forms.

Through rhythm, alignment, changing profile, all dictated by the existing building, the crisp definition through use of precast forms the structure will echo the folded slab concrete beams above and orientate the space within the Sydney Opera House"

".Ply forms for walls will be set out to follow the building module and pour joints and beam wall junctions will be carefully treated and detailed.

Compressed fibre cement panels, clear sealed and carefully detailed will conceal the underside of the in-ground tie-beams and sprinkler and services reticulation at high level. Elsewhere, in keeping with the existing service areas of the Sydney Opera House, services will generally be exposed and painted, carefully and neatly installed and setout.

Outside air will be drawn into the dock directly and discreetly through the Level L+12 structure at its intersection with the foot of the folded concrete slab concourse beams, supporting the Monumental Stairs above, behind the existing upstanding tiled precast crushed concrete granite panels.

A new services trench directly below the Eastern Boardwalk will provide the new dock with an exhaust discharge point into the existing void below the Eastern Boardwalk and behind the open jointed precast panels of the eastern seawall. "

3.5.3 Guardhouse

The existing guardhouse will be demolished and a new guardhouse will be located adjacent to the new access ramp, slightly closer the Macquarie Street boundary. It will be a simple cylindrical shape of reduced volume and dimensions, as compared to the existing structure. The new guardhouse will be constructed in bronze or similar material and matching glass.

3.5.4 Roadway

The proposal includes removal of the existing roadway which is differentiated by a level-changing kerb and raising the road to the surrounding paving level using similar materials to those existing in the surrounding areas. Associated existing elements including cat's eye reflectors and yellow speed humps will also be removed and a more sympathetic treatment to mark the (shared) pedestrian / vehicle zone will be provided as demonstrated by the photomontage below. The purpose of the modification to the roadway is to improve the pedestrian experience and to unify the western area of the Forecourt with the rest of the Forecourt.

Figure 14: Proposed new Guardhouse and modified Roadway.

3.5.5 Forecourt lighting

It is proposed to incorporate improved forecourt lighting as part of the proposal for the sake of both efficiency and ambience, in particular to that area of the forecourt adjacent to the dock entry ramp. The final form of the lighting has not yet been determined and further investigation is required during the design development phase to confirm the final design.

It is noted that in accordance with Schedule 3 of State Environmental Planning Policy (Major Development) 2005 public domain street furniture, such as street lighting can be carried out as 'exempt development' on the site of the Sydney Opera House.

3.5.6 Other Forecourt Elements

Some elements including the granite edged planter beds, garden and dwarf granite walls will be removed as they are identified as intrusive items by the Conservation Management Plan 2003. The air intake grille at the base of the Tarpeian cliff will be replaced with a new shaped grille in bronze or similar material complimentary to the surroundings.

3.5.7 Internal Backstage and Service Areas

Backstage staff areas on Level +12 will be accessed via modified passenger lifts shown on the plans as Lifts 22 and 23. Only minor works are proposed in these areas, mainly associated with the modification of existing lifts and stairs. Any areas that are affected will include simple finishes to match the existing .

3.5.8 Lower Concourse – Pedestrian tunnel

The proposal will impact on the existing pedestrian tunnel entry to the helical carpark. In locating the proposed loading dock entry as close as possible to the Macquarie Street entry to the site, it begins its descent above the pedestrian tunnel access to the carpark. Modification to the roof of this pedestrian tunnel will be required, but there will be no other changes to its configuration.

3.5.9 Alterations to Underground Site Services

The proposal will require significant changes to most existing below ground site services: most services will need to be diverted as part of the initial stage of the development. Electricity, gas, waste, sewerage and telecommunications lines may all be affected

3.6 Construction

3.6.1 Timing, Workforce, Public Access

It is expected that the project will take around two and a half years to complete. Subject to approval, it is anticipated that excavation will commence early 2011 and the project is targeted for completion in mid 2013.

The size of the construction workforce will vary over the stages of the development, with estimates for peak times approximately 125 persons.

The proposed construction hours for all external works will be during standard daytime construction hours, Monday to Saturday as follows:

- Monday – Friday: 7am to 6pm
- Saturday: 8am to 1pm

However due to the very large volumes of pedestrians accessing the Forecourt, and in order to minimise the adverse visual, heritage, amenity and safety impacts caused by the disruption to the Forecourt during the construction process, it is essential that the duration of the construction phase be kept as short as possible.

As such it is proposed that once the loading dock is at a stage where it is enclosed, construction work to all internal areas of the proposal will be carried out throughout the day and night.

It is also proposed to carry out some limited external construction works outside of standard hours, including:

- The portion of the entry tunnel works which is over the pedestrian link. For safety reasons it is preferred to undertake these works outside the car park operating hours.
- Works in the vehicle concourse. These works are more then 180 metres from the nearest residences and are naturally screened by the Monumental Stairs.

The ability to carryout internal works and some limited external works outside of usual construction hours is expected to considerably reduce the total construction timeframe: a significant benefit in terms of heritage, safety and visual impacts on the site, without any unacceptable amenity impacts to surrounding premises.

Sydney Opera House will remain fully operational throughout the project, with theatres, restaurants and guided tours open for business. Appropriate hoardings, access gates and signage will be utilized to ensure public safety and ease of access to the site.

3.6.2 Construction Methodology

A comprehensive detailed Construction Management Plan will be prepared by the successful contractor prior to the commencement of works. A preliminary outline of the proposed construction methodology is provided in the Environmental Assessment Construction Management Plan at Appendix J and can be summarised in terms of the following four stages:

Forecourt & Vehicular Concourse Services Diversions
In order to commence the works to the entry tunnel and loading dock, it is essential to relocate a significant amount of existing services in the forecourt, and some minor diversions in the vehicular concourse. The Diversion of the Bennelong Stormwater Drain is also required prior to the commencement of the works and is currently being assessed as separate Part 3A Application. It is likely that the Services Diversions Works will be commissioned to be undertaken prior to the main works outlined below.

Entry Ramp/Tunnel
The entry ramp/tunnel will be constructed using a cut and cover construction method for the majority of its length. A small portion (approximately 25m) at its junction with the loading dock will be constructed using tunnelling methods, so as not to compromise the structural stability of the foundations to the monumental stairs which are directly above the tunnel /dock junction. The construction of the entry ramp/tunnel will commence at the Macquarie Street roundabout end, along the Tarpeian Wall and progress toward the monumental stairs. The staging and associated placement of hoardings will ensure that access to and from the Royal Botanical Gardens is maintained throughout the construction period. Cobblestones within the Forecourt will be removed prior to excavation and reinstated at the completion of construction works.

Loading Dock
The majority of the loading dock is located underneath the vehicle concourse. The vehicle concourse is underlain by stressed concrete tie beams which tie the southern extent of the monumental stairs beams to the southern structure of the main Opera House building. These tie beams are critical to the stability of the existing House building and must be retained. It is proposed to excavate underneath the tie beams and existing basement areas. During excavation, the rock will be pre-cut vertically using large rock saw blades prior to ripping, in order to minimise the transfer of horizontal noise and vibration through the rest of the site. An innovative process known as Penetrating Cone Fracture (PCF) will also be considered during excavation. This is an environmentally friendly rock-breaking technique using high pressure gas to expand existing small fractures in the rock causing the rock to fail with less vibration and noise than other methods. The structure of the loading dock consists of a roof slab (also acting as the concourse ground level slab), base slab, walls and a plant room slab above the truck turning bay. The structure will be primarily constructed using a conventional formwork and in-situ concrete approach, with the roof slab

utilising precast concrete construction to assist in working around the limited space between existing tie beams.

The portion of the loading dock which is underneath the House basement areas requires an approach which maintains support to the existing structure. This will be achieved by phasing the excavation and providing underpinning and temporary support in strategic locations.

Access Corridors and Lifts
The two access corridors proposed to extend from the loading dock and travel below existing House building structure to provide lift access are proposed to be constructed as tunnels using a road header and temporary fibreglass rock anchors and shotcrete to stabilize the roof and walls before placement of the permanent concrete lining.

3.7 Operation

As with the existing arrangement, the constructed loading dock will be operational 24 hours a day, 7 days a week. However, as the existing uses at the Sydney Opera House will remain unchanged, the proposed development will not generate any additional traffic flows, nor will it change the timing of the vast majority of service delivery vehicles which currently make their deliveries during ordinary business hours.

The one significant change to loading operations, is that loading and unloading will be able to be carried out during performances times. This will provide greater flexibility in the management of delivery vehicle access, particularly relevant to the "bump in" and "bump out" periods for the performing arts uses whom will be able to load and unload over a greater period of time, load more efficiently, complete bump-out overnight and thereby reduce the number of vehicles generated in any one peak period.

The loading dock area will be controlled by appropriately qualified personnel who will be responsible for communication with the guardhouse, allocation of vehicle parking and movement of vehicles generally.

The dock will have the capacity to unload / load up to 4 delivery vehicle at the dock platform and a waste vehicle simultaneously. In addition, the truck turning bay will allow for a number of vehicles to stand and wait to be unloaded / loaded. It is expected that this area will also be used for Outside Broadcast vehicles to park during major events on the Sydney Opera House Forecourt, removing the need for such vehicles to park on the Forecourt as per the existing situation.

3.8 Relationship to other Works

The proposal relies on the diversion of the Bennelong Stormwater Drain to be completed before the excavation and construction phase of the works can commence. The stormwater drains lines within the proposed development area and without its diversion, the VAPS project could not be undertaken. The Bennelong Stormwater Drain Diversion is the subject of a separate Part 3A Application to The NSW Department of Planning (Application No MP 09_0122). At the time of writing that application was still under assessment.

Chapter 4:
The Statutory and Assessment Framework

4.1 Overview

Due to the site's importance at a local, state, national and international level, a wide range of statutory requirements and planning policy apply to the assessment of development proposal for the site. Although this report relates to an application under part 3A of the NSW Environmental Planning and Assessment Act to which state-based policies and planning instruments apply, a bilateral agreement between the State of NSW and the Commonwealth Government means that national legislation is also relevant to the proposal. That agreement also recognises the importance of the status given to other endorsed site-based documents including The Management Plan for the Sydney Opera House, the Conservation Management Plan 2003 and the Utzon Design Principles.

This section of the report provides an overview and demonstration of compliance with all relevant statutory controls and policies, from the national to the site-based level. Eight separate pieces of legislation in all plus three site specific controls endorsed and adopted by the State Government as a guide to parameters for any change.

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4.2 Commonwealth Legislation

4.2.1 Environment Protection and BioDiversity Conservation Act (CTH) 1999

The Environment Protection and BioDiversity (EPBC) Act prescribes the Commonwealths role in environmental protection, biodiversity, and conservation and including conservation of heritage items.

The Sydney Opera House is both a World Heritage Property and listed on the National Heritage list under the EPBC Act. In accordance with Sections 12 and 15B of the Act, actions that significantly affect matters of national environmental significance (including National and World Heritage Sites) require approval under the Environment Protection and BioDiversity Act.

However s29 of the EPBC Act provides that approval is not needed where the action is one of a class of 'actions' declared by a bilateral agreement between the Commonwealth and the State in which the action is taken.

The December 2005 Bilateral Agreement in relation to The Sydney Opera House between the Commonwealth and NSW governments allows the NSW environmental assessment regimes to be accredited under the EPBC Act. Any approval that would have been required under the provisions of the Environment Protection and BioDiversity Act would be satisfied by approval from the NSW government in accordance with the "*Management Plan for The Sydney Opera House*". (See Section 4.5).

In turn, the Management Plan for the Sydney Opera House sets out the assessment and approvals process necessary for any proposed development on the site, including approvals under the Environmental Planning and Assessment Act 1979, the Heritage Act 1977 and other matters for consideration.

As this application is made in accordance with the requirements of the Management Plan for The Sydney Opera House therefore separate approval under the EPBC Act is not required. Refer to detailed discussion in the relevant sections below with respect to the Management Plan for The Sydney Opera House and the other relevant NSW Acts.

4.3 NSW Legislation and Regulations

4.3.1 Environmental Planning and Assessment Act 1979

Part 3A of the EP&A Act provides the assessment and approvals regime for Major Projects which are identified either by a State Environmental Planning Policy or a Ministerial Order.

As discussed below in Section 4.4.2, *State Environmental Planning Policy (Major Development) 2005* identifies that all development at The Sydney Opera House is a Part 3A Project, unless it is exempt development. The proposal, the subject of this assessment, does not meet exempt development requirements and is therefore subject to the provisions of Part 3A of the Act.

Relevant provisions in this case include the requirement to submit an Environmental Assessment report which addresses the Director General's Environmental Assessment Requirements (Clause 75F(3) and (5)). The Director Generals Environmental Assessment Requirements were provided on 17 December 2009, a copy of which is at Appendix A. The Table 1 in Chapter 1 demonstrates how this report satisfies the Director Generals Requirements and therefore the relevant sections of the Act.

Section 75R provides that Parts 4 and 5 of the Act do not apply to the assessment of the proposal; those relevant State Environmental Planning Policies that do apply; and otherwise all other Environmental Planning Policies, including Local Environmental Plans have no direct application. However, in accordance with Section 75J and clause 8N of the Regulations, Local Environmental Plans do apply to the extent that the proposal must be permissible under those Plans.

Furthermore, Local Environmental Plans can be made applicable if included within the Director Generals Requirements. In this case the Sydney Local Environmental Plan 2005 has been included within the Director Generals Requirements.

Section 4.4 below demonstrates compliance with all relevant State Environmental Planning Policies and with Sydney Local Environmental Plan, both in terms of permissibility and applicable controls.

Section 75U(1), provides that a range of authorisations that may otherwise apply for an approved project under Part 3A that would not be required. These include:

(a) the concurrence under Part 3 of the Coastal Protection Act 1979 of the Minister administering that Part of the Act,
(b) a permit under section 201, 205 or 219 of the Fisheries Management Act 1994,
(c) an approval under Part 4, or an excavation permit under section 139, of the Heritage Act 1977,
(d) a permit under section 87 or a consent under section 90 of the National Parks and Wildlife Act 1974,
(e) an authorisation referred to in section 12 of the Native Vegetation Act 2003 (or under any Act to be repealed by that Act) to clear native vegetation or State protected land,
(f) a permit under Part 3A of the Rivers and Foreshores Improvement Act 1948,
(g) a bush fire safety authority under section 100B of the Rural Fires Act 1997,
(h) a water use approval under section 89, a water management work approval under section 90 or an activity approval under section 91 of the Water Management Act 2000.

However, in this case the authorisation under sub-section (c) does apply and approval under the Heritage Act 1977 is required in accordance with clause 90 of Schedule 6 of this Act and furthermore is designated under The Management Plan for the Sydney Opera House.

Section 75V then provides that a range of authorisations cannot be refused if necessary for the carrying out of an approved project. These include:

- an environment protection licence under Chapter 3 of the *Protection of the Environment Operations Act 1997* (for any of the purposes referred to in section 43 of that Act),
- a consent under section 138 of the *Roads Act 1993*,

Because of the provision of clause 90 to Schedule 6 of this Act, the following is also added in respect of the Sydney Opera House:

- *an approval under Part 4, or an excavation permit under section 139, of the Heritage Act 1977*

In summary, unlike all other development in NSW, development on the Sydney Opera House Site *does* require separate approval under the Heritage Act, but that approval cannot be refused if it is necessary to carry out the project. Refer to discussion in Section 4.4.3 below regarding the approvals under the *Heritage Act 1977*

4.3.2 Environmental Planning and Assessment Regulation 2000

As the project is within a designated environmentally sensitive area of State significance, Clause 8N provides that approval cannot be granted if the project would be prohibited by an environmental planning instrument that would apply to the site but for Section 75 R of the Act. In turn, Section 4.4 below demonstrates the proposal is permissible under all applicable EPIs.

Clause 288 of the regulations sets out special provisions relating to The Sydney Opera House. Relevantly:

(2) To the extent that any development that is to be carried out at the Sydney Opera House is a project to which Part 3A of the Act applies, the Director-General's report under section 75I of the Act in relation to the project must include:
(a) the provisions of the Management Plan for the Sydney Opera House that are relevant to the carrying out of the development, and
(b) advice as to the extent to which the project is consistent with the objectives of that Management Plan.

Note. Section 75J (2) of the Act requires the Minister to consider the Director-General's report (and the reports, advice and recommendations contained in it) when deciding whether or not to approve the carrying out of a project.

The following Section 4.5.1 below demonstrates compliance with the provisions of the Management Plan for the Sydney Opera House.

4.3.3 Heritage Act (NSW) 1977

In accordance with the requirements of the Management Plan for The Sydney Opera House and Clause 90 to Schedule 6 of the EPA Act, separate approval is required under the Heritage Act for the proposed works, following the Minister's approval under Part 3A. In accordance with section 57(c) approval would be required in order to *"carry out any development in relation to the land on which the building, work or relic is situated".* Furthermore, there is a requirement under Section 170 of the Act to maintain a Heritage and Conservation register in relation to The Sydney Opera House. These requirements would apply to the subsequent application under the Heritage Act once the Part 3A application is determined.

It is worthwhile to note that the following matters would be considered when an application is made under the Heritage Act and would be material to the considerations under Part 3A:

(a) the extent to which that application, if approved, would affect the significance of any item as an item of the environmental heritage,
(b) the representations, if any, made with respect to that application under section 61(3),
(c) such matters relating to the conservation of that item or land as to it seem relevant,
(c1) any applicable conservation management plan (within the meaning of section 38A) endorsed by the Heritage Council, and
(d) such other matters as to it seem relevant.

An assessment of heritage impacts and conservation matters is outlined in detail in Section 6.1 below. Compliance with the Conservation Management Plan for the Sydney Opera House which has been endorsed by the Heritage Council is outlined in Section 4.5.2.

4.4 Environmental Planning Instruments

4.4.1 State Environmental Planning Policy No 55 – Remediation of Land

SEPP 55 applies to all developments in NSW. Clause 7 of the SEPP provides that a consent authority must not consent to the carrying out of any development on land unless it has considered whether the land is contaminated, and if the land is contaminated, it is otherwise satisfied that the land is suitable in its contaminated state for the purpose for which the development is proposed to be carried out. This includes land where development for a purpose referred to in Table 1 to the contaminated land planning guidelines is known to have been carried out. Table 1 is a list of activities that may cause contamination and includes "Railway Yards". As described above in Chapter 2, the site previously operated as a tram depot.

In order to satisfy the requirements of the SEPP, a Preliminary Contamination Assessment has been carried out by Douglas Partners. Refer to their report at Appendix I and more discussion of site contamination in Section 6.6 of this report. The assessment finds that the site is suitable from a contamination standpoint for the proposed development and the levels and nature of contamination detected are not likely to pose a significant risk either during the construction period or to ongoing / future users of the site.

As such the proposal satisfies the requirements of the SEPP.

4.4.2 State Environmental Planning Policy (Major Developments) 2005

Clause 6 of the SEPP identifies projects to which Part 3A of the Environmental Planning and Assessment Act apply. This includes State Significant sites identified in Schedule 3 of the SEPP. Part 1 of Schedule 3 designates The Sydney Opera House site as a State Significant site and Division 1 provides that all development within the site is a Part 3A project.

Division 2 to this part of the Schedule specifies Exempt Development requirements for work within the Sydney Opera House site. While some minor aspects of the proposal may meet exempt development requirements (such as some re-paving, street re-surfacing and minor alterations to backstage infrastructure), the subject development as a whole is assessed not to be Exempt Development and therefore requires approval under Part 3A of the Act following the considerations applied in this assessment.

4.4.3 Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005

Despite its title, the Sydney Regional Environmental Plan has the same legal status as a State Environmental Planning Policy and therefore, in accordance with the provisions of Section 75R of the Act, it applies to the assessment of the project under Part 3A.

The Sydney Opera House Site falls within the *Sydney Harbour Catchment Area* designated in the REP. It also is within the *Foreshores and Waterways area* and the *'City Foreshore Area'* designated as a Strategic Foreshore Site. The following clauses are therefore applied to the assessment of the application.

Sydney Harbour Catchment - Clause 13
Clause 13 sets out the planning principles which apply to land within the Sydney Harbour Catchment. The principles relate primarily to protecting the health of the catchment including natural assets, water quality, runoff and acid sulfate soils. In addition the clause seeks to enhance the unique visual qualities of the Harbour and the number of publically accessible vantage points. These principles are achieved by compliance with the specific controls set out below.

Foreshores and Waterways Area – Clause 14
The Clause reiterates a number of the objectives under Clause 13 with a further emphasis on foreshore access. As described throughout this assessment report, the primary purpose of the proposal is to improve pedestrian safety and therefore the limitations for vehicular and pedestrian access at all times of day and night both to and from within this foreshore site

Biodiversity, ecology and environment protection – Clause 21
The clause requires that the impact of the development in terms of biodiversity, ecology and environment protection are taken into account.

Of relevance to this application development should have a neutral or beneficial effect on the quality of water entering the waterways; and should protect and reinstate natural intertidal foreshore areas, natural landforms and native vegetation. Impacts to surface water runoff during the construction phase are addressed in Section 6.7. Refer to Section 6.8.2, to the Preliminary Geotechnical Investigation at Appendix G and to the Stormwater Concept Report at Appendix M for a discussion of impacts arising from to ground water flows and quality.

There is otherwise assumed to be no opportunity, nor is it considered appropriate to reinstate the natural landforms and vegetation.

Public access to, and use of, foreshores and waterways – Clause 22
Relevant to this application, the clause provides that:

"(a) development should maintain and improve public access to and along the foreshore, without adversely impacting on watercourses, wetlands, riparian lands or remnant vegetation"

As already described, the primary purpose of the proposal is to improve pedestrian access to and within this foreshore site by the safety measures intended for implementation. There is no impact to watercourses or riparian lands and no wetlands or remnant vegetation in the vicinity of the site.

Maintenance of a working harbour – Clause 23
Clause 23 requires that

(a) foreshore sites should be retained so as to preserve the character and functions of a working harbour, in relation to both current and future demand,

(b) consideration should be given to integrating facilities for maritime activities in any development….

The proposed development is fundamentally of minimum visual impact and makes no change to any perception of the character of the harbour as a working harbour. There is likewise no opportunity, nor is it considered appropriate to integrate facilities for maritime activities within the proposed development beyond the current usage.

Interrelationship of waterway and foreshore uses – Clause 24
The following sub-clauses are relevant to this application:

(b) development on foreshore land should minimise any adverse impact on the use of the waterway, including the use of the waterway for commercial and recreational uses,

(c) development on foreshore land should minimise excessive congestion of traffic in the waterways or along the foreshore,

The proposed works would be set well back from the foreshore itself and in no way impact on the use of the waterway. The proposal is consistent with sub-clause (c) as it will minimise vehicular traffic travelling across this foreshore site.

Foreshore and waterways scenic quality – Clause 25
Clause 25 requires that the scale, form, design and siting of any building should be based on an analysis of the land on which it is to be erected, the adjoining land and the likely future character of the locality. In addition, development should maintain, protect and enhance the unique visual qualities of Sydney Harbour and its islands, foreshores and tributaries.

Refer to Section 6.2 of this report which includes an assessment of the visual impacts of the proposal in terms of the immediate site and the scenic qualities of the site in the context of the Harbour.

Refer to the Architects Statement at Appendix B and Heritage Impact Statement at Appendix C which also provide detailed assessment of the visual impacts of the proposal.

Maintenance, protection and enhancement of views – Clause 26
The clause seeks to protect and enhance views to and from Sydney Harbour, public places, landmarks and heritage items. Section 6.2 of this report, in conjunction with Architects Statement at Appendix B and Heritage Impact Statement at Appendix C includes an assessment of the impacts of the proposal in terms of important views.

Development affecting matters of Aboriginal heritage significance – Clause 57
Clause 57 establishes the need for an Aboriginal Heritage Impact assessment. Refer to discussion in Section 6.1 below and the report by Godden Mackay Logan at Appendix E.

Development affecting matters of non-Aboriginal heritage significance – Clause 58
Before granting development consent on an archaeological site or a potential archaeological site, the consent authority must consider a heritage impact statement explaining how the proposed development will affect the conservation of the site and any relic known or reasonably likely to be located at the site, and must be satisfied that any necessary excavation permit required by the *Heritage Act 1977* has been granted. The Heritage Impact Statement at Appendix C and Archaeological Impact Statement at Appendix D (and associated discussion in Section 6.1 of this report) satisfy the requirements of the clause.

Note that as discussed above in Section 4.3.3, approvals required under the Heritage Act 1977 will be sought from the Heritage Office subsequent to the determination of this Major Projects application.

Sydney Opera House - Clauses 58A - 58C
These clauses establish a buffer zone around The Sydney Opera House and set certain requirements for development within the Buffer Zone in order to protect the integrity of the heritage site including views to and from the site. The proposed development is not within the Buffer Zone and as such the clauses have no application to the assessment of this proposal.

4.4.4 Sydney Local Environmental Plan 2005

In accordance with Clause 75J(3) of the EPA Act the Minister may take into account the provisions of an environmental planning instrument that would have governed the carrying out of the proposal had it been assessed under Part 4 of the Act. In this case the Director General's requirements call for consideration of the provisions of Sydney Local Environmental Plan 2005. The following clauses are therefore relevant to the assessment of the application:

Design Excellence – Clause 26
Consent must not be granted to external alterations to an existing building unless the consent authority has considered whether the proposed development exhibits design excellence, including the following matters:

(a) whether a high standard of architectural design, materials and detailing appropriate to the building type and location will be achieved,

(b) whether the form and external appearance of the building will improve the quality and amenity of the public domain,

(c) whether the new development detrimentally impacts on view corridors identified in the relevant development control plan.

Refer to Architect's Statement at Appendix B and Section 6.2 for a justification of the architectural design, materials and detailing. The development has been specifically designed to be consistent with at least the quality and amenity of The Sydney Opera House forecourt and has no impact on view corridors.

Ecologically Sustainable Development – Clause 27

As the proposal relates primarily to an underground loading dock, many of the measures suggested by the clause such as passive solar design and natural ventilation have no relevance to the application. The client functional brief however, required that the design take ESC principles into account. Just a few examples of some of the requirements included:

- *The structural, electrical, mechanical, architectural and hydraulic designs must demonstrate consideration of relevant issues in the Environmental Sustainability Considerations*
- *The tunnel ventilation system design must consider energy efficiency as a key criteria.*
- *The design must isolate air conditioned areas from non-air conditioned areas.*
- *Lighting design must meet best practice in energy efficiency, sensor and control systems.*
- *Stormwater drainage modified by the project must ensure adequate control of stormwater to minimise risks of impact of stormwater on receiving waters.*
- *Groundwater ingress management must be addressed in the design.*
- *The design team will demonstrate that they have considered materials and that minimise the use of natural resources in the design.*

Parks and Community Places zone – Clauses 44 and 45

The site is within the Parks and Community Places zone and in accordance with the provisions of clause 45, is permissible with consent. Relevant objectives of the Parks and Community Places zone are:

(a) to facilitate continued provision and enhancement of parks and community places, including places in private ownership utilised by the community, as the primary use within this zone, and

….

(c) to facilitate the conservation of items and areas of heritage significance, and

……

(e) to better integrate roads with surrounding or adjoining parks and community places, and

(f) to facilitate continued public access to land and buildings within this zone.

Chapter 3 of this report outlines in the public benefits of the proposal including the enhancement of the forecourt, the better integration of the roadway away from pedestrian movements, and improved pedestrian access. Section 6.1 of this report outlines how the proposal ensures the heritage significance of the site is not adversely affected.

Heritage Provisions – Clauses 67-75

The heritage provisions of the LEP essentially repeat the requirements of other applicable statutory controls and therefore are not outlined in detail in this report. The Heritage Impact Statement, Archaeological Impact Statement, Archaeological Management Plan and Aboriginal Cultural Values Assessment submitted with this application at Appendix C, D and E respectively, address the relevant heritage provisions of the LEP. Refer also to Section 6.1 of this report for a detailed discussion of Heritage and Archaeology.

4.5 Site Specific Documents and Policies

4.5.1 Management Plan for the Sydney Opera House

The *Management Plan for The Sydney Opera House* was prepared by the Sydney Opera House Trust and the NSW Government in August 2005. As discussed above in Section 4.2.1, it has been accredited under Section 46 of the EPBC Act to enable a Bilateral Agreement between the Commonwealth and NSW governments for planning assessment. It is also given legal effect by Section 288 of the Environmental Planning and Assessment Regulation.

The plan provides a framework for the protection of the national and World Heritage values of the Sydney House and sets out the assessment and approvals process necessary for any proposed development on The Sydney Opera House site, including any approvals under the Environmental Planning and Assessment Act 1979, the Heritage Act 1977. These requirements have been set out above in the preceding Sections.

In addition, the plan identifies ministerial responsibility by providing that:

> *The Minister responsible for administering the New South Wales Environmental Planning and Assessment Act 1979 and the New South Wales Heritage Council in administering the Heritage Act 1977 will seek to ensure that:*
> - *any potential impacts on the National and World Heritage values of the Sydney Opera House are appropriately considered at all stages of the assessment and approvals process;*
> - *in assessing an application for approval, and in making a determination in relation to that application, the decision maker will take account of the precautionary principle;*
> - *an activity will not be approved if it will have unacceptable or unsustainable impacts (significant adverse impacts) on the National and World Heritage values of the Sydney Opera House;*
> - *Approved activities will be subject to any conditions necessary to ensure that the National and World Heritage values of the Sydney Opera House are conserved, protected, presented, and transmitted to future generations; and*
>
> *Any conditions attached to an approval will be appropriately monitored and enforced.*

Impacts on the National and World Heritage values are therefore considered in detail in the Heritage Impact Statement at Appendix C and also in Section 6.1 of this report. Wherein it is demonstrated that the proposal will not result in any significant adverse impacts, on the contrary the proposed development would result in a clear net positive outcome, by *improving* the National and World Heritage values of the site. Therefore taking account of the precautionary principle, the proposed application is assessed to be one that ultimately can be supported as a matter of principle.

The Management Plan as a whole also incorporates two other documents – namely:
- Conservation Management Plan—"*Sydney Opera House: A Revised Plan for the Conservation of the Sydney Opera House and its Site*" (3rd edition 2003); and
- *Utzon Design Principles* (2002),

Compliance with those documents is set out in the following discrete section.

4.5.2 Conservation Management Plan (3rd Edition)

Conservation Management Plan—"*Sydney Opera House: A Revised Plan for the Conservation of the Sydney Opera House and its Site*" (3rd edition 2003) (CMP 2003) by James Semple Kerr identifies and

defines the significant values of the Sydney Opera House and then formulates policies framed to retain those values. Along with the Utzon Design Principles, the CMP has been formally endorsed as the guiding policy documents for the on-going conservation of the Sydney Opera House. Compliance with the relevant policies of the CMP has been demonstrated in the Architects Statement at Appendix B, The Heritage Impact Statement at Appendix C, The Archaeological Impact Assessment at Appendix D and also in Section 6.1 of this report.

4.5.3 Utzon Design Principles

The 2002 Utzon Design Principles are a record of Jørn Utzon's vision for the building and his comments on the future. They are intended as a reference for the management of proposals for change. Together with the Conservation Management Plan, they have been formally endorsed as the guiding policy documents for the on-going conservation of the Sydney Opera House.

Consideration of the Utzon Design Principles is a statutory requirement, arising from the Management Plan for the Sydney Opera House. A detailed table demonstrating compliance with all relevant design principles is included in the Architects Statement at Appendix B and also discussed in Section 6.2.4.

Chapter 5: Consultation

5.1 Outline of Consultation Process

In November 2009, the Department of Planning wrote to a number of Statutory Authorities and Agencies and requested that they identify any key issues and assessment requirements for the proposal. A copy of the preliminary plans and Preliminary Environmental Assessment was included with the letters. Responses were received from the following agencies and authorities:

- Australian Government Department of Environment, Water, Heritage and the Arts;
- The City of Sydney;
- NSW Maritime;
- The Heritage Branch of the Department of Planning; and
- Sydney Water.

A copy of those responses is included in Appendix O.

The Proponent then met in person with some key stakeholders / adjoining owners. Meetings were held with:

- State Property Authority (Owner of the Carpark)
- Real Estate Capital Partners (RECAP) (Carpark Lessee)
- The Royal Botanical Gardens
- The Sydney Harbour Tunnel; and
- Sydney City Council

Minutes of those meetings are also included in Appendix O.

Following the meetings, letters were issued to the State Property Authority, the Royal Botanical Gardens and Recap formally inviting them to comment, as was requested. At the time of writing, no written response had been received, other than a letter of owners consent from The State Property Authority. Other parties did not require follow up letters.

The proponent also communicated in writing to the strata managers for the closest residential buildings along Macquarie Street including the Bennelong Apartments and the Mirvac Managed Apartments to the south. At the time of writing, no written response had been received.

The proposal will be formally placed on exhibition as part of the application assessment process. All neighbours, local residents and interested parties will be invited to submit comments on the proposal to the Department of Planning.

5.2 Consideration of Issues Raised

5.2.1 Australian Government Department of Environment, Water, Heritage and the Arts.

The Australian Government Department of Environment, Water, Heritage and the Arts (DEWHA) requested that 2 additional maters be considered, including consideration of alternatives for service vehicle access from other locations and other adjoining properties, apart from the Sydney Opera House Forecourt and consideration of measures to conserve the ovoid Bennelong Stormwater Outfall.

Response:
These two issues have been considered as part of the Environmental Assessment. Refer to Section 3.3 where it is demonstrated that a wide range of options were considered with respect to service vehicle access locations. Section 6.1 reports on the findings of the Heritage Impact Statement and the Archaeological Impact Assessment. The majority of works to the Bennelong Stormwater Drain are proposed as part of a separate application. The minor works to the drain for the construction of the tunnel would represent a very small incremental impact to the heritage item when considered in conjunction with the previous works.

5.2.2 The City of Sydney

In the initial consultation, the City of Sydney requested that further scrutiny be provided with locating the entry and exit to the new tunnel closer to the cliff face of the Royal Botanic Gardens / Government House and existing gatehouse, so as to minimise visual impacts and maintain pedestrian amenity and suggested that in terms of the Heritage Assessment, detailed justification of the location of the entry ramp be provided so as to understand the limitations of the options considered.

At the subsequent consultation meeting the Area Planning Manger for the City of Sydney raised no objections in principle to the presented design and advised that moving the start point of the entry ramp closer to Macquarie Street and placing the ramp along the Tarpeian Wall will be favourably received by Sydney City Council. Official comments will be issued during the Environmental Assessment Review.

Response:
The ramp entry has been designed to be immediately adjacent to the Tarpeian Wall as demonstrated by the cross-section plans. The ramp entry has also been located as close as possible to Macquarie Street. It would not be possible to provide the entry any closer to Macquarie Street without making significant alterations to or diverting the existing pedestrian access tunnel to the carpark. Locating the entry closer to Macquarie Street would also result in traffic implications as there would be insufficient room for a rigid truck to stand at grade at the security gatehouse without the rear of the vehicle protruding into the roundabout. In addition, moving the entry closer to Macquarie Street would result in conflicts with the Sydney Harbour Tunnel.

5.2.3 NSW Maritime

NSW Maritime responded to the initial consultation and advised that it was satisfied the key issues for assessment were included. No response required.

5.2.4 The Heritage Branch of the NSW Department of Planning

The Heritage Branch advised that it considered the draft DGEARs as appropriate. However, in view of the potential impacts on the setting of the Sydney Opera House, it was requested that the final Assessment identifies and assesses other alternative solutions that involve lesser intrusion into the forecourt. These solutions may or may not involve use of other public / private lands to access the proposed loading docks.

Response:
Refer to Section 3.3 where it is demonstrated that a wide range of options were considered with respect to service vehicle access locations. Refer also to Section 6.1 and the findings of the Heritage Impact Statement at Appendix C which discuss the options and impact of the preferred option on the significance of the site and in particular, the Forecourt.

5.2.5 Sydney Water

Sydney Water advised that it will further assess the impact of the development when the proponent applies for a Section 73 Certificate and that the proponent must fund any adjustments needed to Sydney Water Infrastructure as a result of the development. The proponent should engage a Water Servicing Co-ordinator to manage the servicing aspects of the development. Sydney Water notes that the works are dependant on the previously agreed in principle Bennelong Drain Diversion works proceeding before decommissioning of the existing drain currently under the site.

Response:
The proponent will engage a Water Servicing Co-ordinator and will liaise with Sydney Water, obtain any necessary approvals, including Section 73 Certificates before commencing work on the site.

5.2.6 State Property Authority

The State Property Authority raised a number of questions in the consultation meeting, but did not raise any specific concerns or issues with the proposal. Questions related to depth of the dock level; proposed method of removing excavation spoil and dewatering, impacts to rock bolts or other support structures to the carpark, whether the proposal affects their land(Lot 101); the timing of the project and construction duration; hoarding types and locations.

Response:
The State Property Authority's questions were answered during the meeting and most answers are apparent from the plans and text of this report. Refer also to meeting minutes at Appendix O. Impacts to the car park were investigated and it was found that the VAPS project was not likely to impact on the carpark structure or stability. There may be some impact on the existing rock bolts, but the details of the extent and methodology for dealing with any clashes will be dealt with in the detailed design and construction phase Hoarding types and locations will be determined as part of the detailed Construction Management Plan and will be discussed with the State Property Authority before finalising.

5.2.7 Real Estate Capital Partners (RECAP) (Carpark Lessee)

A meeting was held with Recap and the proposal was outlined. Recap asked various questions, all of which were answered in the meeting. No response required.

5.2.8 The Royal Botanical Gardens

At the consultation meeting The Royal Botanical Gardens asked a number of questions to clarify the scope of the works but when asked if there were any concerns at this stage they answered "no". Questions related to access to the Gardens during the construction phase; how traffic queuing will be managed and impacts to forecourt events. The option of commencing the ramp further up Macquarie Street and going underneath the Royal Botanical Gardens was discussed and the Royal Botanical Gardens advised that such an option would not be likely to be approved.

Response:
The questions asked by Royal Botanical Gardens were answered in the meeting. Access to the Gardens will be maintained during the construction period. The dock is capable of handling 3 large trucks at any one time and large trucks for 'bump-in and bump-out' are booked in advance. Smaller vans and vehicles can also be managed within the dock area. Refer to discussion on traffic impacts in Section 6.3. Forecourt events will only be affected in so much as there is more space by raising the level of the roadway. No further action will be taken with regard to investigation of the option of access under the Royal Botanical Gardens.

5.2.9 The Sydney Harbour Tunnel

At the consultation meeting all in attendance agreed that it will not be possible to have the loading dock entry and exit via an acceleration and de-acceleration lane respectively off the southern bound Sydney Harbour Tunnel. It was also advised that in principle no issue was perceived with the proposed VAPS Project including the tunnel entry location. No response required.

5.3 Consultation Summary

Consultation has been carried out in accordance with the Department's *Major Project Community Consultation Guidelines.* Of those stakeholders who responded to the consultation, no objection was raised in principal to the proposal or to any particular aspect of it. Some stakeholders had questions about the proposal and some requested that additional information be provided / additional matters be addressed in the assessment. All those matters have been addressed through the consultation process, the information set out in this report and the accompanying plans.

There will be further opportunity for any interested parties to make representations during the exhibition period.

Chapter 6:
Environmental Assessment

6.1 Heritage and Archaeology

6.1.1 Supporting Documentation

In accordance with the Director Generals Environmental Assessment requirements and the various Statutory requirements set out in Chapter 4, the following reports are provided as the basis for this Environmental Assessment of the Heritage and Archaeological impacts:

- Heritage Impact Statement by Design 5 Architects dated 15 July 2010 (Appendix C);
- Archaeological Management Plan and Archaeological Impact Assessment by Godden Mackay Logan dated February 2010 (Appendix D);
- Aboriginal Cultural Values Assessment report by Godden Mackay Logan 06/10 (Appendix E)

The reports acknowledge that where relevant they have been prepared in accordance with the Burra Charter (Australia ICOMOS) principals and the *Statements of Heritage Impact* published by the Heritage Branch, in accordance with the Director General's Requirements 2(h) and (i).

6.1.2 Current Heritage Listings and Heritage Significance

The Sydney Opera House is listed on the following statutory registers:

- World Heritage List (UNESCO)
- National Heritage List (Australian Government)
- Register of the National Estate (Australian Heritage Council)
- State Heritage Register (NSW Government)
- Sydney Local Environmental Plan 2005 (City of Sydney Council)

The Sydney Opera House is listed on the following non-statutory heritage registers:

- National Trust of Australia (NSW) register
- National Register of Significant 20th Century Buildings (Australian Institute of Architects)

Summaries of the World Heritage Values of the Sydney Opera House; the Statement of Significance of the National Heritage Values of the Sydney Opera House; and Statement of Significance of the State Heritage Values of the Sydney Opera House are set out in the Heritage Impact Statement attached as Appendix C. As would be expected, the heritage values for each of the listings are similar and therefore each listing has not been reproduced in this document.

Fundamentally, the Statement of Significance within the Conservation Management Plan provides a relevant summary of the significant heritage values of The Sydney Opera House:

> *The Sydney Opera House is a dramatic expression of the genius of a then relatively unknown architect, Jørn Utzon (whose subsequent international fame was in part a result of the design of the building), of the high quality completion of the work by Hall, Todd and Littlemore, and of the technical support given throughout by the internationally renowned engineering firm of Ove Arup and Partners and finally by M.R. Hornibrook, the inventive contractor of stages two and three.*
>
> *The Sydney Opera House is of exceptional significance because of:*
> - *its spectacular quality as sculpture in the round both by day and night;*
> - *its inspired design solution in response to its setting;*
> - *the picturesque quality of the peninsula setting;*
> - *the way in which its fabric reflects the contemporary philosophy of creating refined forms from machine-made components;*
> - *the way in which the plastic arts, geometry and technology were drawn on to create a structure at the leading edge of endeavour;*
> - *the majestic quality of its public spaces contained by powerful structural forms;*
> - *the evidence of its fabric in expressing its place in twentieth century architecture (not excluding*
> - *the troubled history of its construction);*
> - *the seminal influence of some of its design and construction techniques;*
> - *its function as a performing arts centre of world renown;*
> - *its almost mythological status as a cultural icon (then and now) arising from all the above, from the high public interest in its protracted and controversial development; and from its power to attract artists, patrons and tourists on a national and international level.*
>
> *This significance is intensified by the extensive associations of the site and its structures, including:*
>
> *Aboriginal and European contact (Bennelong and his house); scientific investigation (Flinders and Baudin); defence (Phillip's 1788 redoubt to Greenway's Fort Macquarie, 1817–1901); Picturesque planning (Macquarie to Utzon); marine and urban transport (overseas shipping and local ferry wharves, tram terminal and depot); popular recreation; and, finally, the nation's most famous cultural icon (The Opera House) and its legions of national and international performers.*

6.1.3 Assessment of Impacts on World Heritage Values, National Heritage Values and State Heritage Values

A detailed discussion of the impact of the proposal on the World Heritage Values, the National Heritage Values and the State Heritage Values of the Sydney Opera House is provided within the Heritage Impact Statement at Appendix C. This discussion is exclusive of considerations relating to Archaeological Heritage and Aboriginal Heritage which are discussed separately in Sections 6.1.4 and 6.1.5 below.

As discussed above the set of values for each listing are similar, and therefore the assessment of the impacts on each set of values is also similar. While some individual elements within each assessment vary, the overall conclusions are almost identical and it is found that while the proposed works will have a significant material affect on the place, most of the works are confined to underground and overall they will not have a negative impact on the World Heritage Values, The National Heritage Values or The State Heritage values of the Sydney Opera House. Rather, the proposal will retain and potentially enhance those values by improving the functionality of the Sydney Opera House and improving pedestrians' experience on and off the Forecourt. These conclusions are based in part on the assessment of the

proposal against the Conservation Management Plan 3rd edition, as this was one of the primary documents in support of the nomination of the Sydney Opera House to the World Heritage List and as The NSW Heritage Council considers the CMP 2003 to include comprehensive policies that will guide the long-term conservation of the World, National and State Heritage values of the Sydney Opera House. Refer to discussion in Section 6.1.6 below in relation to compliance with the CMP 2003.

The following summary of the heritage impacts of the proposal is extracted from the report:

> *The proposed Vehicle and Pedestrian Safety Project (VAPS) will have a significant material affect on the Sydney Opera House but apart from the forecourt, these impacts are mainly confined to existing and new underground areas and less significant 'back-of-house' spaces. The proposal will also have some impact on the immediate setting of the place in relation to the pedestrian arrival experience and the forecourt, although many of these impacts are considered positive.*
>
> *On balance, we conclude that these impacts will retain and potentially enhance the World Heritage, National Heritage, and State Heritage values of the Sydney Opera House by removing heavy vehicles and other hazards to pedestrian safety from the forecourt approach to the place, and also by improving the functionality of the Sydney Opera House as a premier performing arts centre of national and international repute. The improvement in pedestrian safety will enhance the visitor and patron experience of approaching the building and permit a safer appreciation of this outstanding architectural icon, "great urban sculpture", from the forecourt.*
>
> *Potential archaeological impacts are discussed and addressed in the 'Archaeological Management Plan and Archaeological Impact Assessment' (February 2010, by Godden Mackay Logan). A range of options for the location of the access to the loading dock were considered and the decision made to locate it wholly within the SOH site. Refining this location was made more difficult by the complex arrangement of existing tunnels and services, (including the air intake shaft for the underground carpark) in the area close to the site entry off Macquarie St. The aim was to maximise the open paved area of the forecourt between the monumental stairs and the Tarpeian Wall, and minimise the visual impact of the entry point on the setting of SOH and its forecourt.*
>
> *The option selected and described in documents accompanying this application, finely balances these objectives and achieves an increased width of the paved forecourt area between the monumental stairs and the Tarpeian Wall, and a security post and ramp entry as close as possible to Macquarie St site entry, without having to completely divert and rebuild the underground pedestrian access to the carpark. The loss of the area affected by the new tunnel entry is offset by the removal and repaving of the sunken roadway as a continuation of the level surface of the forecourt and its increased amenity as a public gathering and community event space.*
>
> *The project will also remove or replace many of the elements in the forecourt area which have been assessed as intrusive, and thus improve the 'open relationship' of this space with the setting of the Sydney Opera House. The most intrusive of these relate to pedestrian safety and include the sunken roadway leading to the vehicle concourse. This roadway presently deters pedestrians from approaching the monumental steps, intended by Utzon to be the primary approach to the building. Removal of the heavy vehicles and the trip hazard kerbs would be in complete accordance with objectives outlined in various policies in the CMP 2003.*
>
> *This present proposal has a major impact on existing below ground site services and requires their relocation as well as the Bennelong Sewer to allow it to sit as close as possible to the Tarpeian Wall face.*
>
> *The existing guardhouse, identified as 'intrusive' in the CMP 2003, is reduced in size and re-located in line with the new loading dock entry.*
>
> *The proposal will impact on the broad open sweep of the paved forecourt by its encroachment, and potentially on the views and appreciation of the Tarpeian Wall itself, however due to the careful placement of the proposed loading dock entry tunnel, and the details of the surrounding kerb and balustrade, these impacts are considered acceptable. The edge detail around the tunnel entrance is simple and minimal in scale and should*

not distract from the strength and scale of the Tarpeian Wall, but it will prevent close viewing of this section of the cliff face. The balustrade treatment is open allowing minimal obstruction of views.

The proposed construction of the underground loading dock will involve excavation around and below the existing tie beams connecting the base of cranked concrete beams supporting the monumental stairs, with the base of the podium on the north side of the vehicle concourse. It is proposed that none of these tie beams be cut or re-located. They will be incorporated into the design and configuration of the proposed concrete beamed ceiling over the new loading dock space. The main structural elements connecting these tie beams and cranked beams together beneath the base of the stairs will not be affected by the works.

The VAPS project anticipates the as yet unfunded Opera Theatre Renewal project, allowing for it to 'add on' to the facilities provided in this project. The new acoustically isolated loading dock facility will replace this same activity in the central passage, allowing it to operate at any time.

The proposed works for the VAPS project will have only minor impacts on backstage areas and will improve functional flexibility and efficiency. It will also allow the central passage space to be better utilised as the main back-of-house pedestrian and circulation spine in the podium.

In the VAPS proposal, Utzon's concept of creating a powerful sequence of approach and arrival spaces is retained, respected and strengthened.

The most significant impact will be during the construction period, when the facilities, activities and excavation required will have a major impact on the topographic setting. These activities and the movement of trucks carrying excavated material or delivering new materials will be a constant source of intrusive noise and annoyance to patrons and visitors as well as the surrounding areas, and will require careful planning and constant management to ensure the impact is acceptable.

A number of recommendations are also made to mitigate against impacts to the World, National, and State Heritage values. Refer to discussion in Section 6.1.8 below.

6.1.4 Assessment of Archaeological Impacts

The Archaeological Management Plan and Archaeological Impact Assessment at Annexure D provides a comprehensive assessment of the Archaeological potential of the site, its significance, an assessment of the impacts of the proposal, as well as mitigative strategies.

It is noted that the National Heritage List and World Heritage List citations for Sydney Opera House do *not* include the site's archaeological potential. Furthermore, The New South Wales State Heritage Register citation also concludes that the contribution of the site's potential relics to the site's overall significance is likely to be low. While the Sydney Opera House is an item of Outstanding Universal Value, the site's potential archaeological remains have no direct association with Sydney Opera House itself or this significant phase of the site's history.

The study area has potential to contain archaeological evidence associated with the modification of Bennelong Point's shoreline, Fort Macquarie, nineteenth- and twentieth-century wharf and harbour facilities and the twentieth-century tram operations. The potential remains are assessed and while some remains (such as evidence of the changing shoreline, evidence associated with Aboriginal occupation, remains associated with Fort Macquarie) would be considered to have a high archaeological significance, others would only have a moderate significance (such as relics relating to the nineteenth-century wharf facilities) or low significance (relics associated with the operation of the trams).

The Archaeological Impacts Assessment finds that the component of the proposed works that would have the greatest archaeological impact would be the potential cut-and-cover excavation for construction of the loading dock and loading dock turning circle. Excavation of this area (that is, disturbance of levels above the proposed loading dock level) would potentially disturb structural and other remains associated with the south-eastern extension of the Fort Macquarie battery, structural and other remains of an early nineteenth-century building in this area, and potential remains associated with the original shoreline and former seawalls. Excavation of this area would therefore be considered to have a major archaeological impact.

The proposed construction of the remainder of the new basement level that will be constructed by horizontal drilling rather than excavation would be unlikely to have any major archaeological impacts, given the proposed depth of the new basement level (below the majority of the site's potential archaeological remains).

Two of the proposed lifts that would be unlikely to have any impacts as they would be located within the footprint of the existing basement level. The proposed temporary scenery lift may have some impacts, as it would extend through a part of the site that may not have been previously disturbed. It would be located within the former footprint of Fort Macquarie and the later tram-car house and may therefore disturb archaeological deposits or features associated with these periods of the site's history. The nature and extent of any surviving remains in this specific area is unknown.

The proposed cut-and-cover construction of the vehicular tunnel is considered to have a relatively minor archaeological impact as this area of the site is identified as having limited archaeological potential or significance. Potential remains, if they survive, would be likely to be limited to tram tracks and other associated infrastructure. These are assessed has having only low significance and research potential.

Excavation for the proposed tunnel would also require removal of sections of the Bennelong stormwater channel (sections of the original brick oviform drain as well as later concrete diversions). The stormwater channel would have been diverted prior to the commencement of the proposed works (as part of a previous development proposal for the site, in preparation for the current scope of proposed works). Removal of sections of the drain for construction of the tunnel would represent only a minor incremental impact to this heritage item when considered in conjunction with the previous works. It should be noted that this proposal does not include any change to the Outfall of the stormwater channel at the sea wall.

The assessment makes a number of recommendations to mitigate against the archaeological impacts of the proposal. These are outlined in Section 6.1.8 below.

6.1.5 Assessment of Aboriginal Cultural Heritage Impacts

The Aboriginal Cultural Values Assessment at Annexure E identifies Aboriginal cultural values associated with the place and an assessment of the impacts of the proposal on those values.

The National Heritage Listing for the Sydney Opera house recognises Aboriginal cultural values and associations with the site, in particular with Bennelong, an Aboriginal man 'captured' by Governor Phillip and who subsequently lived on the peninsula. The Conservation Management Plan 2003 also recognises Aboriginal Associations as described above in Section 6.1.2. While the CMP 2003does recognise Aboriginal use of the site, it is assessed only in light of the potential for physical remains. Refer to Section 6.1.6 below for a discussion of compliance with the CMP 2003 policies.

Consultation with Aboriginal stakeholders has built upon these previously documented values and a range of cultural values, both tangible and intangible are set out in the report. Values relate to the association of the site and surrounding areas a meeting and gathering place for Aboriginal people, the negative associations with the site including the dislike of the Australia Day commemoration in the Botanic Gardens and the slaughtering of Aboriginal people in the early days of settlement. The Tarpeian Wall Project (a planned future mural) is of particular interest to the local Aboriginal communities. The value of the place for performing arts, including Aboriginal performers. Surviving middens and physical relics would also have value.

There is potential for impacts to any physical Aboriginal objects that may survive at the site. The Aboriginal cultural values associated with any such tangible material is high, regardless of any previous level of disturbance. Works may also impact upon intangible cultural values, which may be connected to the potential physical evidence of Aboriginal heritage or may also be connected to the history and beliefs associated with the site.

The report makes a number of recommendations for the mitigation of both physical impacts and for the ongoing management of broader Aboriginal cultural values associated with the Sydney Opera House. These are set out in Section 6.1.8 below.

6.1.6 Compliance with Conservation Management Plan 3rd Edition

Conservation Management Plan—"*Sydney Opera House: A Revised Plan for the Conservation of the Sydney Opera House and its Site*" (3rd edition 2003) (CMP 2003) by James Semple Kerr identifies and defines the significant values of the Sydney Opera House and then formulates policies framed to retain those values. As described above, it includes comprehensive policies to guide the long-term conservation of the heritage values of the place and thus is given status through various statutory requirements outlined in Chapter 4.

It is noted that the objectives of minimising intrusion of heavy vehicles into the forecourt and separating them from pedestrian traffic and to provide a new loading dock facility that is acoustically separate from the performance venues area identified in the CMP 2003 as being important to the future safe and efficient use of the Sydney Opera House.

The Heritage Impact Statement provides a detailed assessment of the proposal's compliance with the CMP 2003. It considers the impact on each of the significant elements of the place followed by a detailed discussion of all relevant policies. Consideration of the impacts on the various elements is similar to the matters considered in Sections 3.5 and 6.2 of this report and is not repeated here.

26 of the policies set out in the CMP 2003 are relevant to the proposed application. The following is a summary of the findings of the Heritage Impact Statement and the Archaeological Impact Assessment with regard to compliance with these policies:

> *Policy 1.1 Utzon, Hall and the approach to change – Utzon's principles*
> *Policy 1.2 Utzon, Hall and the approach to change – Utzon's concepts*
> Refer also to the *Architects Statement* at Appendix B. The proposal responds positively and well to Utzon's Design principles and concepts, particularly in terms of design, form, materials, scale, function and human experience, and by ensuring all of the essential fabric and elements of the design concept are retained.

Policy 1.5 Utzon, Hall and the approach to change – Major works
Policy 1.6 Utzon, Hall and the approach to change – Additional on-site facilities
These policies anticipated a project to resolve the heavy vehicle access and loading dock. The assessment finds that overall the proposal is a positive impact, but care will be required to ensure the quality and detail described in the concept design is achieved in the implementation. To achieve this, the procurement processes for projects at the Sydney Opera House should, except in extenuating circumstances, both encourage and allow key individuals of the original design and consultant team to be engaged for all stages of a project, providing continuity from inception to completion. Refer to the recommendations in Section 6.1.8 below. Policy 1.5 also requires compliance with Policy 56.1 – see below.

Policy 3.3 Setting – Open and uncluttered setting
Policy 4.1 Setting – Forecourt pedestrian and vehicle paths
Policy 4.2 Setting – Forecourt pedestrian and vehicle paths
The VAPS Project not only maintains the open and uncluttered setting of the forecourt and removes a number of intrusive elements, it simultaneously reduces the conflict of pedestrian and vehicle paths and makes the approach to the Sydney Opera House via the Forecourt clearer and safer.

Policy 6.1 Exterior – External form
Policy 6.2 Exterior – External form
The Project introduces a new permanent element into the southern side of the forecourt, however it is far enough away from the podium and monumental stairs, as well as important view lines, to avoid adversely affecting the exceptionally significant exterior form of the Sydney Opera House. The proposal also removes the need for the above-ground loading dock : both a distracting and unsightly element, as well as a hazard to pedestrian safety. The negative impact on the southern side of the forecourt but this must be balanced against the substantial functional and safety improvements across the forecourt and resulting in a very positive impact overall .

Policy 11.1 Exterior – Podium "platform", broadwalk and forecourt
The removal of heavy trucks and the majority of vehicles from the Forecourt is consistent with the policy. The proposed entry ramp and opening will introduce a new permanent element but its detailing, configuration, and location mean that it should not be visually intrusive. Proposed materials and colours are consistent with Utzon's palette of natural materials used elsewhere on the site.

Policy 13.1 Exterior – Paving and cladding of podium and broadwalk
Policy 13.2 Exterior – Paving and cladding of podium and broadwalk
Details of the materials and finishes outlined in the Architects statement indicate that precast pink reconstituted granite panels will be used to line the publicly visible sections of the tunnel entry, with the angled parapet and bronze handrail and balustrade detail matching that on the western side of the forecourt. To ensure a good match, care should be taken to achieve a finish which is not highly polished.

Policy 15.3 Exterior – The forecourt and lower forecourt
As expected under the policy, the existing level of the Forecourt is retained under the proposal and is improved by removal of the kerbed roadway. Above ground protrusions are limited to the loading dock entry opening which has been assessed as acceptable. In addition, as part of the project the existing surface area of the grille over the air intake vents for the carpark will be reduced to decrease its intrusion on the forecourt space. As required, the affected Forecourt areas will be repaved in the same material as existing in this project. In terms of below-ground impacts, the Archeologically Impact Assessment at Annexure D and the in Section 6.1.4 above details the appropriate method to record the fabric of the storm water drain consistent with the requirements of Policy 15.3

Policy 21.1 Lighting – Forecourt and podium steps
Lighting studies will be carried out to investigate the appropriate methods, locations and illumination levels, to improve lighting in the areas affected by the Project.

Policy 25.1 Character and treatment of internal spaces – New areas
The policy envisages new underground spaces and provides that where they have a visual relationship with the Hall designed spaces they should correspond with the design regime. In this case the proposed underground loading dock has no significant visual relationship with Hall designed spaces. The form, material, natural finishes and colours proposed for the project are consistent with Utzon's Design Principles and are considered appropriate.

Policy 37.1 Spaces within the podium – Central vehicle passage as delivery space
The policy anticipates the increasing demand for improved delivery of goods that may put pressure on creating additional openings to the podium. The VAPS proposal removes this pressure. The proposal does not affect the central vehicle passage which is a significant space within the podium.

Policy 38.1 Care of the fabric – Removal or alteration of fabric
Important fabric should be removed only when there is no feasible alternative or in the context of an overall plan. In this case the proposal is the result of consideration of an extensive variety of other options, which were either not feasible or resulted in greater impacts.

Policy 39.1 Care of the fabric – Treatment of intrusive items
Policy 39.2 Care of the fabric – Treatment of intrusive items
Several intrusive items will be removed or modified including the Forecourt Present security gatehouse 3 circular granite edge planter beds; Garden and dwarf granite walls at base of Tarpeian cliff; Cat's eye reflectors and black and yellow speed humps on roadway; Impediments to pedestrian vision across and into forecourt and Vehicle concourse Glazed shop added beside Reception Hall entry.

Policy 46.3 Housekeeping – Signs
Any signage associated with the Project will be guided by the Signage Manual.

Policy 49.1 Managing the process of change – Use, approach and review
The improved operational efficiency will enhance the use of the Sydney Opera House as a performing arts centre as well as a place for outdoor visitation.

Policy 51.1 Managing the process of change – Relating levels of significance to proposals
The impact of the VAPS Project on affected spaces, qualities, features and components of the Sydney Opera House is discussed in more detail in the tables in Section 10.0 of the Heritage Impact Statement. As the majority of works are below ground, they are unrelated to areas of high significance.

Policy 53.1 Managing the process of change – Excavation
Archaeological and excavation issues – both Aboriginal and European – are addressed in the reports prepared by Godden Mackay Logan at Appendix D and E and as discussed above in Sections 6.1.4 and 6.1.5. As required by this policy, these archaeological reports have been prepared as supporting documentation for an application to the Heritage Branch to ensure that the potential archaeological impacts of the proposed works are appropriately managed

Policy 56.1 Managing the process of change – Sequence and advice in developing proposals
Design 5, as heritage architect and consultant, has been involved since 2004 in various processes of investigating options and assessing proposals affecting the Sydney Opera House, including providing comment on various options under consideration for the current VAPS Project. Design 5 has detailed knowledge and understanding of the significance of the place and is also currently preparing the 4th edition of the Conservation Management Plan for the Sydney Opera House.

6.1.7 Compliance with Sydney Opera House Management Plan 2005

The three reports (Heritage, Archaeology, Aboriginal Values) that inform this heritage section of the Environmental Assessment have been prepared to address the heritage impacts of the proposed works in relation to the requirements of the Sydney Opera House Management Plan and to provide supporting documentation for the required statutory approvals.

The Heritage Assessments conclude that the proposed works do not include any activities that would have a significant adverse impact on the National and World Heritage values of Sydney Opera House. As set out below, the reports also recommend measures to mitigate and protect the National and World Heritage values of Sydney Opera House. These measures are included in the Draft Statement of Commitments in Chapter 7 and can be formalised as conditions of approval. The conclusions and recommendations are consistent with the objectives of the 2005 Management Plan.

6.1.8 Measures to Mitigate against Impacts

The following is a list of the combined recommendations of the three reports in order to mitigate against heritage impacts arising from the proposal. Where recommendations are similar or cross-over between the reports, they have been combined to create a single recommendation.

- The quality and detail described in the concept drawings and documents should not be diminished during the detailed design or construction process. In order to achieve this, the documentation and construction process should be reviewed at regular and/or significant points along the project's implementation program to ensure these are maintained, and if possible enhanced. Unless prevented by extenuating circumstances, key personnel from the original architects and designers of the project should be part of this quality control and checking process, and their recommendations properly considered and included in the implementation.
- Specialist heritage conservation advice should continue to be sought during the design development and documentation stages for the VAPS Project and continue through to completion of the project to ensure the broader as well as detailed conservation objectives are achieved.
- The location of hoardings and site and construction facilities required to carry out the works, should be located as unobtrusively as possible and should only be erected for a stated limited time to minimise impacts on the setting and accessibility of the Sydney Opera House. Hoardings should be erected to contain all aspects of the proposed excavation and construction works.
- The Sydney Opera House Trust should advise the public via appropriate signage or other means, of the purpose of the works and their timeframe.
- Construction activities and the movement of trucks carrying excavated material or delivering new materials should be carefully planned, considered and managed and monitored to ensure their impact on patrons, visitors and surrounding areas is minimised and acceptable.
- The program of archaeological investigation outlined in the Archaeological report should be adopted as part of the mitigative strategy for these works to address the potentially adverse impacts that these works would have on the archaeological significance of the site. The proposed program of archaeological investigation includes:
    - Potential cut-and-cover excavation for loading dock construction—archaeological testing of this area prior to bulk excavation, followed by further archaeological investigation (open area excavation or monitoring, if required).

- Cut-and-cover excavation for vehicular tunnel—exposure and recording of sections of Bennelong stormwater channel (original section and later diversion) prior to removal of these elements, followed by monitoring of the initial stages of all excavation works.

- Archaeological monitoring of proposed development works should occur in accordance with the Archaeological Management Plan submitted as part of the application. It would be appropriate for Aboriginal stakeholder representatives to participate in the monitoring.
- In the event that any archaeological remains were to be exposed during site works, they should be appropriately documented according to the procedures outlined the Archaeology Report.
- Suitable clauses should be included in all contractor and subcontractor contracts to ensure that on-site personnel are aware of the heritage issues associated with the site and the role of the archaeologist(s) on site.
- Subsurface disturbance should be limited to those areas identified in the documentation of the proposed works so as to avoid disturbance of other potential archaeological remains at this site.
- In the event that unexpected historical archaeological evidence were to be encountered during site works, works should cease and the Heritage Branch, Department of Planning should be notified immediately. Further assessment and/or approval may be required before works could recommence.
- In the event that unexpected Aboriginal archaeological evidence were to be encountered during site works, works should cease and the Department of Environment, Climate Change and Water (DECCW) should be notified immediately. Further assessment and/or approval may be required before works could recommence.
- In the event that Aboriginal cultural material is identified and collected, it may be appropriate for such material to be retained, interpreted and displayed on site. Further consultation with Aboriginal stakeholders would be required to determine the appropriate management of such material.
- The proposed works do not allow for in-situ retention of any archaeological evidence in the areas of proposed excavation. In-situ retention of the potential archaeological evidence on this part of the site would not be viable as part of the proposed program of works.
- Opportunities to interpret any evidence discovered during the proposed forecourt works should be considered as part of a holistic approach to interpreting the site.
- An online resource should be established to provide information about the proposed works before they commence, in anticipation of public interest in visible on-site works.
- Any artefacts recovered from the site during site works and a full set of archaeological investigation reports should be included in the Sydney Opera House's moveable heritage collection.
- Sydney Water should be consulted in relation to any preservation requirements, including the retention and storage of any fabric or artefacts recovered from the Sydney Water asset (Bennelong stormwater channel).
- A copy of the Archaeological report should be sent to the Metropolitan Local Aboriginal Land Council for their information.

The following recommendations are not strictly related to the proposed works but are made for the ongoing management of broader Aboriginal Cultural Values for the site:

- The Sydney Opera House Trust should develop a protocol for ongoing Aboriginal stakeholder consultation and engagement as part of the long-term management of the Sydney Opera House.
- The Sydney Opera House Trust should develop and interpretation strategy that outlines an approach to the recognition and interpretation of the Aboriginal cultural values and Aboriginality associated with the Sydney Opera House site. Aboriginal people are the rightful interpreters of Aboriginal cultural heritage. Any proposed interpretation of Aboriginal cultural heritage at the Sydney Opera House should involve identified Aboriginal Stakeholders.
- As part of the current revision of the Sydney Opera House Conservation Management Plan, further consideration and assessment of Aboriginal cultural values with regard to the aforementioned recommendations should be considered. Such revision would facilitate better consideration of Aboriginal cultural values within the day-to day management of the Opera House.
- Any future revision of the Management Plan for the Sydney Opera House should reflect the updated Conservation Management Plan, particularly any revised policies regarding Aboriginal cultural significance.

6.2 Urban Design and Visual Impacts

The design and resulting visual impacts of the proposal are considered in detail in the Architect's Statement and the Heritage Impact Statement included at Appendix B and C. Relevant to this assessment the following observations provide a summary of the main findings of those documents as they relate to the satisfaction with the urban design and visual impacts. A further consideration of satisfactory compliance with Utzon's Design Principles is also included in this section.

6.2.1 Visual Impacts to the site as a whole

The proposed works will restrict the clutter of the otherwise alien traffic intrusion on the unique and special visual qualities of the Sydney Opera House and on the majestic qualities of its public forecourt. The proposed works will simplify and make safer the broad open platform on which the spectacular sculptural form of the Sydney Opera House sits. By removal of the depressed roadway, as well as removing distracting and intrusive service vehicle traffic from the Forecourt, the appreciation of the spectacle of this '*sculpture in the round'* is enhanced when viewed and traversed from its southern approaches.

Consistent use of the existing materials means that the proposal will have no adverse impact on the sculptural form, materials and colours of the place. The proposed works continue the language of honest expression of natural materials, textures and colours used in the original design of the forecourt, broadwalk and podium – unpainted off-form concrete, precast reconstituted granite paving and wall cladding panels.

As viewed from Macquarie Street and the pedestrian approach from the City:
It is from this external vantage point that changes will be most apparent. The pedestrian approach from the city is a key feature of Utzons intended arrival sequence. The new ramp and shared pedestrian zone will improve openness in the visitors approach to the Sydney Opera House. As visitors approach, the width of the pedestrian area reduces between the Tarpeian Wall and the western edge of the Forecourt before expanding into the full width of the Forecourt. The proposed development allows for a broad paved area to act as a continuation of the Forecourt, increasing the sense of opening and improving the pedestrian's sequential visual experience as originally intended.

As viewed from the foreshores and the waterway:
From all other external vantage points, the proposal will not result in any change to the significance of the way in which the site is viewed. The change in built form would be barely perceptible for most persons viewing the site from other foreshore locations or from the Harbour. The location of the entry ramp adjacent to the Tarpeian Wall, the low rise upstand around the ramp entry, the use of materials which match existing materials on the site and complement the natural rock face of the wall, mean that the new above ground structure will be barely perceptible from foreshores and waterways. Even where the structure is perceptible, its location, close to the site entry from Macquarie Street, will mitigate its potential impact on the setting by keeping it as far away from the Sydney Opera House itself as possible, thus minimising its impact on views to and from that place. The one significant change that will be perceptible however, will be the reduction in service vehicle movements meandering through the site, thereby resulting in a net positive visual impact to the site and its contribution to the foreshores and waterways of Sydney Harbour.

As viewed from adjoining Sites
The proposed entrance ramp will be obscured from the eastern boundary that is otherwise overlooked from the elevated adjoining Botanical Gardens or from Government House adjoining to the south. It will be visible from the pedestrian pathway at the top of the Tarpeian Wall, know as Tarpeian Way, but only if looking immediately down over the edge of the cliff face and therefore does not form part of the primary panoramic views of the Sydney Opera House and the Harbour from this point. Any minor adverse visual impacts from this vantage point are off-set by the positive impacts of having an essentially underground path for service vehicles and therefore their elimination from view.

6.2.2 Urban Design and Impacts of Above-ground Elements

Guardhouse
The existing guardhouse is identified in the CMP 2003 as 'intrusive', impacting on important views of the Sydney Opera House as approaching from the city. The location of the new entry ramp also allows the guardhouse to be located much closer to the Tarpeian Wall. Compared to the existing structure the new guardhouse will be a constructed in bronze and matching glass as a simple cylindrical shape of reduced volume and dimensions. The overall result of the proposal is a valuable reduction in the visual impact of this necessary functional structure due to its size, colour, location and simplicity of design.

Vehicle Entry Ramp
Visual impacts of the proposed ramp entry are minimised by ensuring that new works are integrated into the forecourt through geometry, material, module and detail. Important aspects of the design include:

- Sympathetic alignment of the ramp with the curve of the Tarpeian Wall reflects the line of Wall, the opposing line of the western Forecourt edge; and larger outline of the Boardwalk and Forecourt;

- Ramp grade maximised to shorten the opening;
- Sloping wall up-stand constructed of precast granite to match exiting podium cladding and western parapet edge of the Forecourt; as with angled parapet and bronze handrail and balustrade detail
- Ramp paving will be constructed of granite or similar material to complement existing Boardwalk and Podium paving
- A single row of granite slabs laid below the upstand and ramp parapet will mirror the existing double row against the western edge of the Forecourt.

The proposed loading dock entry ramp and opening will introduce a new permanent element into the southern edge of the space, but the visual impact is considered acceptable as adverse impacts have been minimised through careful design and any remaining impacts are more then offset by the positive visual impacts of the removal of the separated roadway and reduced above-ground service traffic on the site.

Roadway

The proposed removal of the depressed roadway level and replacement with a repaved surface that is level with the surrounding paving in the same material as existing results in positive visual results as well as safety provisions. It allows for the western area of the Forecourt above the Lower Concourse to be unified in all respects with the rest of the Forecourt. Associated existing intrusive elements including cat's eye reflectors and yellow speed humps will also be removed and a more sympathetic treatment to mark the shaded pedestrian / vehicle zone will be provided.

Air Vents

Existing air intakes and exhausts associated with the adjoining underground carpark will be retained. However the air intake grille at the base of the Tarpeian cliff will be replaced with a new shaped grill custom designed in bronze or similar material and the surface appearance of the shaft will be reduced, resulting in a positive visual impact. Outside air intakes for the new dock are discretely located in the Vehicle Concourse and exhaust discharged below the Eastern Boardwalk while new egress points are proposed in the lower section of the external ramp. As such with the further improvements overall there are no adverse visual impacts arising from these retained functional elements.

Lighting

Improved forecourt lighting will be incorporated as part of the proposal. The final form of the lighting has not yet been determined. It is proposed to carry out detailed design investigation during the design development phase to ensure lighting will complement and enhance the special features of the place and will be consistent with Utzon Design Principles, the lighting policies specified in the CMP 2003 and the Utzon endorsed 2007 Lighting Masterplan.

Other Forecourt Elements

Various elements assessed as intrusive, including the granite edged planter beds, garden and dwarf granite walls will be removed as part of this project – resulting in further positive visual outcomes.

6.2.3 Design and Impacts on Existing Internal and Below-ground Elements

There are no impacts to any of the main internal spaces of the Sydney Opera House. Internal changes are otherwise minor and limited to the following:

Backstage Areas
The proposed works for the VAPS project will have only minor impacts on backstage areas and no adverse visual impacts. Backstage staff areas on Level +12 will be accessed via modified passenger lifts shown on the plans as Lifts 22 and 23. There is also an extended lift 12 to the Concert Hall and the new scenery lift to the opera Scenery Store. Apart from these lifts, no other changes to existing backstage areas are proposed as part of this development.

Service areas
Only minor works are proposed in these areas, mainly associated with the modification of existing lifts and stairs. Any areas that are affected will include simple finishes to match the existing will be included to ensure no adverse visual impacts arise.

Lower Concourse – pedestrian tunnel
The proposal will impact on the existing pedestrian tunnel entry to the helical carpark. Modification to the roof of this pedestrian tunnel will be required to accommodate the clearance for the vehicle entrance ramp above, but there will be no other changes to its configuration. There will be no visual impact to the pedestrian link or lower concourse

6.2.4 New Loading Dock Design

In terms of design, Page 11 of the Architect's Statement describes the design concept of the loading dock:

> *Utzon's Architecture is characterised by beautiful and inventive concrete structures which tested the limits of engineering and construction technology of the time. The dock area will be one of the largest spaces in the building and will be integrated with the architecture of the Opera House through the dominant quality of refined and expressed concrete structure.*

The form, material, natural finishes and colours proposed for the project are set out in detail the Architects statement and are consistent with Utzon's Design Principles.

As this part of the proposal is underground and does not impact on any of the existing parts of the Sydney Opera House, no adverse visual impacts arise. It is acknowledged that the proposed underground loading dock and associated spaces such as plant rooms, lifts and stairs, have no significant visual relationship with Hall designed spaces. The design is appropriate to the existing hierarchical regime for the place particularly for service areas and therefore a detailed consideration is not warranted in this summary report.

6.2.5 Utzon Design Principles

The 2002 Utzon Design Principles are a record of Jørn Utzon's vision for the building and his comments on the future as his legacy, they are intended as a reference for the management of proposals for change. Together with the Conservation Management Plan, they have been formally endorsed by the then Heritage Office and the Management Plan for the Sydney Opera House as the guiding policy documents for the on-going conservation of the Sydney Opera House.

As set out in Chapter 4, consideration of the Utzon Design Principles is a statutory requirement, arising from the Management Plan for the Sydney Opera House. A detailed table demonstrating compliance with all relevant design principles is included in the Architects Statement.

Of most relevance are some of Utzon's comments regarding the future, including:

> *Keep the approach, the openess and fluidity of movement*
> *"One of the great features of the Opera House is the approach, the openness, the fluidity of people's movements through the house, and once you clutter this you have a problem."*
>
> *Accommodate new approach and back of house for events under Forecourt*
> *"It might still be possible to locate functions underground under the eastern part of the forecourt."*
> *"If needed some functions could be sunk below the forecourt level, in such a way as to be accessible from the forecourt, but without disturbing the visual impact of the original layout."*
> *"...an approach from the underground parking in the Botanical Garden could emerge via an opening in or near the Tarpian wall. Facilities like dressing rooms or rooms for temporary catering for activities in the forecourt could be placed under the forecourt surface*
> *Access from carpark through a hole in the forecourt. Space could accommodate back of house and storage for outdoor events.*

The proposed development is consistent with these principles in that the primary aim of the proposal is to improve the fluidity of pedestrian movement by removing as many vehicles as possible. Access from the adjoining carpark was investigated but not feasible (refer to discussion regarding design options in Chapter 3), however the proposal is otherwise consistent with Utzon's vision for undergrounding of services while maintaining the original layout of the Forecourt.

Other relevant principles relate to: Orientation and Movement; Geometry of Architecture; Structural Expression; Colour and Light. Through careful design, the use of consistent materials and finishes, the proposal is demonstrated to be well integrated and consistent with all such principles.

6.3 Traffic and Vehicular Access

6.3.1 Introduction

A description of the current site and traffic arrangements has been detailed in Chapter 2 of this report. Importantly, there are around 150 delivery and service vehicles arriving at the site on a typical day. Of these, around 90 are trucks making general deliveries to the Western Broadwalk Loading Dock for the day to day function of the Sydney Opera House and 40-50 are service and courier vehicles which access the Stage Door vehicle concourse. Larger trucks and semi trailers also access the site for deliveries to the Central Passage. The volume of these vehicles varies greatly and is especially high during the "bump in' and 'bump out' at the beginning / end of a production period with a peak of up to 20 vehicles over a two day period. All vehicles currently traverse across the forecourt along the designated route, with larger vehicles continuing along the entire length of the Western Broadwalk before entering the building at the northern end of the central passage. As such there is significant potential for conflicts with pedestrians who also use this area.

The proposed underground loading dock would be for the use of almost all vehicles accessing the site, removing those vehicles from the Forecourt and pedestrian areas. A full description of the proposal and the associated new traffic arrangements is included in Chapter 3 of this report. In accordance with Issue 5 of the Director General's requirements, Halcrow have prepared a Traffic and Vehicular Access Report to address Operational and Construction Traffic impacts of the proposal, as well as outline restrictions on access to the Sydney Opera House and adjoining properties and the proportion of vehicles accessing the site that will be affected by the proposal. A copy of the report is included at Appendix F. The following provides a summary of the main findings in term of traffic impacts.

6.3.2 Operational Traffic Impacts

On-site Traffic Movements

Existing vehicle access restrictions will remain unchanged by the proposal and general vehicle access to the site will remain prohibited, other than hire car and taxi services for the drop off / pick up of patrons. As with the existing arrangements, deliveries vehicles will continue to be required to be pre-booked. The number of on-site traffic movements (around 150 vehicles or 300 movements per day) would therefore remain the same.

However the vast majority of vehicles, including delivery vehicles and trucks will be removed from the forecourt and relocated to the new underground loading dock. Vehicle access to the Forecourt would be limited to taxis and hire cars, ad hoc Sydney Opera House vehicles including the mini bus and emergency vehicles. The proposal therefore results in a positive impact in this regard.

Off-site Traffic Movements

As vehicle numbers remain the same, there will be no change to the daily volume of traffic utilising Macquarie Street and the surrounding road network. The only change will be to the times at which vehicles may arrive, as the restriction on vehicles entering during performance times can be lifted. It is expected that most daily deliveries such as those associated with the food and beverage uses on the site will continue with the same operational hours, however vehicles associated with the high demand "bump in" and "bump out" periods for the performing arts uses will be able to load and unload over a greater period of time, load more efficiently and thereby reduce the number of vehicles generated in anyone peak period: a positive result for off-site traffic impacts.

Impacts to Neighbours

As detailed in Chapter 2 of this report there are a number of land uses within the vicinity of the entrance to the Site which use Macquarie Street to access the Sydney Opera House Car Park and Macquarie Street residential properties. All existing on street bus stop and parking arrangements and all access to existing car park entrances and exits will not be affected by the operational changes resulting from the proposed development.

Loading Dock and Driveway Design and Vehicle Manoeuvring

The Loading dock has been designed to facilitate simultaneous two way movements along the vehicle ramp, and to allow all vehicles to enter and leave the site in a forward direction. The dock has the capacity to unload / load up to 4 delivery vehicles and a waste vehicle simultaneously, as well as space for a number of vehicles to stand and wait. The area is also designed to accommodate Outside Broadcast vehicles during major events on the Sydney Opera House Forecourt, removing the need for such vehicles to park on the Forecourt as per the existing situation. In this regard the proposed loading dock is vastly superior in design to the existing loading arrangements as detailed in Chapter 2 above.

The new guardhouse will need to be located slightly closer to the Macquarie Street roundabout in order to allow vehicles to stop there on a flat grade before driving down the ramp. While the location of the guardhouse will enable a heavy rigid vehicle to stop with the body of the vehicle completely off the road, articulated vehicles would have the rear of the vehicle extending into Macquarie Street. Therefore it is proposed that for articulated vehicles the procedure will be for the guard to walk out of the guard house to stop the vehicle at the point where the vehicle is clear of the Macquarie Street roundabout. This is considered acceptable as articulated vehicle deliveries are limited to certain periods and are not typical daily occurrences.

Safety and Pedestrian Movements
The removal of heavy delivery vehicle movements from the Forecourt area is a primary outcome intended by the proposal. Clearly defined to significantly reduce the vehicle / pedestrian conflict and improving pedestrian safety by separating the service access to enhance pedestrian access to and from the Forecourt.

6.3.3 Construction Traffic Impacts

As identified in the Traffic Report, the potential impacts of construction activities and traffic include:

- *Construction vehicle access arrangements*
  - *Impact on adjacent properties and land uses:*
  - *Access to the Sydney Opera House;*
- *Degradation of amenity via construction traffic noise;*
- *Road network operation – loss of intersection capacity with additional construction vehicles;*
- *Safety implications for all road users as a result of additional heavy vehicle flows and new construction vehicle access arrangements; and*
- *Potential loss of available on street parking:*
  - *Additional parking demand by construction workers;*
  - *Loss of on street parking to accommodate construction vehicle access*

Final construction details and methodology for the proposed development will not be developed until the successful contractor has been appointed. Detailed Construction Traffic Management Plans will then be prepared for each stage of construction to mitigate and minimise impacts that have been identified above.

The Traffic Assessment submitted with this application provides an outline of the matters that need to be included in the Detailed Construction Traffic Management Plan. They will also need to be prepared in accordance with RTA guidelines. However, the Traffic Report makes a number of recommendations that can be included in the Plans to mitigate against some of the potential impacts identified:

- Vehicle access to and from the site will be generally restricted to the existing access routes to and from the site.
- Heavy construction vehicles be restricted from accessing the site via Macquarie Street during peak arrival and departure periods for events / performances at the Sydney Opera House.
- Hours of operation for construction vehicle movements be managed so that the impacts of construction vehicle noise on amenity can be mitigated for sensitive times.
- Construction vehicle access arrangements should be designed such that all construction vehicles can enter and exit the site in a forward direction.

On balance it is considered that the significant long term traffic and safety improvements of the proposal far outweigh any short term construction impacts. As those short term impacts can be minimised through detailed Construction Traffic Management Plans, the proposal can be supported with the inclusion of appropriate conditions requiring the approval of detailed plans prior to construction works.

6.4 Noise and Vibration

In accordance with the DGEARs, an assessment of noise and vibration impacts, both during the construction and operational phases of the development is required. Acoustic Studio have been engaged to prepare and Operational and Construction Noise Assessment and a copy of their report is included at Appendix K. A summary of the main findings are outlined as follows:

6.4.1 Operational Noise

As the proposed VAPS project is not intended to either modify the existing NSW road network or permanently increase the number of vehicles entering the site, no significant changes to the operational noise of the site is expected.

The only operational difference affecting noise emissions is that once service vehicles have entered the site, instead of driving across the Forecourt, vehicles will enter at grade for a short distance before descending to the new underground loading dock. Acoustic Studio made an assessment of the likely noise impacts to the closest residential noise receptors at 1 Macquarie Street in order to test the most sensitive and therefore the 'worst case scenario'. A comparison was then made between the existing and likely future noise impacts from service vehicles passing the residential premises on Macquarie Street.

The Assessment finds that peak sound pressure levels as the vehicles pass by the residences remains unchanged. However, as trucks enter the ramp to the loading dock, sound pressure levels at the nearest residences would experience a minor increase (up to 2 – 3dB) as compared to the existing situation. This is a minor impact that will be offset as the duration of these noise events will be reduced – that is audible noise will cease as soon as the truck has completely entered the underground ramp where as currently it may remain audible as it traverses the Forecourt.

The net result is that the proposal will not result in any undue increase in overall operational noise impacts in general. The proposal is therefore acceptable and no further mitigation measures are required.

6.4.2 Construction Noise

As the project is at preliminary design stage and the detailed construction program is not yet fully defined, the report provides general recommendations only, together with best noise control practices to be observed during the construction phase. There is no detailed information on the types of plant and equipment that will be used during construction, or on the construction scheduling or program. Therefore,

the report provides an assessment of potential noise impact of various generic items of plant and equipment at most affected receivers

Noise levels are predicted for each item of generic equipment located at 50 m and 100 m from the sensitive receiver location. Allowances have been made for distance attenuation, shielding, ground reflections and reflections from existing structures. The findings are presented in Table 10 of the report and demonstrate the while most generic equipment will comply with accepted noise criteria when used 100m or more from the nearest residential premises during ordinary weekday construction hours, only some equipment will be comply if used at 50 metres from the nearest premises. No equipment would comply with noise criteria on a Sunday at these distances. However it should be noted that all significant works, including the start of the access tunnel / ramp entry will be more than 50 metres from the nearest residential receiver and the majority of the works will be well in excess of 100 metres. It is therefore likely that most construction work would comply with accepted noise criteria during daytime hours.

The proposed construction hours for all external works are in accordance with typical daytime construction hours, namely:

- Monday to Friday : 7am to 6pm
- Saturday : 8am to 1pm

However, due to the large volumes of pedestrians accessing the Sydney Opera House Forecourt, and in order to minimise the adverse visual, heritage, amenity and safety impacts caused by the disruption to the Forecourt during the construction process, it is essential that the duration of the construction phase be kept as short as possible.

As such, it is proposed that once the loading dock is at a stage where it is enclosed, construction work to all internal areas of the proposal will be carried out throughout the day and night. It is also proposed to carry out some limited external construction works outside of the standard hours, including:

- The portion of the entry tunnel works which is over the car park pedestrian link. For safety reasons it is preferred to undertake these works outside of the car park operating hours.
- Works in the vehicle concourse. These works are more then 180 metres from the nearest residences and are naturally screened by the Monumental Stairs.

The carrying out of internal works outside usual construction hours is consistent with previous approvals granted for works on the site. For those limited external works, impacts will be mitigated by appropriate controls as outlined below.

6.4.3 Measures to Mitigate and Manage Construction Noise Impacts

As recommended by the acoustic report and as included in the Draft Statement of Commitments in Chapter 7, detailed construction noise control measures should be included as part of a future Construction Management Plan to be prepared by the Contractor prior to works commencing on the site. The Construction Management Plan should include Noise Control Measures, Best Practices, a Monitoring and Reporting regime and a Communication and Complaints Procedure. Specific provisions to protect the amenity of neighbours for out-of-hours construction works are also included:

Noise Control Measures and Best Practice

Where an item of equipment exceeds ether the noise criteria or the equipment noise level limits set out in the Acoustic Studio report, a number of noise controls measures and construction best practices should be applied where possible to minimise the noise impacts on the neighbourhood.

Recommended noise control measures that may be found to be appropriate to the proposal include:

- Schedule noisy construction activities to occur outside of the most sensitive times of the day for each nominated receiver.
- Consider implementing equipment-specific screening or other noise control measures recommended in Appendix E of AS2436.
- Limit the number of trucks on site at the commencement of site activities to the minimum required by the loading facilities on site.
- Provide exit ramps to the street and all internal haul roads at the lowest grade practicable.
- During the demolition of the concrete elements, consider using concrete crushing jaws to minimise the use of rockbreakers.
- Removed rock by a "ripper" attached to a large dozer wherever practical.
- When loading trucks, adopt best practice noise management strategies to avoid materials being thrown into dump trucks.
- Avoid unnecessary idling of trucks and equipment.
- Locate concrete mixers as far from noise-sensitive receivers as possible.
- Ensure that any miscellaneous equipment (extraction fans, etc) not specifically identified in this plan incorporates silencing equipment as required to meet the noise criteria.

Construction best practices include:

Plant and equipment:

- Use quieter methods.
- Use quieter equipment.
- Operate plant in a quiet and effective manner.
- Where appropriate, limit the operating noise of equipment
- Maintain equipment regularly.
- Where appropriate, obtain acoustic test certificates for equipment

On site noise management:

- Strategically locate equipment and plant.
- Avoid the use of reversing alarms or provide for alternative systems.
- Maximise shielding in the form of existing structures or temporary barriers.
- Schedule the construction of barriers and structures so they can be used as early as possible.

Consultation, notification and complaints handling

- Provide information to neighbours before and during construction.
- Maintain good communication between the community and project staff.
- Have a documented complaints process and keep register of any complaints.
- Give complaints a fair hearing and provide for a quick response.
- Implement all feasible and reasonable measures to address the source of complaint.

Work scheduling

- Schedule activities to minimise noise impacts.
- Ensure periods of respite are provided in the case of unavoidable maximum noise levels events.
- Keep truck drivers informed of designated routes, parking locations and delivery hours.

Monitoring and Reporting

It would be appropriate that the Contractor undertake noise monitoring at nominated affected occupancies In that case if the noise and vibration criteria are exceeded the offending activities could be stopped, providing it is safe to do so, and action taken to ensure compliance.

Communication and Complaints

The contractor should establish a communications register for recording incoming complaints. An example of a complaints procedure is detailed in the report and should be incorporated into any future Detailed Construction Management Plan.

Specific Provisions for Construction outside of typical daytime construction hours

- All construction is to be carried out between the hours of 7am to 6pm Monday to Friday and 8am to 1pm Saturdays, with the exception of the following activities:
    - Construction work to internal areas of the proposal;
    - Construction of the portion of the entry tunnel works which are over the car park pedestrian link; and
    - Works in the vehicle concourse.

- Where necessary, acoustic screening for out of hours construction works will be put in place to mitigate the noise impacts for the closest affected residential receivers and

- Monitoring of noise levels will be put in place to ensure that all the noise levels for all out of hours works comply with the requirements of The City of Sydney's "Construction Hours / Noise within the Central Business District – Code of Practice", 1992.

- Deliveries of building materials and spoil removal, etc will be managed so as not unreasonably impact on the amenity of the patrons of the Sydney Opera House and the surrounding residential receivers outside of the standard daytime construction hours.

The ability to carry out internal works plus some limited external works outside of the standard (daytime) construction hours is expected to considerably reduce the total construction timeframe. This is considered to be of significant benefit in terms of heritage, safety and visual impacts on the site, with no unacceptable amenity impacts to surrounding premises.

6.4.4 Construction Vibration Management

It is likely that some vibration impacts will arise from the excavation and building works although as exact construction methods have not yet been determined an accurate assessment of likely impacts cannot be provided at this stage. It is important that construction is managed so that vibration levels arising from demolition, excavation, and construction activities do not exceed the limits for human comfort as set out in Table 11 to the Acoustic Studio Report.

A range of guidelines for the management strategy of vibration are set out in Section 6.4 of the Acoustic Studio Report and include:

- A preliminary assessment to determine whether the existence of significant vibration levels justifies a more detailed investigation: and
- Where necessary, a detailed investigation;
- The use of vibration surveys;

- Vibration monitoring;
- Non-compliance reporting
- Control measures;
- Site Specific Vibration Management Considerations

6.4.5 Conclusion

Noise and vibration impacts will be limited to the excavation / construction phase of the development only. As the proposal is still in the design stage and the detailed construction program is not yet fully defined, the exact extent of impacts has not yet been determined. Noise and Vibration Impacts could be mitigated and minimised as part of the detailed Construction Management Plan. The recommendations of the Acoustic Studio Report as outlined above should form the basis of a Noise Control and Vibration Management Strategy within the Construction Management Plan to be submitted for approval prior to commencement of works.

6.5 Geotechnical and Structural Stability Impacts

In accordance with the Director General's Key Issues Nos 7 and 11, Geotechnical Impacts and Structural Stability Impacts have been the subject of preliminary investigations.

This Environmental Assessment is accompanied by

- A Structural Engineers Report by Arup at Appendix L; and
- A Preliminary Geotechnical Investigation at Appendix G

A summary of the findings of those reports are outlined below:

6.5.1 Structural Stability

The levels of impacts of various aspects of the proposal on the fabric and structure of the Sydney Opera House are identified. A level of satisfaction is expressed that raises no engineering impediments to the implementation of the proposal. In summary:

The Access Ramp:
No direct impact on the structure of the Sydney Opera House apart from tunnelling under the foundation beam for the monumental stairs. This tunnelling operation is likely to be technically feasible and will require the adoption of techniques which minimize movements to the stair foundations.

The Main Dock, Truck Turning Area and Garbage Area:
The proposed new structures are capable of being designed and constructed to satisfactorily support all existing elements of the Sydney Opera House and can be built in a manner that is unlikely to result in unacceptable movements to the existing structure and fabric of the Sydney Opera House.

Tunnel to New Temporary Scenery Lift and to Existing Lift 12 and Lifts 22/23:

Provided tunnel construction techniques are adopted that meet suitable limits for displacement of the existing ground, the tunnel works should not lead to any distress to the existing structure or fabric of the Sydney Opera House.

Exhaust Tunnel to Eastern Broadwalk:
This tunnel will be cut and cover and is essentially outside the envelope of the existing structure. The construction of this tunnel is not likely to affect the structural integrity of the Sydney Opera House.

The proposed development is therefore capable of being carried out without any adverse impacts to the structural integrity of the Sydney Opera House. A detailed structural design and structural engineer's report will be prepared for approval prior to commencement of works.

6.5.2 Geotechnical Impacts

A preliminary geotechnical investigation was carried out to supplement available subsurface information and two boreholes were drilled as part of this investigation. A full Geotechnical Investigation has not been carried out at this early stage due to the issues associated with the disruption to the functioning of the Sydney Opera House which will be necessary to carry out extensive sampling.

In addition to the specific drilling investigations to date, that information has been supplemented by the drilling program to investigate the presence of acid sulfate soils and which confirmed the depth of rock in the process. By the time construction works for the subject proposal are due to commence there will also be additional geotechnical information available due to excavation works associated with the Bennelong Sewerage Diversion. In all it means that there will be a substantial amount of geotechnical information to hand in the interim period even before a complete geotechnical investigation is carried out. Postponement of the final investigations are therefore justified on that basis and because of the opportunity afforded to minimise disruption to the functions of the Sydney Opera House by incorporating closer co-ordination with other construction contracts affecting the same forecourt area.

The initial investigation has found that in general, rock depths are indicated to be between 1 m and 2 m over the central portion of the loading dock, increasing to about 5 m at the eastern side of the proposed excavation, in the area of the truck turning bay. However, some irregularities are anticipated due to excavations associated with previous land uses on the site and which may have included quarrying.

An interpreted geotechnical cross-section shows that bulk of the proposed excavation will be within high strength, Class II and Class I Sandstone. Noise and vibration constraints associated with the rock excavation are likely to dictate that much of the rock is removed using rotary rock saws and milling heads, possibly in conjunction with line-drilling around the perimeter, so as to avoid excessive overbreak. (refer also to Acoustic Assessment at Appendix K).

The presence of post-tensioned cables that act to brace the existing Monumental Steps precludes the opportunity to carry out the excavation using conventional excavation and support methods for the main loading dock. However, where the excavation footprint extends beyond the Steps, it is expected that a conventional piled or diaphragm wall system will be required to support the deeper overburden materials and form a relatively impermeable barrier to groundwater.

A major constraint for the proposed service tunnels and also for the main loading dock excavations is the degree of stress-relief that will occur and is largely unavoidable. The report advises that careful detailed

consideration should be given to the implications of stress relief movements for the existing Opera House and surrounding structures. The proximity of the Harbour and possibility that the site is traversed by the GPO Fault Zone suggests that there would be a relatively high likelihood of experiencing large rates of saline groundwater inflows/upflows through the rock.

Further geotechnical investigation will be necessary to address the key issues of stress relief related ground movements and rock mass permeability. In particular, the report recommends that the presence of the GPO Fault Zone should be investigated using inclined boreholes. If the proposed development is supported by the Minister, a more exhaustive geotechnical analysis to address the above issues will be prepared before construction implementation can commence. But the disruption to the daily functioning of the Sydney Opera House is not considered to be justified beyond the preliminary geotechnical investigations that have already been carried out.

6.6 Excavation and Construction Impacts

6.6.1 Introduction

This Section addresses impacts of building implementation that would be associated with the demolition, excavation and construction phase of the development. The proposed construction methodology has been set out in detail in the Construction Management Plan, Appendix J, and has also been described in Chapter 3 of this report.

Construction traffic impacts have already been discussed in Section 6.3 above. Noise and vibration is also considered previously in Section 6.4.

Other matters associated with outcomes generated by the excavation process that need to be considered include:

- Acid Sulfate Soils
- Contamination
- Waste Management
- Erosion and Sediment Control
- Air Quality
- Safety
- Heritage Protection;

This Environmental Assessment is therefore accompanied by the following reports, prepared in response to the issues generated by the considerations arising:

- Preliminary Waste Classification Assessment by Douglas Partners at Appendix G
- Preliminary Acid Sulfate Soils Investigation by Douglas Partners at Appendix H
- Preliminary Contamination Investigation by Douglas Partners at Appendix I
- Environmental Assessment Construction Management Plan prepared by Savills Project Management at Appendix J;

A summary of the findings of those reports as they relate to the above issues is set out below.

6.6.2 Acid Sulfate Soils

The presence of acid sulfate soil in the ground can have significant longer term impacts for excavation and construction due to corrosive impacts on concrete and steel and transferred impacts in the surrounding natural environment. Accordingly and in response to the requirements of Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005, consideration must be given to the potential for acid sulfate soils, a preliminary Acid Sulfate Soils Assessment was carried out by Douglas Partners to investigate the possible presence of acid sulfate soils underlying the site and their potential impacts of six test bore holes. Their full report is provided at Appendix H. Their preliminary investigation did not find any actual or potential acid sulfate soils. Therefore based on the findings at this stage no acid sulfate soils management plan is deemed necessary.

The Douglas Partners report, does however, recommended that the materials be inspected following excavation by a qualified environmental consultant. Particularly where refuse was encountered in the filling; in areas where deeper filling was encountered (i.e. near the Man-O-War Steps); and in between test bore locations to confirm that the underlying materials are consistent with those observed (and tested) under the current investigation.

If the materials are inconsistent with those observed during the current investigation or if signs of acid sulfate soils are detected then additional assessment should be conducted to confirm the presence/absence of potential or actual acid sulfate soils.

6.6.3 Contamination

In accordance with the requirements of State Environmental Planning Policy No 55 – Remediation of Land , consideration must be given to whether the land is contaminated, and if the land is contaminated, whether suitable in its contaminated state for the proposed development. The site's previous use as a tram depot indicates a potential for contamination and Issue 6 of the Director Generals Requirements also requires an assessment of the potential for contaminated materials.

A Preliminary Contamination Assessment has therefore been prepared by Douglas Partners. Refer to the full report at Appendix I consisting of a review of the previous reports, a review of site history, the drilling of six test bores and the sampling and analysis of representative soil and groundwater samples.

During the course of the European occupation of the site it has been subject to several episodes of filling and reclamation associated with the various uses of the site. Generally speaking it is considered that the land use would have a low overall contamination potential, although there is a potential for contamination from filling imported to the site from unknown sources at various unrecorded times.

For the most part the concentrations the soil samples were found to be less than the adopted site assessment criteria.

Based on the results of this preliminary assessment it is considered that the site is suitable (from a contamination standpoint) for the proposed development and that the levels and the nature of contamination detected are not likely to pose a significant risk to site users or workers during the construction period. Furthermore, the final construction outcome will eliminate exposure pathways between general users of the site and the underlying soils with all floors, walls and ceilings being appropriately lined.

Due to the inherent variability of the filling beneath the site, and the fact that a number of the investigation bores truncated by filling material (i.e. deeper filling could not be assessed at some locations) it is recommended that filling excavation works be monitored by an experienced environmental consultant. Furthermore, it is recommended that a Construction Environmental Management Plan be prepared and implemented to control segregation of materials, final waste classification, and management "unexpected finds".

6.6.4 Waste Management

The Environmental Assessment Construction Management Plan prepared by Savills Project Management provides the following information with respect to Waste Management:

The proposed waste management measures for VAPS are as follows:

- *Excess Spoil:* where practical spoil will be reused on-site as backfill. Any surplus spoil that cannot be reused will be transported off-site to recycling facilities or to approved landfill sites.
- *Brick/Concrete materials:* disposed to appropriately licensed landfill.
- *Excavated Sandstone:* disposed to appropriately licensed landfill using trucks on road.
- *Services Waste*: Recycling bins will be provided on site. Recyclable materials will be collected separately and recycled.
- *General Waste:* Recycling bins will be provided on site. Recyclable materials will be collected separately and recycled.

The management of waste including spoil will be in accordance with relevant NSW legislation and the principles of the waste management hierarchy as set out in the NSW 'Waste Avoidance and Resource Recovery Strategy'.

The Preliminary Contamination Assessment discussed above indicates the site spoil is likely to be classified as General Solid Waste. All transported spoil material will be tested in accordance with the 'Waste Classification Guidelines' (DECC 2008), and will take place in accordance with legislated docket tracking systems that ensure the spoil reaches the appropriate destination. Only licensed contractors and drivers will be used.

At the appropriate time a fully detailed Waste Management Plan will be developed by the Contractor engaged to undertake the project prior to construction and will be consistent with the Waste Avoidance and Resource Recovery Act 2001 and the 'Waste Classification Guidelines'.

6.6.5 Water Quality: Erosion and Sediment Control

The majority of the excavation is in rock. In areas which have fill to a depth of more than 1m to 1.5m (portions of the loading dock and small portion of the tunnel), temporary shoring or battering measures will be utilised to ensure earth stability thereby eliminating the risk of erosion and sediment displacement. Water pumps will be utilised to remove water seepage through the rock face during excavation. Once exact construction methods have been determined, measures to monitor and minimise soil erosion and the discharge of sediments and other pollutants will be incorporated into the detailed Construction Management Plan for authorisation prior to commencement of works.

6.6.6 Air Quality

As with all construction sites. the project has the potential to generate dust from the various excavation, construction and truck movement activities as well as the potential to impact upon local air quality by generating vehicle emissions.

However, any potential impacts will be localised, short in nature, and no more than expected from any construction site. The implementation of environmental management measures will minimise the potential of those impacts in accordance with current methods of best practise.

A dust management plan will be prepared by the Contractor engaged to undertake the works prior to commencing construction. The plan will include measures such as:

- Areas with the capacity to cause dust will be dampened to suppress dust emissions.
- Materials transported in trucks will be appropriately covered to reduce dust generation.
- Vehicle movement controls will be installed, particularly entrance and exit from construction work sites.
- Construction activities that generate high dust levels would be avoided during high wind periods.
- Rehabilitation of disturbed surfaces will be undertaken as soon as possible.
- All construction plant and machinery will be fitted with emission control devices complying with Australian Standards and would be regularly maintained.

6.6.7 Safety

The Opera House is to continue operating as normal during the construction period. Access to the Royal Botanical Gardens will also be maintained throughout the construction period.

Appropriate hoardings, access gates and signage will be utilised during the construction period to provide a clear delineation between public and construction spaces, and ensure public safety. Restrictions will be placed on the timing of certain activities if required during performance and peak tourist visit times.

Prior to commencing construction the Contractor engaged to undertake the works in conjunction with the SOH will prepare a fully detailed works staging strategy, which addresses public access and ensure safety.

6.6.8 Heritage Protection

The Director General's requirements state that a Safe Work Method Statement must be provided explaining the delivery and installation of the project whilst ensuring protection of the surrounding heritage fabric.

An indicative description of the methodology likely to be adopted to construct the works is provided in the Construction Management Report at Appendix J. However this is based only on the available concept design documents. Once the detailed design is complete, the Contractor engaged will be able to develop a detailed safe work method statement which addresses the various activities to be undertaken during the construction phase, and ensures the safety of the site's existing heritage fabric.

6.6.9 Other Temporary Construction Impacts

Other temporary construction impacts include temporary road deviations on Forecourt as well as impacts of site sheds and hoardings

The location of hoardings and site and construction facilities required to carry out the works, will be located as unobtrusively as possible and should only be erected where necessary to minimise impacts on the setting and accessibility of the Sydney Opera House. Hoardings will be constructed to contain all aspects of the proposed excavation and construction works

Directional signage and interpretive signage will be consistent with the requirements and restrictions identified in the Sydney Opera House Management Plan and Signage Manual.

Temporary diverted vehicle access paths will be clearly delineated and managed to minimise pedestrian and vehicle conflict.

6.7 Infrastructure Impacts

Impacts on infrastructure relate primarily to diversion of existing in-ground services. These services diversions include High Voltage Cables underneath the forecourt and vehicle concourse, water mains and gas mains cross the forecourt, Telstra Cables across the forecourt, and stormwater lines across the forecourt and vehicle concourse.

In addition to in-ground services diversion, the Bennelong Stormwater Drain is also required to be diverted prior to the commencement of the VAPS works and is currently being assessed under a separate Environmental Assessment Submission. Those works will be carried out in accordance with any conditions applied to an approval, as well as the commitments outlined in the Environmental Assessment submitted with that application.

The intended timing of the Bennelong Stormwater Diversion works means that they will proceed and be substantially completed prior to the commencement of the VAPS project.

Other than the diversion of services on site, it is not expected that the proposal will result in any significant impacts to infrastructure on the site or surrounding area. As the proposal does not result in an intensification of the use on the site, additional demand in term of power, telecommunications and other site services will be relatively minor in the context of all existing service demand and should be able to be met by the existing infrastructure provision. This will be subject to confirmation. Where upgrading of services is required, the appropriate approvals will be sought from service providers.

Likewise there will be no impact on infrastructure off-site in the immediate locality. Once construction is completed, vehicle numbers entering the site will remain a function of the circumstances as they are today, as will visitor numbers. Therefore no impacts arise to the local road networks or public transport infrastructure requirements and the current provisions will be unaltered.

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6.8 Remaining Matters for Consideration as required by the Director General

In addition to the matters already assessed in this Chapter, the Director General's Environmental Assessment Requirements requires that the following matters be also be given consideration:

- Odour and Air Impacts;
- Water Quality;
- Climate Change and Sea Level Rise

Odour, Air and Water Quality have already been considered with regard to the construction phase of the development in Section 6.6. The following therefore relates only those impacts arising during the operational phase of the development.

6.8.1 Odour and Air Impacts

No adverse odour and air impacts are expected to arise. If anything, pedestrians on the Forecourt will have a more pleasant experience as they will not be exposed to truck exhaust fumes. Air intake and exhaust vents have been described in the Architects Statement. Fresh air intake will be provided to the loading dock area and a new services trench will be provided directly below the Eastern Boardwalk for an exhaust discharge point into the existing void below the Eastern Boardwalk behind the open jointed panels of the eastern seawall, providing both adequate ventilation for the loading dock and locating exhausts away from public or sensitive areas. All ventilation will be designed in accordance with accepted standards to ensure no adverse impacts arise.

6.8.2 Water Quality

There will be no change as to quantity or quality of surface water run off. The development site is already entirely hard paved, with all surface water outlets diverted to stormwater channels and this will remain unchanged by the proposal, although the Forecourt stormwater pipe will be diverted for approximately 60 metres as part of the proposal.

Stormwater falling on the open access ramp will be drained to a pump out pit in the loading dock. The Loading dock will be a tanked construction and drainage will be provided around the inside of the perimeter walls as a precautionary measure. Drainage will also be provided to the perimeter of the underground tunnel to collect any ground water seepage. All drains will run to a pump-out pit which will include gross pollutant traps to remove sediment, oil and floating debris. Refer to Stormwater Concept Report at Appendix M.

However, as discussed in the Geotechnical Assessment in Appendix G, the ground water is likely to be highly saline (essentially sea water) and is likely to have relatively high dissolved iron and manganese content. As such, it is possible that ground water captured may lead to significant precipitation of red-brown iron-oxide sludge in the drainage system. If that is the case, further treatment will be necessary (such as aeration of the water) to ensure no unacceptable impacts to the receiving water body – Sydney Harbour. However until detailed geotechnical investigations are undertaken and until the final design of the loading dock is established, the likely extent of groundwater flows and their content can not be finally

determined. As discussed in Section 6.5 above, a full geotechnical investigation will be carried out prior to the commencement of the works. That investigation will inform the final design of ground water discharge and treatment. Where necessary the design will include further treatment beyond gross pollutant traps and will ensure all water discharged from the pump out pits complies with accepted standards.

6.8.3 Climate Change and Sea Level Rise

The *Draft NSW Coast Planning Guideline: Adapting to Sea Level Rise* been prepared to provide guidance on how sea level rise and its associated impacts are to be considered in land use planning and development assessment in coastal NSW. The guideline adopts planning benchmarks for mean sea level rise of 40cm by 2050 and 90cm by 2100. The Guideline includes six Coastal Planning Principles:

1. *Assess and evaluate coastal risks taking into account the NSW sea level rise planning benchmarks.*
2. *Advise the public of coastal risks to ensure that informed land use planning and development decision-making can occur.*
3. *Avoid intensifying land use in coastal risk areas through appropriate strategic and land use planning.*
4. *Consider options to reduce land use intensity in coastal risk areas where feasible.*
5. *Minimise the exposure to coastal risks from proposed development in coastal areas.*
6. *Implement appropriate management responses and adaptation strategies, with consideration for the environmental, social and economic impacts of each option.*

Note: 'coastal risks' refer to coastal erosion, tidal inundation and coastal flooding. '

The Draft Guidelines also includes 8 Planning Criteria for Proposed Development In Coastal Risk Areas:

1. *Development avoids or minimises exposure to immediate coastal risks (seaward of the immediate hazard line)*
2. *Development provides for the safety of residents, workers or other occupants on-site from risks associated with coastal processes*
3. *Development does not adversely affect the safety of the public off-site from a change in coastal risks as a result of the development*
4. *Development does not increase coastal risks to properties adjoining or within the locality of the site*
5. *Infrastructure, services and utilities on-site maintain their function and achieve their intended design performance*
6. *Development accommodates natural coastal processes*
7. *Coastal ecosystems are protected from development impacts*
8. *Existing public beach, foreshore or waterfront access and amenity is maintained*

The site is entirely bounded by sea walls where it adjoins the foreshore. As no changes to the sea walling is proposed as part of this application, the proposal does not result in impacts to coastal processes or any impacts to adjoining coastal properties.

The forecourt area adjacent to the proposed ramp entrance will be more than 3 metres above sea level and therefore even a sea level rise of 90cm by 2100 will not affect the Ramp Entry or any other modification proposed at the Forecourt level. The only potential impact from Sea Level Rise to the development could be an increase in ground water level adjacent to the basement loading dock and associated tunnels and exhaust outlets. This is not strictly a matter for consideration under the Draft Guidelines, but protection from ground water flows will be an essential part of the engineering design in any case. Potential long term ground water flow changes will be a considered factor when finalising the design solution to ground flow impacts.

The proposal is therefore considered to be consistent with the Draft Guidelines.

Chapter 7:
Draft Statement of Commitments

As demonstrated by the detailed assessment in Chapter 6, once constructed, the proposed development gives rise to very few impacts, and results in an overall significant net beneficial outcome in terms of heritage values, the aesthetic appearance of the site, safety and the functionality of the Sydney Opera House.

The majority of impacts arise from the construction process and therefore will be only temporary in nature.

The majority of Commitments set out in this chapter therefore relate to the construction phase and will be primarily enacted through the provisions of a future Detailed Construction Management Plan.

However, in accordance with the findings of the Environmental Assessment, some commitments are also made in relation to the Design Development Stage; in relation to further consultation; and in relation to the ongoing operation of the new loading dock and the site generally.

7.1 Draft Commitments for Detailed Design Work Phase

EA Issue	Commitments
Design - Consistency	The quality and detail described in the concept drawings and documents will not be diminished during the detailed design or construction process. In order to achieve this, the documentation and construction process will be reviewed at regular and/or significant points along the project's implementation program to ensure these are maintained, and if possible enhanced. Key personnel from the original architects and designers of the project will invited to be part of this quality control and checking process, and their recommendations properly considered and included in the implementation.
Design - Heritage	Specialist heritage conservation advice will continue to be sought during the design development and documentation stages for the VAPS Project and continue through to completion of the project to ensure the broader as well as detailed conservation objectives are achieved.
Design – Structural	A detailed structural design and structural engineer's report will be prepared for approval prior to commencement of works
Design - Lighting	Detailed design investigation will be carried out during the design development phase to ensure lighting will complement and enhance the special features of the place and will be consistent with Utzon Design Principles, the lighting policies specified in the CMP 2003 and the Utzon endorsed 2007 Lighting Masterplan
Archaeological Investigation	The program of archaeological investigation outlined in the Archaeological report will be adopted as part of the mitigative strategy for these works to address the potentially adverse impacts that these works would have on the archaeological significance of the site. The proposed program of archaeological investigation includes:

	▪ Potential cut-and-cover excavation for loading dock construction—archaeological testing of this area prior to bulk excavation, followed by further archaeological investigation (open area excavation or monitoring, if required). ▪ Cut-and-cover excavation for vehicular tunnel—exposure and recording of sections of Bennelong stormwater channel (original section and later diversion) prior to removal of these elements, followed by monitoring of the initial stages of all excavation works
Geotechnical Investigation and Design	Further geotechnical investigation will be carried out to address the key issues of stress relief related ground movements and rock mass permeability, including the presence of the GPO Fault Zone using inclined boreholes and in accordance with the recommendations of the *Report on Preliminary Geotechnical Investigation and Waste Classification Assessment Proposed Vehicle and Pedestrian Safety (VAPS) Project Sydney Opera House Bennelong Point* by Douglas Partners dated February 2010. The results of the Geotechnical Investigation are to inform the final design of the project.
Geotechnical Investigation and Water Quality	The geotechnical investigation above will inform the final design of ground water discharge and treatment. Where necessary the design will include further treatment beyond gross pollutant traps and will ensure all water discharged from the pump out pits complies with accepted standards

Table 3: Draft Commitments for Detailed Design Work Phase

7.2 Draft Commitments in relation to Consultation

EA Issue	Commitments
Sydney Water Requirements	The proponent will engage a Water Servicing Co-ordinator and will liaise with Sydney Water, obtain any necessary approvals, including Section 73 Certificates before commencing work on the site.
Heritage Requirements	Sydney Water will be consulted in relation to any preservation requirements, including the retention and storage of any fabric or artefacts recovered from the Sydney Water asset (Bennelong stormwater channel).
Infrastructure Impacts	Where upgrading of services is required, the appropriate approvals will be sought from service providers.
SOH Carpark Requirements	Impacts to the structure of the adjoining carpark will be further investigated during the detailed design phase and the extent and methodology for dealing with any clashes will be the subject of further consultation with the State Property Authority and Recap before finalising. Hoarding types and locations will be determined as part of the detailed Construction Management Plan and will be also be discussed with the State Property Authority and Recap before finalising.
Archaeology and Aboriginal Assessment Requirements for Consultation	A copy of the Archaeological report will be sent to the Metropolitan Local Aboriginal Land Council for their information. An online resource will be established to provide information about the proposed works before they commence, in anticipation of public interest in visible on-site works
Local Residents	Local Residents will be informed of Construction Works before they commence and will be provided with the Site Manager's contact details as a point of contact for concerns that may arise during the construction phase. Refer also to commitments in the following section.

Table 4: Draft Commitments in relation to Consultation

7.3 Draft Commitments for the Construction Phase

Construction Management Commitments will be in the form of a Detailed Construction Environmental Management Plan. This plan will include commitments known at this stage as set out in the table as well as further commitments based on additional detail and investigations that will be carried out during the detailed design phase.

Detailed Construction Environmental Management Plan

A construction environmental management plan will be prepared and implemented. The plan will outline environmental management practices and procedures to be followed during site preparation and construction. The plan will cover the environmental protection practices, resources and sequence of activities required to comply with relevant environmental legislation, conditions of any applicable licence, approvals and permits. The plan will be prepared in accordance with Guideline for the Preparation of Environmental Management Plans (DIPNR 2004) and include:

General	▪ A description of activities to be undertaken on the site during the site preparation and construction stages of the project. ▪ Statutory approvals and other obligations that would be fulfilled during site preparation and construction.
Heritage	The location of hoardings and site and construction facilities required to carry out the works, will be located as unobtrusively as possible and will only be erected for a stated limited time to minimise impacts on the setting and accessibility of the Sydney Opera House. Hoardings will be erected to contain all aspects of the proposed excavation and construction works.
	The Sydney Opera House Trust will advise the public via appropriate signage or other means, of the purpose of the works and their timeframe.
	Once the detailed design is complete, the Contractor engaged is to develop a detailed safe work method statement which addresses the various activities to be undertaken during the construction phase, and ensures the safety of the site's existing heritage fabric.
Archaeology and Aboriginal Values	Archaeological monitoring of proposed development works will occur in accordance with the Archaeological Management Plan submitted as part of the application. It would be appropriate for Aboriginal stakeholder representatives to participate in the monitoring.
	In the event that unexpected historical archaeological evidence were to be encountered during site works, works will cease and the Heritage Branch, Department of Planning will be notified immediately. Further assessment and/or approval may be required before works could recommence.
	In the event that any archaeological remains were to be exposed during site works, they will be appropriately documented according to the procedures outlined the Archaeology Report.
	Suitable clauses will be included in all contractor and subcontractor contracts to ensure that on-site personnel are aware of the heritage issues associated with the site and the role of the archaeologist(s) on site.
	Subsurface disturbance will be limited to those areas identified in the documentation of the proposed works so as to avoid disturbance of other potential archaeological remains at this site. In the event that unexpected Aboriginal archaeological evidence were to be encountered during site works, works will cease and the Department of Environment, Climate Change and Water (DECCW) will be notified immediately. Further assessment and/or approval may be required before works could recommence.
	In the event that Aboriginal cultural material is identified and collected, it may be appropriate for such material to be retained, interpreted and displayed on site. Further consultation with Aboriginal stakeholders would be required to determine the appropriate management of such material.
	Opportunities to interpret any evidence discovered during the proposed forecourt works will be considered as part of a holistic approach to interpreting the site.
Traffic	As part of the Construction Management Plan, a Construction Traffic Management Plan (CTMP) will be prepared and approved prior to construction works to address the potential impacts identified in the EA and *Sydney Opera House Vehicle and Pedestrian Safety Project Environmental Assessment Traffic Report* by Halcrow. The CTMP is to set out a plan to manage construction activities such that the potential traffic implications are mitigated or appropriately managed and is to include:

	• Details of proposed works • Timing of proposed works; • Hours of construction activities; • Number of construction vehicles, particularly heavy vehicles to be used; • Mitigation and management measures including use of construction vehicle on site management system, construction vehicle access arrangements and circulation; and • Contact details for on site construction personnel. The CTMP shall be prepared in accordance with RTA guidelines.
	The CTMP is to also include the specific recommendations of the *Sydney Opera House Vehicle and Pedestrian Safety Project Environmental Assessment Traffic Report* by Halcrow, including for example: • Vehicle access to and from the site will be generally restricted to the existing access routes to and from the site. • Heavy construction vehicles be restricted from accessing the site via Macquarie Street during peak arrival and departure periods for events / performances at the Sydney Opera House. • Hours of operation for construction vehicle movements be managed so that the impacts of construction vehicle noise on amenity can be mitigated for sensitive times. • Construction vehicle access arrangements will be designed such that all construction vehicles can enter and exit the site in a forward direction
Noise & Vibration	Construction work is to comply with the recommendations of *Sydney Opera House Vehicle and Pedestrian Safety Operational and Construction Noise Assessment* by Acoustic Studio
	The Contractor is to undertake noise monitoring at nominated affected occupancies
	Noise and vibration levels are generally to comply with the requirements of *The City of Sydney's "Construction Hours / Noise within the Central Business District – Code of Practice"*, 1992.
	All construction is to be carried out between the hours of 7am to 6pm Monday to Friday and 8am to 1pm Saturdays, with the exception of the following activities: ▪ Construction work to internal areas of the proposal; ▪ Construction of the portion of the entry tunnel works which are over the car park pedestrian link; and ▪ Works in the vehicle concourse.
	Where necessary, acoustic screening for out of hours construction works will be put in place to mitigate the noise impacts for the closest affected residential receivers and ensure compliance with the requirements of The City of Sydney's "Construction Hours / Noise within the Central Business District – Code of Practice", 1992.
	Deliveries of building materials and spoil removal, etc will be managed so as to not unreasonably impact on the amenity of the patrons of the Sydney Opera House and the surrounding residential receivers outside of the standard daytime construction hours.
	Where an item of equipment exceeds ether the noise criteria or the equipment noise level limits set out in the *Sydney Opera House Vehicle and Pedestrian Safety Operational and Construction Noise Assessment* by Acoustic Studio, a number of noise controls measures and construction best practices will be applied where possible to minimise the noise impacts on the neighbourhood.
	Recommended noise control measures that may be found to be appropriate to the proposal include: ▪ Schedule noisy construction activities to occur outside of the most sensitive times of the day for each nominated receiver. ▪ Consider implementing equipment-specific screening or other noise control measures recommended in Appendix E of AS2436. ▪ Limit the number of trucks on site at the commencement of site activities to the minimum required by the loading facilities on site. ▪ Provide exit ramps to the street and all internal haul roads at the lowest grade practicable. ▪ During the demolition of the concrete elements, consider using concrete crushing jaws to minimise the use of rockbreakers. ▪ Removed rock by a "ripper" attached to a large dozer wherever practical. ▪ When loading trucks, adopt best practice noise management strategies to avoid materials being thrown into dump trucks. ▪ Avoid unnecessary idling of trucks and equipment. ▪ Locate concrete mixers as far from noise-sensitive receivers as possible. ▪ Ensure that any miscellaneous equipment (extraction fans, etc) not specifically identified in this plan incorporates silencing equipment as required to meet the noise criteria
	Construction is to be managed so that vibration levels arising from demolition, excavation, and construction activities do not exceed the limits for human comfort as set out in Table 11 to the Acoustic Studio Report

	The CMP is to include the following measures as set out in Section 6.4 of the Acoustic Studio Report ▪ A preliminary assessment to determine whether the existence of significant vibration levels justifies a more detailed investigation: and ▪ Where necessary, a detailed investigation; ▪ The use of vibration surveys; ▪ Vibration monitoring; ▪ Non-compliance reporting ▪ Control measures; ▪ Site Specific Vibration Management Considerations
Acid Sulfate Soils	Materials are to be inspected following excavation by a qualified environmental consultant in accordance with the recommendations of *Report on Preliminary Acid Sulphate Soil Assessment Vehicle and Pedestrian Safety (VAPS) Project Sydney Opera House Bennelong Point* by Douglas Partners. If the materials are inconsistent with those observed during the preliminary investigation or if signs of acid sulfate soils are detected then additional assessment will be conducted to confirm the presence/absence of potential or actual acid sulfate soils.
Contamination	Filling excavation works be monitored by an experienced environmental consultant in accordance with the recommendations of *Report on Preliminary Contamination Assessment Vehicle and Pedestrian Safety (VAPS) Project Sydney Opera House Bennelong Point* by Douglas Partners. Furthermore, it is recommended that a Construction Environmental Management Plan be prepared and implemented to control segregation of materials, final waste classification, and management "unexpected finds
Waste Management	A fully detailed Waste Management Plan will be developed by the Contractor engaged to undertake the project prior to construction and will be consistent with the Waste Avoidance and Resource Recovery Act 2001 and the 'Waste Classification Guidelines'.
	The plan will be consistent with the advice in the Environmental Assessment Construction Management Plan prepared by Savills Project Management and ▪ Identify requirements for waste avoidance, reduction, reuse and recycling. ▪ Provide procedures for handling, stockpiling, and reuse of wastes. ▪ Identify disposal sites and relevant testing as well as transport options. ▪ Set out procedures for obtaining the required approvals for offsite management of spoil.
Air Quality	*A dust management plan* will be prepared by the Contractor engaged to undertake the works prior to commencing construction. The plan will include measures such as: ▪ Areas with the capacity to cause dust will be dampened to suppress dust emissions. ▪ Materials transported in trucks will be appropriately covered to reduce dust generation. ▪ Vehicle movement controls will be installed, particularly entrance and exit from construction work sites. ▪ Construction activities that generate high dust levels would be avoided during high wind periods. ▪ Rehabilitation of disturbed surfaces will be undertaken as soon as possible. ▪ All construction plant and machinery will be fitted with emission control devices complying with Australian Standards and would be regularly maintained.
Water Quality	Measures to monitor and minimise soil erosion and the discharge of sediments and other pollutants will be incorporated into the detailed Construction Management Plan for authorisation prior to commencement of work
Safety	Appropriate hoardings, access gates and signage will be utilised during the construction period to provide a clear delineation between public and construction spaces, and ensure public safety. Works will be appropriately managed and scheduled during performance times..
	Prior to commencing construction the Contractor engaged to undertake the works in conjunction with the SOH will prepare a fully detailed works staging strategy, which addresses public access and ensure safety.
	Temporary diverted vehicle access paths will be clearly delineated and managed to minimise pedestrian and vehicle conflict.
Communication and Complaints	The contractor is to establish a communications and complaints protocol for dealing with complaints
	The contractor is to establish a communications register for recording incoming complaints

Table 5: Draft Commitments for the Construction Phase

7.4 Draft Commitments for the Operational Phase

EA Issue	Commitments
Traffic Requirements	At all times vehicle movements in the Loading Dock Area will be managed by appropriately qualified personnel.
	Articulated vehicles arriving at the site entrance will be managed by the guard who is to walk out of the guard house to stop the vehicle at the point where the vehicle is clear of the Macquarie Street roundabout
Future Aboriginal Values Commitments	The Sydney Opera House Trust will develop a protocol for ongoing Aboriginal stakeholder consultation and engagement as part of the long-term management of the Sydney Opera House.
	The Sydney Opera House Trust will develop an interpretation strategy that outlines an approach to the recognition and interpretation of the Aboriginal cultural values and Aboriginality associated with the Sydney Opera House site. Aboriginal people are the rightful interpreters of Aboriginal cultural heritage. Any proposed interpretation of Aboriginal cultural heritage at the Sydney Opera House will involve identified Aboriginal Stakeholders
	As part of the current revision of the Sydney Opera House Conservation Management Plan, further consideration and assessment of Aboriginal cultural values with regard to the aforementioned recommendations will be considered.
	Any future revision of the Management Plan for the Sydney Opera House will reflect the updated Conservation Management Plan, particularly any revised policies regarding Aboriginal cultural significance

Table 6: Draft Commitments for the Operational Phase

Chapter 8: Conclusion

The credentials for any proposal involving change to the Sydney Opera House as a World Heritage Item are most demanding. In addressing the eight separately legislated planning control instruments and the three separate site specific control documents, a rigorous examination of the current proposal has been followed. In essence, the application is a simple proposition to quarantine service vehicle movement underground, for the benefit of extended and safer pedestrian usage of the Sydney Opera House forecourt and efficient loading and unloading facilities. The formulation of the application demonstrates that all necessary considerations have been given to the associated interests and their consequences before maturing into the current proposal.

The Utzon Design Principles is the legacy that has been followed as the guiding hand for future aesthetic changes including the built form changes. 'Openness and fluidity of movement' were key attributes to be sustained for people using the Sydney Opera House: along with a further opportunity to use the area beneath the forecourt for the expansion of back-of-house activities with the advent of future changes. As such the application fully conforms with the intent and form of aesthetic changes to be followed.

Prompted by the necessary upgrading for pedestrian safety within the forecourt the current proposal to reduce pedestrian hazard has meant adjustment to paving levels and discretely sidelining the means of access for the more than 200 daily service vehicle movements across the Forecourt. By relocating the path of service access to the east of the current central path within the forecourt and then directing those vehicles underground to an improved back-of-house terminus the safety and service objectives are both fulfilled.

Consultation has been consistent with protocol established in the course of previous applications. As a consequence of incorporating detailed considerations responding to the numerous factors impinging on an otherwise simple concept, the solution is assessed as being functionally well integrated and aesthetically positive for the future appreciation of visitors to the Sydney Opera House within its setting. The incorporation of a new gatehouse in a less central location along with the elimination of minor but otherwise intrusive visual elements results in a simplification of those impinging elements within the forecourt itself. The proposed simplification of the traffic pattern for pedestrians and service vehicles alike therefore reinforces Utzon's quest for avoiding clutter as a consequence of any future change.

The outcome as a final proposal evidences exhaustive examination of the listed impacts identified in response to the considerations required to be examined by the Director General. Starting with systematic explanation and elimination of alternative routes for the under-grounding of the service access. The result being a forecourt relocation on its eastern edge that reflects the alignment of the Tarpeian Wall for the exposed section of ramp and a sympathetically reshaped expression of the extensive car park air intake vent that also had to be accommodated by the changes imposed.

The proposal is therefore also seen to be a catalyst for a variety of associated works to be integrated within the forecourt and further improvement as a clearer interpretation of the Utzon Principles.

Despite inevitable temporary impacts due to construction, the associated inconvenience to public visitors has been taken into account. Access at all times to the performance functions at the Opera House and to the neighbouring Royal Botanic Gardens are assured not to be interrupted. The proposal is one that will need to be supplemented by appropriate conditions were it to be approved, necessary to accommodate safeguards that address details of circumstances identified but yet to be revealed. For example, a future detailed Construction Management Plan will be the subject of further detailed provisions when a contractor has been appointed. This assessment is therefore made complete by the incorporation of commitments that would be incorporated as part of any approval. Their inclusion being necessary to safeguard the otherwise assured outcome form the body of the assessment

Once the construction period is over, the surrounding area impacts will return to normal, in so much as there will be no changes to street traffic pattern or capacity, or the number of visitors or service vehicles visiting the site.

The result being a development that will serve the coincident needs of safety, servicing and aesthetics. Thereby justifying a proposal that is visually discrete, more pedestrian friendly and an eminently more practical solution to the servicing needs of the Opera House functions.