MAJOR PROJECT ASSESSMENT: Sydney CityGrid Project - Stage 2A(ii) City East Zone Substation and Integrated Commercial Tower 33 Bligh Street Sydney NSW 2001 (MP 11_0092)

Photomontage of the substation and commercial tower

Director-General's
Environmental Assessment Report
Section 75I of the
Environmental Planning and Assessment Act 1979

December 2012

ABBREVIATIONS

CECT	City East Cable Tunnel
CEZS	City East Zone Substation
CEMP	Construction Environmental Management Plan
CLG	Community Liaison Group
CNVMP	Construction Noise & Vibration Management Plan
DCP	Development Control Pan
Department	Department of Planning & Infrastructure
DGRs	Director-General's Requirements
Director-General	Director-General of the Department of Planning & Infrastructure
EA	Environmental Assessment
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPI	Environmental Planning Instrument
ESD	Ecologically Sustainable Development
FSR	Floor Space Ratio
MD SEPP	State Environmental Planning Policy (Major Development) 2005
Minister	Minister for Planning and Infrastructure
MCoA	Minister's Conditions of Approval
Part 3A	Part 3A of the *Environmental Planning and Assessment Act 1979*
PEA	Preliminary Environmental Assessment
POEO Act	Protection of the Environment Operations Act
PPR	Preferred Project Report
Proponent	Ausgrid
RtS	Response to Submissions

Cover Photograph: Photomontage of the substation and commercial tower

Published December 2012
NSW Department of Planning & Infrastructure
www.planning.nsw.gov.au

EXECUTIVE SUMMARY

Ausgrid (the Proponent), proposes to upgrade electricity supply to the Sydney Central Business District to meet future demand and to ensure supply security to the area (CBD) and immediate suburbs, which is called the Sydney CityGrid Project.

The then Minister for Planning granted Concept Approval for the Sydney CityGrid Project under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on 20 September 2009. The project is comprised of a number of discrete but interrelated components, one of which involves the construction and operation of a new City East Zone Substation, being Stage 2A(ii) of the Sydney CityGrid Project.

The Stage 2A(ii) project site (known as Kindersley House) is at 20-22 and 24-26 O'Connell Street and 33 Bligh Street, Sydney. The site was selected based on the need for a substation in the northern section of the CBD, preferably in the vicinity of Phillip, Bent, Bligh and O'Connell Streets in order to facilitate the upgrade of the electricity network.

The project involves the construction, operation and maintenance of the City East Zone Substation, cable tunnel and an integrated 24 storey commercial tower located above the substation. The substation would be in the basement and lower levels and the commercial tower would be above the substation. The project also involves the bulk excavation for the substation basement; excavation and construction of a shaft and a 150 metre section of cable tunnel beneath Bligh Street to the intersection of Bent Street and Bligh Street.

Construction of this project would commence immediately following completion of Stage 2A (i) of the project, which involves site establishment and demolition of the existing building (Kindersley House). Project Approval for Stage 2A(i) was given on 13 July 2011.

The Environmental Assessment for the project was exhibited from 29 February 2012 to 30 March 2012. The Department received six submissions from public authorities and four submissions from the neighbouring buildings/business owners. Key issues identified were built form and urban design; heritage; electric and magnetic fields and noise and vibration impacts. A submission report was submitted by the Proponent in May 2012, and in October 2012, additional information was presented subsequent to the Submissions Report on urban design in response to issues raised by the Department.

Based on its assessment, the Department is satisfied that the Proponent has undertaken a robust and conservative assessment of the impacts of the proposal and that the impacts can be managed and/or mitigated through application of appropriate management plans/ measures to an acceptable level. In addition, a range of conditions of approval are recommended which would ensure the key issues are addressed. The conditions would also ensure that commitments made in the Environmental Assessment are implemented and monitored.

The Department considers that failure to construct the Stage 2A(ii) City East Zone Substation would compromise the ability to achieve the objectives of the broader Sydney CityGrid project. The substation is considered to be in the public interest, as it would help provide a reliable electricity supply critical to allowing the CBD to function efficiently and effectively, particularly given Sydney's function as Australia's only recognised global city, and hub for commercial and financial operations. The commercial tower would also provide additional commercial space in the CBD. The Department considers the project achieves a high quality urban design outcome.

The Department further considers that on balance the project is justified and in the public's interest. Consequently, the Department recommends that the project be approved subject to the implementation of the recommended conditions of approval.

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1. BACKGROUND

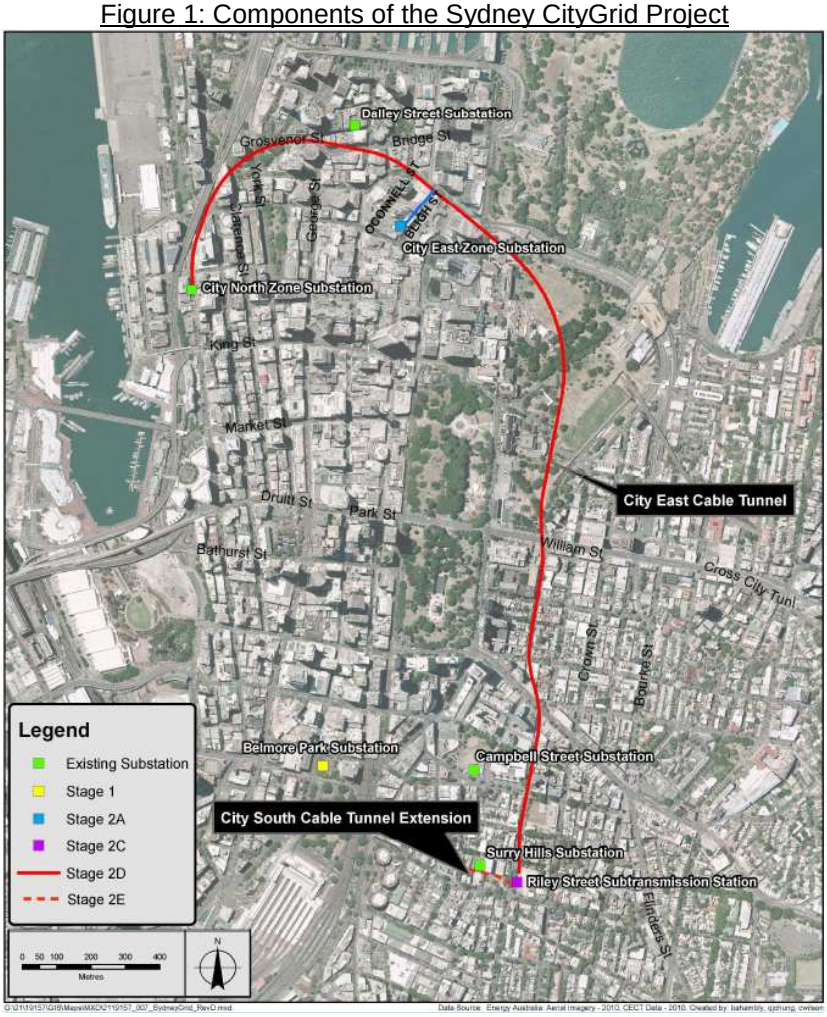
Ausgrid (the Proponent), proposes the construction and operation of an indoor 132/11kV Zone substation and integrated 24 storey commercial office tower (known as the City East Zone Substation - Stage 2A(ii)) at 33 Bligh Street and 20-26 O'Connell Streets in the Sydney CBD.

The Capital investment value of the project is $162 million, and the proposal would create approximately 100 full-time construction jobs and 2 full time equivalent operational jobs for the substation.

1.1 Concept Plan (MP08_0075)

The Sydney CityGrid Project is an integrated program of works to upgrade critical electricity infrastructure in Sydney's central business district (CBD). Concept Approval was granted by the then Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on 20 September 2009 (as shown in Figure 1).

Figure 1: Components of the Sydney CityGrid Project



The Concept Approval requires further environmental assessment to be undertaken prior to commencing various stages of the Sydney CityGrid Project, such as:

- **Stage 1**- the works in and around the Belmore Park Zone substation site;
- **Stage 2**- the balance of works required for the concept plan, such as:
  - the City East Zone substation;
  - the refurbishment of the existing Dalley Street Zone substation;

- the construction and operation of a sub-transmission switching station and the City East Cable Tunnel (CECT) to be constructed between Riley Street sub-transmission switching station (STSS);
- the City North Zone substation; and
- the extension to the City South Cable Tunnel.

To date, approvals have been granted for a number of components including the Belmore park substation; Stage 2A(i) - demolition of the existing building on the site of Stage 2A(ii) (Kindersley House); and Stage 2D – City East Cable Tunnel (CECT) and extension of City South Cable Tunnel.

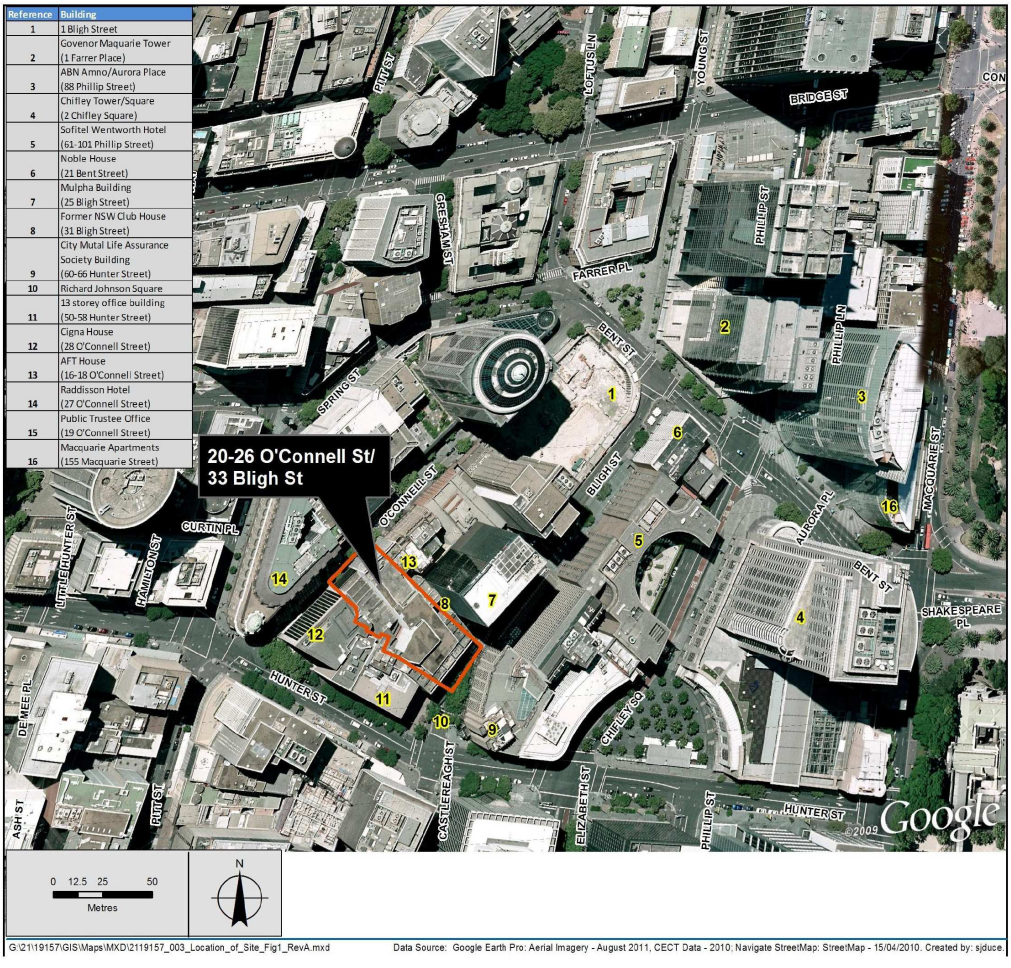
Project Approval is also required to construct and operate the City East Zone substation (CEZS) and integrated commercial tower.

1.2 Site location and surrounding land uses

The site of the CEZS is located at 33 Bligh Street and 20-26 O'Connell Streets in the Sydney CBD, and fronts both Bligh and O'Connell Streets. An aerial view of the site (highlighted in red) and adjacent properties are shown in Figure 2.

Two commercial buildings currently exist on the site. These properties are 20-22 O'Connell Street and 33 Bligh Street, and 24-26 O'Connell Street. These buildings are collectively known as Kindersley House. The site is immediately surrounded by commercial and office buildings, including the adjacent Lowy Institute (former NSW Club House) and sits opposite the City Mutual Life Assurance Society Building on Bligh Street. The site also sits above the CBD Metro Stage 1 and the Interim Rail Corridor 'Metro Pitt' rail corridors (see Section 5.5 and Figure 13).

Figure 2: Project location



2. PROPOSED PROJECT

2.1 Project Description

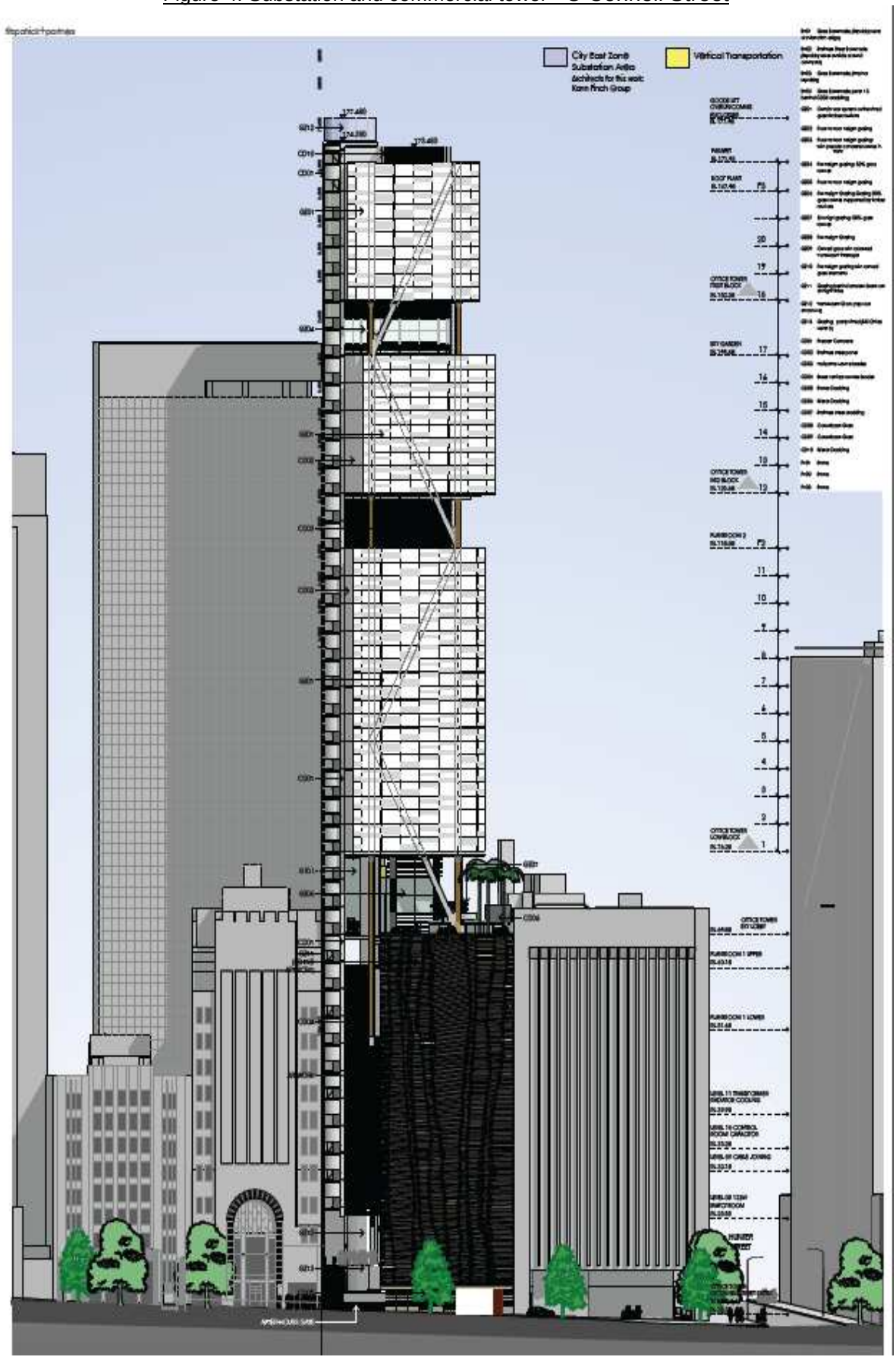
The project is an integral part of the Proponent's Concept Plan Approval and involves the construction and operation of the CEZS and cable tunnel, and the construction of an integrated office tower above the substation (known as Stage 2A(ii)). The key components of the project are described in Table 1, and shown in Figures 3 and 4:

Table 1: Key Project Components

Aspect	***Description***
Project Summary	• Construction, operation and maintenance of the City East Zone Substation and integrated commercial tower over a 41 month period. • Construction of a 150m stub tunnel to interface the City East Cable Tunnel.
Stratum Subdivision	Stratum subdivision of the commercial tower and the substation components to provide for the independent management of the two components of the project. Easements would be established to provide access to both lots.
Excavation	Bulk excavation and removal of approximately 34,866 m^3 of in-situ material from the basement and approximately 5,644 m^3 of in-situ material from the shaft and tunnel.
CEZS	The CEZS will be constructed over eleven levels, (split by a two level car park, lobby and retail floor). It will include cable marshalling, a switch room and distribution centre, transformer bays, amenities and plant room, 132KV switch rooms, cable jointing, a control and capacitor room and transformer radiator cooling.
Cable Tunnel	The cable tunnel will be 150m long, 4m high and 4m wide, would start from a shaft to a depth of RL -23.6m underneath the project site and link up to the future City East Cable Tunnel. The tunnel will also pass 5.5m below the Metro Pitt corridor.
Commercial Tower and Substation	Integrated commercial tower and substation (inclusive of ground floor café) to 161.73m (37 storeys) high, with a floor area of 28,050m^2 (FSR of 13.75:1), pedestrian link from O'Connell to Blight Streets. The tower is targeting a 5 Star Green Star Office Design (v3) rating and a 5 Star NABERS Office Energy Rating.
Carparking	A maximum of 40 car parking spaces across two basement levels.
Water and Sewage	The project would connect to the water mains in O'Connell Street and Bligh Street to provide fire and hydraulic services. No upgrades are anticipated to be required. A temporary groundwater treatment system during construction would be provided.
Gas	A new gas connection would be made on O'Connell Street to serve the mechanical boiler plant and other services.
Construction	Overall construction period of 41 months General construction hours 7am-7pm Monday to Saturday Tunnelling works to be conducted 24hrs/day
Jobs	100 construction jobs 2 operational jobs for the substation
CIV	$162 million

Figure 3: Substation and commercial tower – Bligh Street

Figure 4: Substation and commercial tower - O'Connell Street



2.2 Project Need and Justification

The Proponent states that in order to provide a reliable and secure supply of energy in Sydney's CBD the existing infrastructure requires refurbishment, replacement and augmentation which complies with its "n-2" licensing requirement. The licence requirement specifies that all city zone substations and transmission feeders must achieve "n-2" capacity by 2014. This means they must be able to provide electricity at peak demand with two transformers or feeders offline.

The Proponent has found that it is not feasible to replace the existing City South 33/11 kV zone substation located at Woolloomooloo to provide this increased level of security. As such, it is necessary to construct a new City East Zone Substation that is integrated into the CBD 132kV network to provide additional capacity to meet the imposed "n-2" security criteria.

The main electricity supply to the Sydney CBD is derived from five zone substations (City North, City East, Dalley Street, City South and New City Central), which range in age from three years to more than 50 years old. The Proponent states that the reliability and performance of its equipment and infrastructure is managed through maintenance and replacement of that infrastructure. The Department understands that the existing City East and Dalley Street zone substations need to be replaced by a new City East substation. The CityGrid Stage 2A(ii) Project encompasses the Proponent's long term strategy to replace and/or refurbish its infrastructure and to comply with licence requirements. It takes into account the need to ensure that security of supply is maintained to the Sydney CBD, while equipment is removed from service for refurbishment or replacement.

The Department accepts that failure to construct the City East Zone Substation would compromise the ability to achieve the objectives of the overall Sydney CityGrid Project in terms of the provision of a secure and reliable electricity supply to the CBD. The Department notes that the concept approval specifically provides for construction and operation of the new City East Zone Substation in the vicinity of Philip, Bligh, Bent and O'Connell Streets, Sydney, subject to receipt of Project Approval.

The site for the City East Zone Substation was selected based on the need for a substation in the northern section of the CBD, preferably in the vicinity of Phillip, Bent, Bligh and O'Connell Streets. Ausgrid investigated potentially suitable available sites in this area. Sites of the required size and configuration are extremely limited. The site at 33 Bligh Street met Ausgrid's criteria.

The Department also notes the overall project benefits. For example, an increase in the capacity of electricity distribution in the Sydney region would mean that adequate power supply can be maintained and improved in circumstances where new commercial and residential developments are approved. The proposal is also consistent with housing and employment targets contained in the Metropolitan Plan.

The Department further notes the project is consistent with the NSW Government's *NSW 2021* plan which sets out goals and strategies for rebuilding and developing NSW and delivering sustainable growth. A key goal of *NSW 2021* is to increase expenditure on critical NSW infrastructure.

The site currently features two commercial buildings and the City of Sydney has previously granted development consent to construct a tower at this site. The Proponent proposes to integrate the City East Zone Substation with a commercial tower to reduce the capital cost of the substation and provide a built form that complements the surrounding urban environment. The Department believes the commercial tower would provide valuable additional commercial space in the CBD and achieve a high quality urban design outcome.

2.3 Design Review Process

A design competition was undertaken for the project in consultation with the City of Sydney Council. This approach addressed the requirements of condition 3.2 of the Concept Approval, which included the need for a design review process.

Five competitors were invited to participate in May 2011. The brief for the competitive process was reviewed and endorsed by the City of Sydney Council prior to its distribution to competition entrants, and included the design principles of the Concept Approval, being to:

- Stimulate imaginative architectural and urban design proposals that achieve design excellence;
- improve the quality and significance of the public domain of the site and Richard Johnson Square;
- conserve and respect existing heritage items and archaeological items and streetscapes within and adjacent to the site;
- provide a high level of pedestrian amenity, with street level activation through public artwork in both O'Connell and Bligh Streets or other appropriate activity and connection to Richard Johnson Square; and
- ensure that the design proposals are compatible with other approved developments and the city's planning framework.

A six member Selection Committee was established to assess the submissions which included representatives from the City of Sydney, The Government Architect, Investa (the likely developer of the commercial tower) and Ausgrid.

The Selection Committee evaluated the shortlisted designs and selected the submission by Fitzpatrick and Partners as the preferred option. The selection committee recommended the following options be further investigated in the design development phase:

- Alternatives to detailing the substation façade should be investigated. This could include reconstituted stone if the "sandstone" elements become too fine, as it would allow different fixing and customised profiles, and could be colour matched to a sandstone finish; and
- investigation of alternate solutions for the O'Connell St substation façade. The panel felt this elevation did not have to be replica artwork of the Bligh St elevation, but could be a solution more consistent with the adjoining facades.

3. STATUTORY CONTEXT

3.1 Major Project

The project is a major project under Part 3A of the EP&A Act by virtue of a specific order made by the then Minister for Planning on 11 February 2008.

Although Part 3A of the EP&A Act was repealed on 1 October 2011, the project remains a 'transitional Part 3A project' under Schedule 6A of the Act. Consequently, the Minister for Planning and Infrastructure (or his delegate) is the approval authority for the project application.

3.2 Permissibility

The project site is located in the City of Sydney Local Government Area, and is within the City Centre Zone under the Sydney Local Environmental Plan 2005 (LEP), and is Zoned B8 Metropolitan under the draft Sydney LEP 2011. Under both of these plans all components of the proposal would be permissible with consent.

Development for the purpose of an electricity distribution network may be carried out by or on behalf of an electricity supply authority or public authority without development consent on any land under the State Environmental Planning Policy (Infrastructure) 2007.

A summary of consistency with the key local development standards and controls is described in Appendix E.

3.3 Environmental Planning Instruments

Under Section 75I of the EP&A Act the Director General's environmental assessment report is required to include a copy of (or reference to) the provisions of environmental planning instruments that substantially govern the carrying out of the project.

The Department has considered a range of planning instruments including *State Environmental Planning Policy (Infrastructure) 2007* (in particular clause 86 in relation to development in the vicinity of rail corridors) and *State Environmental Planning Policy no.55 – Remediation of Land*, and is satisfied that there are no environmental planning instruments that substantially govern the carrying out of the project other than the LEP detailed in section 3.2.

3.4 Objects of the EP&A Act

The Minister should consider the objects of the EP&A Act when making decisions under the Act. The objects most relevance to the Ministers decision on whether or not to approve the project are found in Section 5(a) (ii), (iii), (iv) and (vii). They are to encourage:

(ii) the promotion and co-ordination of the orderly and economic use and development of land,

(iii) the protection, provision and co-ordination of communication and utility services,

(iv) the provision of land for public purposes,

(vii) ecologically sustainable development.

The Department is satisfied that the project encourages the orderly and economic use of land, and protection of utility services, particularly as the project is a permissible land use and will contribute to a reliable electricity supply critical to allowing the CBD to function efficiently and effectively.

The land will be also be used partially for a public purpose, and with respect to ecologically sustainable development, the Act adopts the definition in the *Protection of the Environment Act 1991*. This is discussed further in section 3.5.

These objects are key items for assessment with respect to the proposal and are addressed further in this report. The agency and community consultation undertaken as part of the assessment process (see Section 4 - Consultation and Submissions), address objects 5(b) and 5(c) of the Act.

3.5 Ecologically Sustainable Development

The *Environmental Planning and Assessment Act 1979* adopts the definition of Ecologically Sustainable Development found in the *Protection of the Environment Administration Act 1991*. Section 6(2) of that Act states that ecologically sustainable development requires the effective integration of economic and environmental considerations in decision-making processes and that ecologically sustainable development can be achieved through the implementation of:

(a) the precautionary principle;
(b) inter-generational equity;
(c) conservation of biological diversity and ecological integrity; and
(d) improved valuation, pricing and incentive mechanisms.

The Department's assessment of the need for the project (Section 2.2) has considered the need for ensuring reliable electricity supply to facilitate the ongoing efficient functioning, development and social and economic welfare of the Sydney CBD resident population and workforce inclusive of the need for public utility infrastructure.

The Department's assessment of the need for the project (Section 2.2) has also considered the need to ensure secure and reliable electricity supply to meet the needs of existing and future demand consistent with the principles of inter-generational equity.

The Department's assessment of urban design and visual impacts, heritage, noise and vibration impacts, electric and magnetic fields, and traffic management (sections 5.1-5.5) has considered all reasonable and feasible measures to minimise impacts consistent with the principles of appropriate valuation and pricing mechanisms.

The Department is satisfied that the project would not pose any significant risks to the conservation of biological diversity and ecological integrity as the project would be undertaken on an already developed site, within an already built up area with little ecological value.

The commercial tower would be designed to achieve 5 star Green Star design and 5 Nabers (National Australian Built Environment Rating System) energy ratings. This would include measures such as a high performance façade system, high levels of insulation and a high quality indoor environmental quality through good ventilation rates, air change effectiveness and daylight penetration. The proposal will also include the provision of cyclist facilities, be in proximity to good transport and include a reduction of water use against 'best practice' benchmark'.

On the basis of the assessed impacts on the environment and their ability to be managed, it is considered that the development would be ecologically sustainable within the context of the above principles.

4. CONSULTATION AND SUBMISSIONS

4.1 Exhibition

Under section 75H(3) of the EP&A Act, the Director-General is required to make the environmental assessment (EA) of an application publicly available for at least 30 days. After accepting the EA, the Department publicly exhibited it from 29 February 2012 until 30 March 2012 (30 days) on the Department's website, and at the following locations:

- Department of Planning & Infrastructure, Information Centre, 23-33 Bridge Street, Sydney NSW 2000;
- City of Sydney Council, Level 2, Town Hall House, 456 Kent Street, Sydney NSW 2000; and
- Nature Conservation Council, Level 2, 5 Wilson Street, Newtown NSW 2041.

The Department also advertised the public exhibition in the Sydney Morning Herald, the Daily Telegraph and the Central Courier on 29 February 2012 and notified landholders and relevant State and Local government authorities in writing.

The Department received ten submissions during the exhibition of the EA - six submissions from public authorities and four submissions from commercial neighbours.

A summary of the key issues raised in submissions is provided below.

4.2 Public Authority Submissions

Six submissions were received from public authorities: the Environment Protection Authority (EPA), Heritage Council of NSW, NSW Office of Water (NOW), Roads & Maritime Services (RMS), Transport for NSW (TfNSW) and City of Sydney Council.

None of the agencies objected to the proposal, however the submissions raised issues for the Department's consideration.

The **Environment Protection Authority** recommended a number of conditions in relation to noise and vibration management such as construction times and in particular times for the undertaking of certain noise intensive works, noise level criteria and the method for assessing construction noise vibration.

The **Heritage Council of NSW** raised issues in respect of the design of the fire stairs and its architectural impacts; potential archaeological remains within Richard Johnson Square and impacts associated with the cabling works; landscaping and archaeology.

The **NSW Office of Water** notes that the project will involve bulk excavation for the substation basement, shaft and cable tunnel. NoW recommends conditions in relation to the obtaining of a licence under Part 5 of the *Water Act 1912,* providing NoW with a copy of the Water Quality Management Sub-Plan and a requirement that all groundwater inflows must be adequately treated prior to entering the stormwater system to protect the quality of the receiving water.

The **Roads and Maritime Services** recommends conditions in relation to the layout of the proposed car parking areas, loading docks and access driveway associated with the subject development, the submission of a Traffic Management Plan and road occupancy licence.

Transport for NSW requests that the Proponent enter into an agreement with TfNSW, to ensure that should the metro be developed, it is not compromised. TfNSW has proposed that the Proponent must allow in the design, construction and maintenance of the approved development for the future operations of metro railway tunnels in the vicinity of the approved development, especially in relation to noise, vibration, stray currents and electromagnetic fields.

The **City of Sydney Council** did not object to the project, but raised issues regarding the following:

- *Urban Design and Heritage* - Building setbacks, pedestrian amenity, façade treatment, internal café space, design modifications and the provision of public art (in addition to the façade);
- *Floor Space Ratio (FSR) - Allocation of heritage floor space* - any approval issued by the Department should require the allocation (purchase) of heritage floor space in accordance with the provisions of Sydney LEP 2005;
- *Public domain* - Council believes that the upgrade of Richard Johnson Square should not be undertaken separate to this project but should be completed in line with the proposed building and associated forecourt/public domain works. Council has requested that the draft Statement of Commitment relating to the preparation of condition surveys be carried forward into the final Statement of Commitments; and
- *Traffic issues - Construction Traffic Management Plan* – as the roads authority surrounding the site, the detailed Construction Traffic Management Plan must be submitted to Council for approval.

4.3 Public Submissions

Four submissions were received from the public. This included submissions from the following commercial neighbours:

- PPS Nominees (Owner of 6 O'Connell Street);
- ACE Insurance Limited (Owner of 28-34 O'Connell Street);
- Telado Pty Limited (Property 44-48 Hunter Street); and
- Kingsmede (Owner of 25 Bligh Street).

Of the four public submissions, one objected to the project, and three raised concerns.

The key issues raised in public submissions are shown in Table 2:

Table 2: Public Submissions

Construction Noise and vibration	Mostly related to disruption to the amenity of the immediate locality, noise intensive construction work and proposed noise intensive works.
Air Quality	Air quality issues during construction and operation and input into the construction air quality management plan.
Traffic Management:	Traffic impacts from the project and input into the traffic management plan prior to the approval of the project
Electric and Magnetic Fields	Modelling should be undertaken to simulate actual project emission of EMFs during operation. A condition should be imposed that the EMF levels should not exceed 40mG under ultimate (85th percentile) loading conditions.
Geotechnical Issues	Ground movement and settlement and that vibration monitoring points should be included at the cost of the Proponent.
Development potential	The proposal may adversely limit the development potential of 28 O'Connell Street due to the need for rock anchors.
Community Consultation	The consent should include an appropriate regime for community consultation and provision of adequate information so that disruption and inconvenience can be minimised.
Architectural Plans	Further detail is required on the façade treatment (artwork stone louvres) prior to commencement of work to verify its suitability, particularly in relation to maintenance, health and safety.
Operational Noise	A detailed operational noise and vibration assessment needs to be conducted once the plant selection is finalised.

4.4 Proponent's Response Submissions

The Proponent provided a response to the issues raised in submissions. The Proponent's response to submissions was made publicly available on the Department's website on 11 July 2012 (refer to Appendix C). The Proponent has submitted additional information on urban design issues, subsequent to the Submissions Report, in response to issues raised by the Department. A copy of the supplementary information is attached as Appendix D.

5 ASSESSMENT OF ENVIRONMENTAL IMPACTS

After consideration of the Environmental Assessment, submissions, Submissions Response report and Statement of Commitments, the Department has identified the following key environmental issues associated with the proposed project requiring detailed consideration:

- Built Form, Urban Design and Environmental Amenity;
- Heritage;
- Electric and Magnetic Fields (EMFs);
- Noise and Vibration; and
- Other relevant issues are discussed in section 5.5.

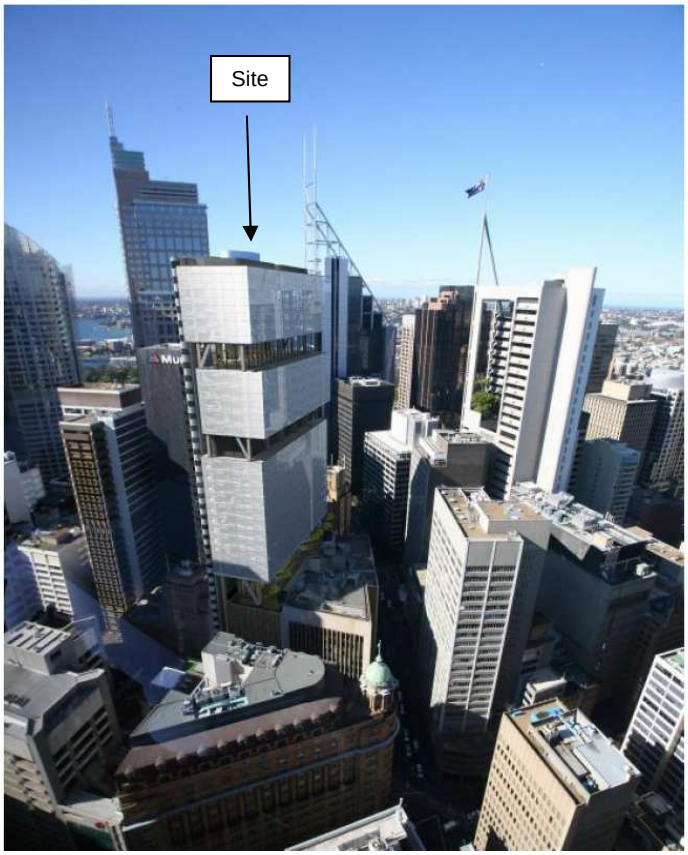
5.1 Built Form, Urban Design and Environmental Amenity

The Proposal consists of a building of up to 37 levels, or a maximum building height of 161.73m (RL 177.48 AHD), inclusive of 20 commercial floors (plus plant, sky lobby and sky garden), and an 11 storey podium element (containing the substation, lobby and 2 levels of underground parking) plus plant. Concerns have been raised in submissions in relation to the height, setbacks of the building to Bligh and O'Connell Streets, and façade treatments. It should be noted that subsequent to the submissions report, the Proponent submitted additional information in relation to design issues titled S*upplementary Information to Assist in the Assessment of the Project Application,* prepared by Fitzpatrick and Partners Architects, dated 12 October, 2012.

Height

The overall building height of 161.73m is below the maximum building height of 235m as detailed in the *Sydney Local Environmental Plan 2005 (*LEP*)*. The Proposal is also comparable in height with other tower forms in the locality as shown in Figure 5. Nearby buildings in the vicinity of the site are up to 225m in height.

Figure 5: Tower height and existing buildings – Looking North



The *Central Sydney Development Control Plan 1996* (DCP) specifies street frontage heights for the site between 20m to 45m. The podium is proposed to be constructed to a height of 45.48m fronting Bligh Street, and 52.58m fronting O'Connell Street, which exceeds the DCP requirement by 0.48 to 7.58m.

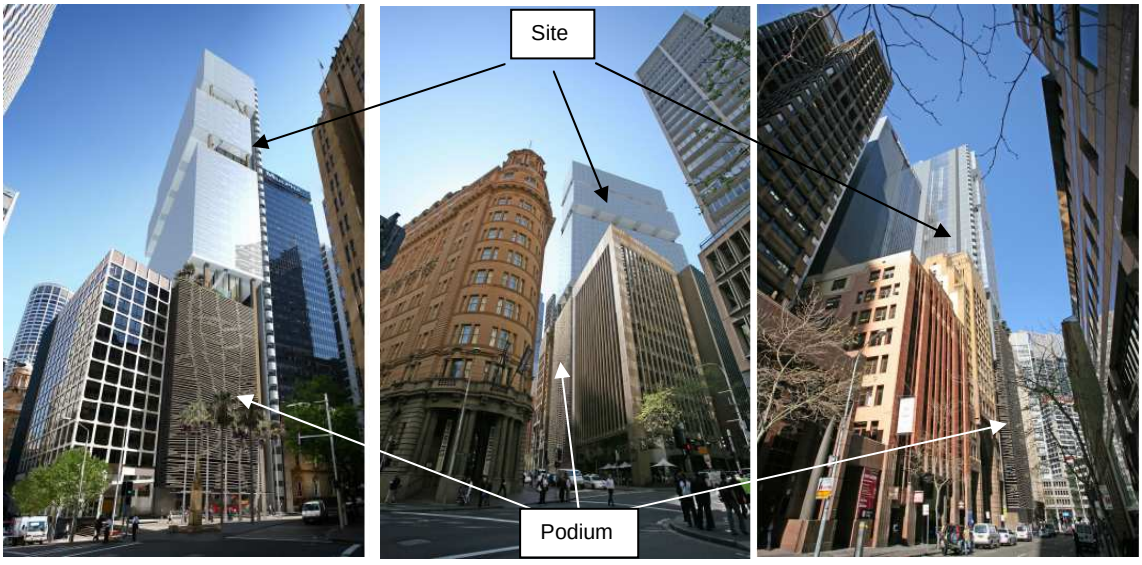
Notwithstanding this non-compliance, the Proponent considers that the proposed podium has regard to the street frontage heights of the adjacent buildings as required by the DCP design principles. In this regard, the proposed podium is generally consistent with the parapet height of the majority of the adjoining buildings (see Figure 6), being 37 Bligh Street, 48 Hunter Street, 24-28 O'Connell Street and 16 O'Connell Street.

The proposed podium is also considered by the Proponent to achieve a more comfortable street environment for pedestrians in terms of daylight, scale, sense of enclosure and wind mitigation.

The Department has reviewed the issue in detail and considers that the overall building and podium height is acceptable given that:

- The tower element is within the maximum height provisions of the LEP;
- the site is located in the Central Sydney CBD, and is in proximity to other buildings of similar height (the adjoining "Mulpha" building to the north at 25-29 Bligh Street is one of the tallest buildings in the immediate area up to a height of approximately 146.5m); and
- the podium height is consistent with that of adjoining buildings and will ensure a high level of amenity at street level for pedestrians in terms of daylight, scale, sense of enclosure and wind mitigation.

Figure 6: Podium height and existing buildings



Bligh Street *O'Connell Street* *O'Connell Street*

Setbacks

The DCP requires a minimum setback of 6m, and a weighted 8m average setback, to tower elements above the street frontage height to both Bligh and O'Connell Streets. The proposed tower has a 2.6m to 5.65m setback to Bligh Street and a 0.2m to 1m setback to O'Connell Street.

The Proponent states that although the podium will be constructed closer to the site boundaries than required by the DCP, the proposal will still achieve the amenity objectives of the DCP as a 7-12m high atrium space is proposed, which in combination with the proposed

through site link (that provides a visual connection between the adjoining streets), would increase daylight at street level.

Council however raised particular concern regarding the Bligh Street frontage alignment of the building, and its relationship with 31 Bligh Street (known as the Lowy Institute). Council also requested that the column from the commercial tower be located within the recessed entry on Bligh Street (behind the line of the street wall) so as not to overwhelm the former NSW Club and streetscape with its scale.

The Proponent has stated that the proposed setback was the outcome of a design review process (in conjunction with the constraints imposed by the substation), which determined that the adjoining 31 Bligh Street has historically had a recessed setback, and a significant setback of the proposed building would disassociate 31 Bligh Street from the streetscape, visually placing it as a building in space and totally removing its heritage context (see the Heritage Section 5.2 for further discussion).

The DCP also requires that tower elements above 45 metres provide a 3m setback to side property boundaries.

The tower is proposed to have a zero setback to the eastern boundary, and the setback to the western boundary varies from 0.2m to 1m, with the core of the tower located next to the western face of the Mulpha building. The Proponent states that the variation in setback is considered appropriate as it would not result in any significant adverse daylight access or view impacts for the Mulpha Building, and is unlikely to have adverse impacts in terms of ventilation, privacy or wind effects (further discussed below in *Environmental Amenity*).

The Department agrees that incorporating varying setbacks into the tower elements provides a visually interesting building envelope, whilst ensuring adequate light and ventilation is provided. The podium setbacks are also considered appropriate for the streetscape and contribute positively to the immediate context at ground level. The podium (which the Department notes is comparable in height to the existing building, and the existing buildings located to the South of the site at 30-32 Hunter Street) is considered to improve the existing relationship of the site with the adjoining 31 Bligh Street, and will contribute to activating both of O'Connell and Bligh Streets via the pedestrian connections and ground floor café.

Building bulk

The proposal includes 28,050m^2 of floor area resulting in a floor space ratio (FSR) of 13.75:1 for the site. The LEP permits an FSR of 8:1 for the site which would allow a floor area of 16,320m^2. However, under Clause 62(1) of the LEP, the Proponent can seek to increase the FSR by 4.5:1 by purchasing an appropriate amount of heritage floor space if the height of the building exceeds 55m and the FSR is above 8:1. The Proponent will purchase heritage floor space to qualify for this additional floor space, providing a FSR of 12.5:1.

Additionally Clause 10 of the LEP 2005 contains a provision which enables the consent authority to vary the maximum permissible FSR by 10% provided that the project contributes positively to the public domain and achieves design excellence. The total maximum achievable FSR for the site is therefore 13.75:1.

The Department believes that an FSR is acceptable given that:

- The proposal complies with the maximum height provisions of the LEP;
- the project was subject to a competitive design review process and the resultant proposal exhibits design excellence;
- the proposal is seeking to achieve a 5 star building rating;
- the proposal will provide a substantial public benefit through the provision of regional infrastructure to service the eastern part of central Sydney;

- the proposal provides a through site link between O'Connell and Bligh Streets which encourages pedestrian movement and improves permeability through the site;
- the proponent will contribute to public domain upgrades within Richard Johnson Square which would include kerb and gutter installation and restoration, lighting and landscaping work;
- the allocation of heritage floorspace (as an offset for the increase in FSR) will be required through conditions of approval; and
- the proposed floor space is unlikely to compromise the amenity of the surrounding area as discussed below.

Urban Design

As detailed in section 2.3, the design of the proposal (see Figure 7) was subject to a competitive design process, in accordance with the design principles as detailed in the Director-General's Environmental Assessment Requirements and Competitive Design Alternatives Process as outlined in the DCP.

The commercial tower has been split into 3 separate building elements, which the Proponent states is to break up the glazed areas of the tower (containing white frit curtain wall façades) and provide a distinct façade that contributes to the central Sydney skyline. It is also proposed to be light in colour which would result in reflected light into the streets. The Proponent further states that the substation and tower elements have been separated and incorporate distinctly different treatments "*to create an urban dialogue with both the medium rise and the high rise buildings in its locality*".

Figure 7: Podium and tower design elements – Bligh Street

The podium element, which includes the substation, has been designed to be enclosed in a sculptural overlay fronting both Bligh and O'Connell Streets. The intention of the street

sculpture is to "*pay homage to the city's history of stone*", as many buildings in the Bligh and O'Connell Street area have been cut from local sandstone.

Council however has raised concerns that the two podium façades appear to be the same, and that the protrusion of the façades has the effect of narrowing the streetscape. The Proponent has stated in the supplementary information provided on 12 October 2012 that the Bligh Street frontage will be expressed with a strong horizontal focus, while the O'Connell Street frontage will have a more vertical focus which will be achieved by introducing more vertical "fracture" lines. The Department considers this enables sufficient differentiation between Bligh Street and O'Connell Street façades.

The Department notes that the internal configuration and function of the substation constrain its scale and location. The Department understands that the substation requires a certain percentage of open area in conjunction with a venting system, which constrains the minimum size of the floorplate and results in the requirement for a concrete louvred exterior wall, which the façade will be attached to. The requirement to achieve a high percentage of ventilation is due to significant exhaust and supply air requirements for the internal equipment within the substation.

The Proponent states that the concrete wall behind the sculptural façade solution consists of large openings with a single stage metal louvre infill. The Proponent further states that the façade treatment would be refined in consultation with Council during the detailed design phase so that it does not extend further than 450mm beyond the site boundary, i.e. its overhang over public space.

Council also raised concerns noting the limited setback of the tower above the podium, and whether this would result in satisfactory wind conditions at ground level and in the through site link, and that the growth of trees should not be inhibited. The EA included a wind tunnel test which was conducted by CPP in September 2011 which demonstrated that both the street and upper levels would be suitable for pedestrians. It was also found that the project is unlikely to create wind conditions that would inhibit the growth of trees.

Further issues raised in the submissions related to the height of the façade and parapet.

The submission from Council requested for the base of the sculptured slatted wall to align with the springing point of the arch windows to the heritage building to the north of the site. In the supplementary information provided by the Proponent on 12 October 2012, the Proponent stated that this would result in the elevation of the base of the screen. This would reveal the zone substation louvres, but also increase the height of the café and the awning to such a height that it loses any relevance as an awning providing weather protection or as a scale defining element. The Department agrees with the Proponent's response.

Council also suggested that the base of the sculpture wall to the O'Connell Street façade be raised to align with the soffit to the podium recess of the southern neighbouring building. In response, the Proponent notes that this would result in similar difficulties as discussed above where louvres from the substation would be exposed. Additionally it would introduce a third material between the sculpture and the solid stone base. It would also require the access door to be elevated. The Proponent therefore proposes to align the base of the substation with the stone feature on the adjoining building on O'Connell Street on the northern side.

The Proponent has addressed the parapet height in its supplementary information. The Proponent states that the alignment of the buildings can only truly be witnessed at an acute perspective angle, steeply looking up, or given the narrowness of the street, standing at the end of the street looking down its complete length. The Proponent states that modifying the design would result in several negative impacts including the loss of a naturally ventilated lobby, loss of afternoon light and light penetration and significant loss of views. The

Department accepts the argument that modifying the parapet height would result in negative amenity impacts and would not be a desirable outcome.

In relation to Council's concern regarding street trees, the Proponent has indicated that street trees are not part of the project application. The paved area located directly in front of the proposed substation is the only element which has the potential to affect the public domain. Any works to be conducted within the public domain will be conducted in accordance with the City of Sydney Guidelines.

Council requested the Proponent provide a glass line at ground level for O'Connell Street with doors as a 'line of defence' after hours instead of the proposed fencing/security gate and this has been accepted by the Proponent in its supplementary information. Council's suggested glazed doors are also supported by the Department.

Council also raised concern regarding public domain lighting and public art. The Proponent has indicated that no city street lighting will be required. The Proponent has stated that the sculptural facades to Bligh and O'Connell Streets will constitute the biggest single art installation in the City of Sydney. The Department acknowledges the significant work that has gone into the façade design and does not consider further public art is required.

Further, Council raised concern over the lack of internal space and 'back of house' area for food preparation and storage proposed for the café on the Bligh Street frontage. The Proponent states that the design solution has been developed such that the café is a fully operational "hole in the wall" outlet. It is provided with space contained within the basement, easily accessed from the loading docks, for the use of food preparation, storage and administration. The café above is linked to this space with a dumbwaiter. The neighbouring fire stairs also link these levels. The Department has therefore included conditions which require the café to comply with the *Food Act 2003* and *AS 4674-2004* Design, Construction and Fit Out of Food Premises and Australian Standards, Codes of Practice and the current Building Code of Australia.

It should be noted that the design was reviewed by the Department's urban designer who, was satisfied with the final design outcome.

Environmental Amenity

Solar Access

The Proponent submitted shadow diagrams which indicate that the proposal will create some limited additional overshadowing of the neighbouring buildings, streets, and footpaths when compared with the existing buildings. This additional overshadowing is for a relatively short period (up to approximately 1 hour during the Winter Solstice June 21st), which the Proponent considers to be minor.

The additional overshadowing is also consistent with the additional shadow caused by the previously approved development (approved by the City of Sydney) on the site. Further, given the site is located south-east of the heavily pedestrian populated area of Martin Place, between Pitt and George Streets, no additional shadow impacts will occur in this area during the lunchtime or afternoon periods. The proposal also does not reduce solar access to Richard Johnson Square. The Proponent therefore, does not propose any further mitigation strategies to reduce overshadowing impacts.

The Department notes that any additional shadows will largely be restricted to buildings and avoid any significant public open space or gathering areas, and is therefore satisfied that the future building on the site will not result in any unacceptable additional overshadowing impacts.

Internal amenity

As discussed in Section 3.5, the proposal is seeking to achieve a 5 star building rating which will provide a high quality indoor environmental quality through good ventilation rates, air change effectiveness and daylight penetration. The selection of a high performance façade system, including double glazing and extensive fritting to the glass surface area will also ensure the internal amenity of the office component of the proposal for future inhabitants of the building.

Wind Impacts

The Proponent undertook two impact assessments to determine the potential impacts of the proposal on the local wind environment, giving consideration to the interaction between the wind and building morphology, distances between the proposed building forms, heights, landform and street pattern. The assessments concluded that the general wind amenity of the site is similar to other CBD locations and both the street and upper levels would be suitable for pedestrian sitting and standing. Where street trees exist, it is unlikely that the project would create wind conditions that would inhibit the growth of trees.

The Department is generally satisfied with the wind assessments undertaken by the Proponent. Notwithstanding this, a condition has been recommended that requires the Proponent to demonstrate to the satisfaction of Director-General that the detailed design of the building is consistent with the provisions of Council's DCP in relation to wind criteria and that any wind mitigation structures must be designed in consultation with Council.

Visual Impacts

The Proponent notes that as part of a previous development application, the City of Sydney Council granted consent to construct a 205m high commercial tower, which is 43m higher than the proposal. The proposal is also 73m lower than the maximum permissible height for the site of 235m. The Proponent notes that the proposal went through an extensive design review process, and therefore does not consider there to be any unacceptable visual impacts on adjoining buildings.

The Department considers that impacts to views over the site from surrounding buildings as a result of the height of the tower do not warrant a reduction in height of the tower. Although views from the Mulpha building to the south will be obscured by the proposal, the building will still enjoy views to the north and east. The Department also notes the height of the previously approved tower and considers the reduced height of the current proposal acceptable in terms of views. The Department further notes that the majority of surrounding buildings are largely commercial, and so will be largely occupied by workers who will not reside on the premises after hours or on weekends, which further diminishes the extent of any view impacts.

Consideration

The Department considers that the overall building and podium height is acceptable given that the tower element is within with the maximum height provisions of the LEP, is in proximity to other buildings of similar height which will not result in any detrimental visual or view loss impacts and the podium height is consistent with that of adjoining buildings and will ensure a comfortable street environment for pedestrians.

The Department agrees that incorporating varying setbacks into the tower elements provides a visually interesting building envelope, whilst ensuring adequate amenity. The podium is also considered to contribute positively to the immediate context at ground level, improve the existing relationship of the site with the adjoining 31 Bligh Street, and contribute to activating both O'Connell and Bligh Streets via the pedestrian connections and ground floor café.

The Department is of the opinion that the proposal achieves good design quality in terms of architectural expression and contribution to the public realm. The Department understands that the design of the podium is constrained by the functions of the substation, however

believes that overall the design intent and architectural outcomes presented are of a high quality and of merit. The proposal therefore establishes design quality in the aspects of architecture, finishes and materials.

The Department believes that the proposal provides an acceptable differentiation between the Bligh Street and O'Connell Street facades through proposed horizontal and vertical design elements.

The Department notes that the upgrade and landscaping of Richard Johnson Square is not part of the project application. However, in regards to the public domain, the Department has recommended that the small elements of landscaping (such as pruning) within the public domain be consistent with Council guidelines.

In relation to Council's request for the sculptured slatted wall to align with the springing point of the arch windows to the heritage building to the north of the site, the Department notes that a modified design would result in exposed louvres and potential compromised weather protection for café customers. On this basis, the Department does not consider any design changes warranted.

Similarly, the Department agrees with the Proponent's approach in relation to Council's request to raise the base of the sculpture wall to the O'Connell Street façade as to align with the soffit to the podium recess of the southern neighbouring building. The Department believes that exposing the louvres and the introduction of a third material between the sculpture and stone base will result in a visually dominant element on the streetscape. Therefore, the Department considers that the base of the substation should be aligned with the stone feature on the adjoining building on O'Connell Street on the northern side, as currently proposed

Furthermore, in relation to the parapet, the Department concurs with the Proponent that modifying the design would result in a loss of naturally ventilated lobby, loss of afternoon light and light penetration and significant loss of views and therefore is not a desirable option.

The Department agrees with Council that a glass line is a more suitable design solution than a security fence and has therefore recommended that a glass line be provided at ground level for O'Connell Street, with doors, for after hour security instead of the proposed fencing and a security gate.

In regards to the café, the Department believes as the basement would be used to prepare food and a dumbwaiter would be installed there is adequate space for the café.

The Department has also recommended a condition that ensures that the design of the building is consistent with the provisions of Council's DCP in relation to wind criteria which will further ensure the protection of ground floor amenity.

Given the above, the Department therefore agrees with the Proponent, that the site could realise the maximum floor space as detailed within the LEP. Under the LEP there is a requirement for the purchase of heritage floor space for any development above 55m in height which exceeds a FSR of 8:1. The required heritage floor space is calculated to be 7140m^2. However, the LEP states that this amount may be reduced by 50% (up to a maximum of 1000m^2) when a development has undergone a design competition and, in the opinion of the consent authority (the Minister) achieves design excellence.

The Department is satisfied that the proposed development exhibits design excellence and has been through a design competition process, therefore under Clause 26(6) of the LEP the Department believes that the heritage floor space required to be purchased should be reduced by 1000m^2. The Department has therefore recommended a condition that prior to

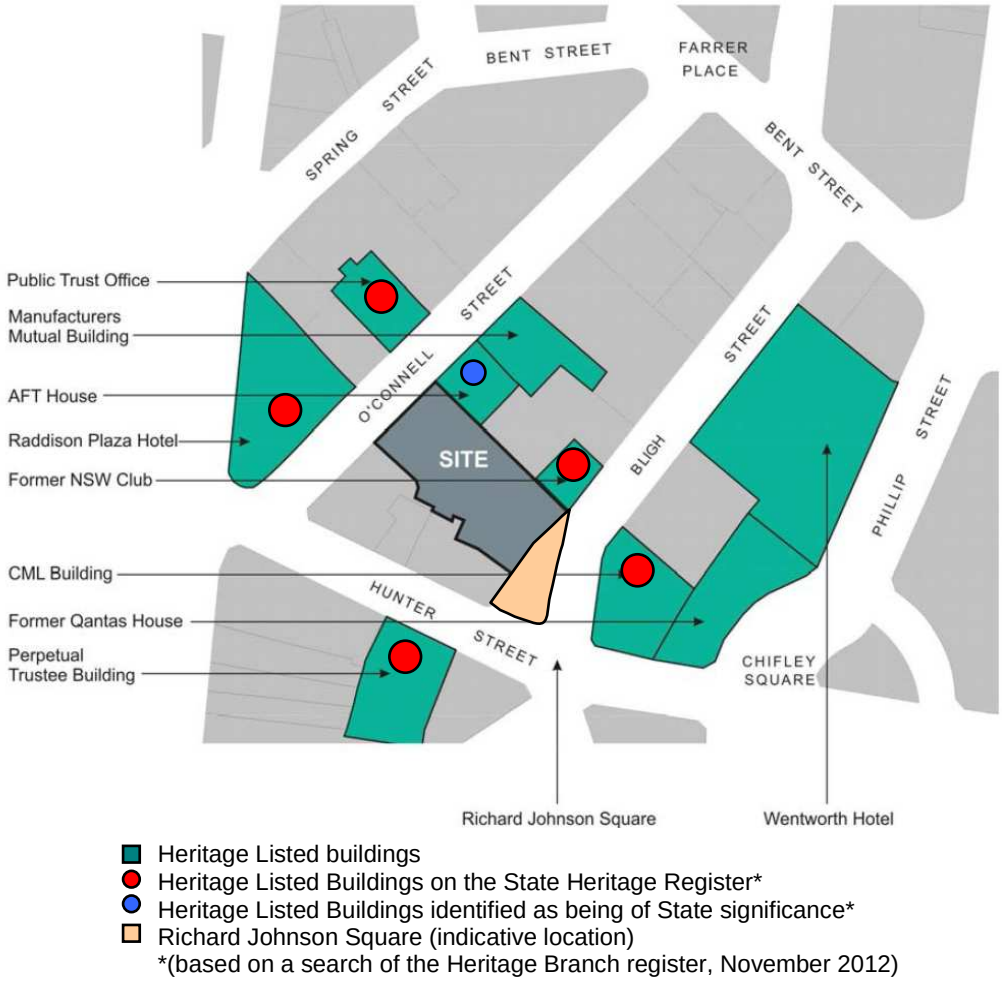
construction, the Proponent provide verification that 6140m^2 of heritage floorspace has been allocated (purchased and transferred) to the development, being that floorspace in excess of the 8:1 FSR as specified in the LEP.

On this basis, the Department is satisfied that the proposed building height, density and form are acceptable in the context and will result in a building of high architectural standard making a positive contribution to the public domain. The proposal will also strive to achieve a 5 star environmental performance and the Department is satisfied that amenity of the public domain in terms of overshadowing, wind and visual impacts are acceptable.

5.2 Heritage

The proposal is located in the vicinity of a number of heritage items assessed as being of state and/ or local heritage significance (Figure 8 identifies all items listed on the State Heritage Register and/or locally within the Sydney LEP 2005). The proposal itself does not involve the demolition of any heritage listed buildings, however it adjoins the State heritage listed former NSW Club building (now known as the Lowy Institute at 31 Bligh Street) and AFT House (at 16-18 O'Connell Street) identified as being of state significance, and the locally significant Richard Johnson Square. A Statement of Heritage Impact (SoHI) has been submitted by the Proponent that assesses the impact on the heritage items within the vicinity of the site in accordance with the relevant NSW Heritage Council guidelines.

Figure 8 – Location of heritage items in the vicinity of the site (based on an extract from the Sydney LEP 2005)



While the main building is proposed to sit forward of the former NSW Club Building, the lobby and stair tower would be recessed back from Bligh Street opening up views to the corner and southern façade of the NSW Club building.

City of Sydney Council raised concerns with the setback of the proposal to Bligh Street, and believe that the Bligh Street wall should be set back further to reveal more of the façade of the former NSW Club, particularly as viewed from the corner of Hunter and Bligh Streets. The Proponent states that the setback of the former NSW Club Building was analysed in detail as part of the design review process, which determined that historically the building has never sat flush to the streetscape, but has always contained a recessive element (see Figures 9 and 10). The SoHI further states that historically, the southern wall of the former NSW Club has adjoined a building. It was further determined by the Proponent that introducing a significant setback to Bligh Street for the proposal would "*disassociate the former NSW Club from the streetscape, visually placing it as a building in space and totally removing its heritage context*".

Figure 9: The relationship between the site and former NSW Club building – c1925

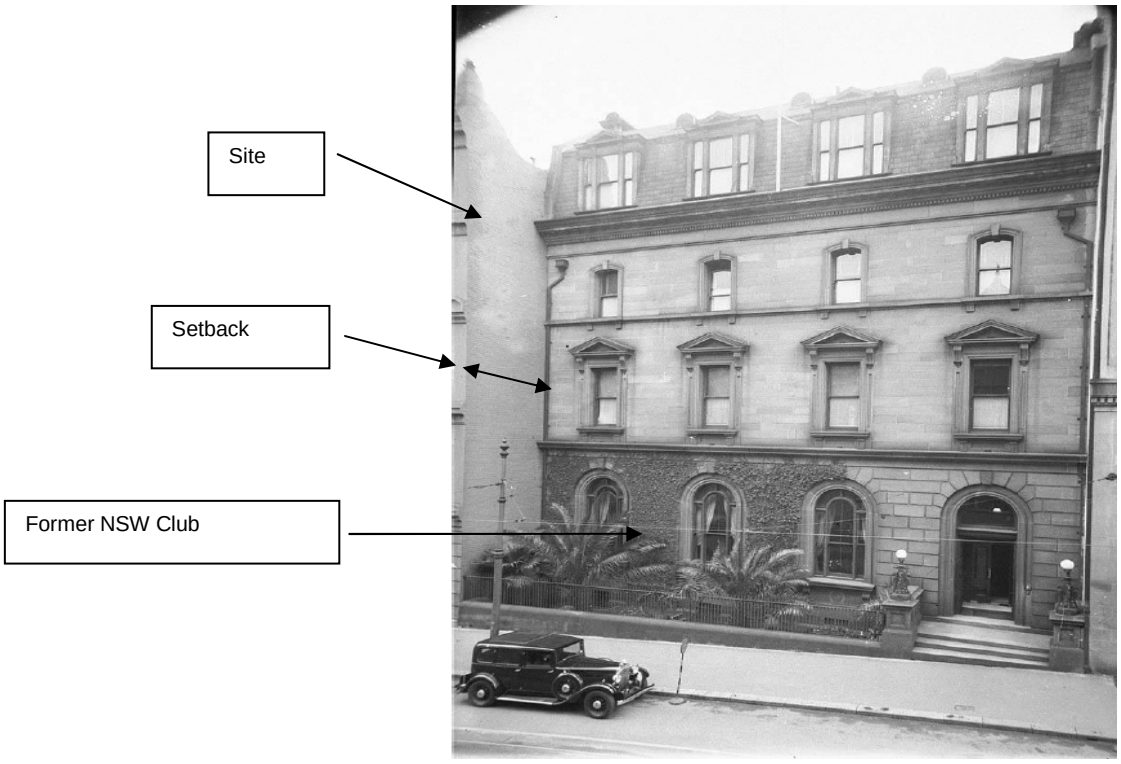


Figure 10: The relationship between the site and former NSW Club building – 2012

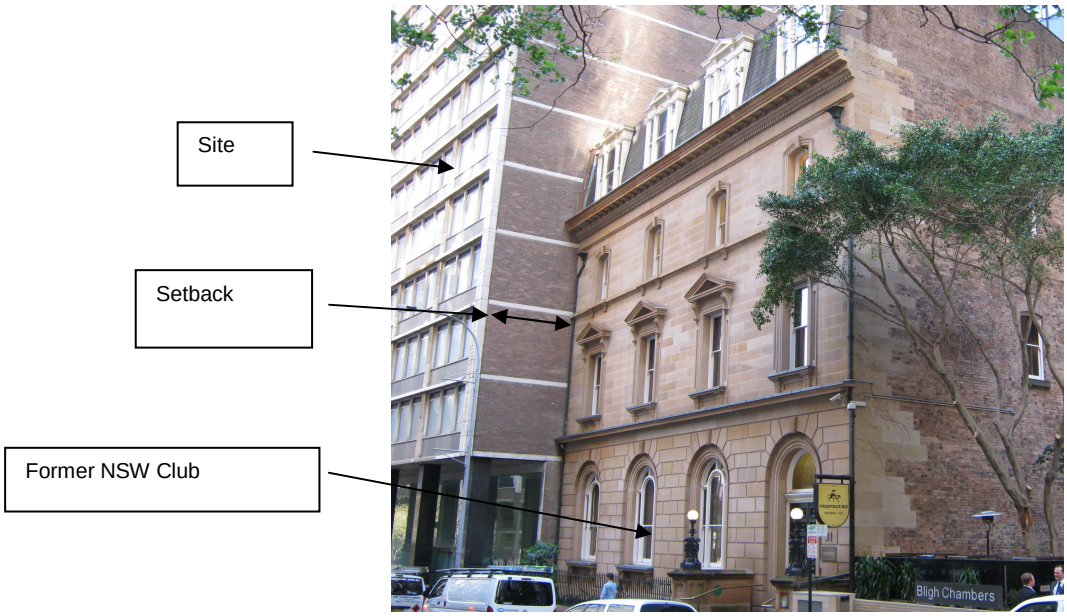
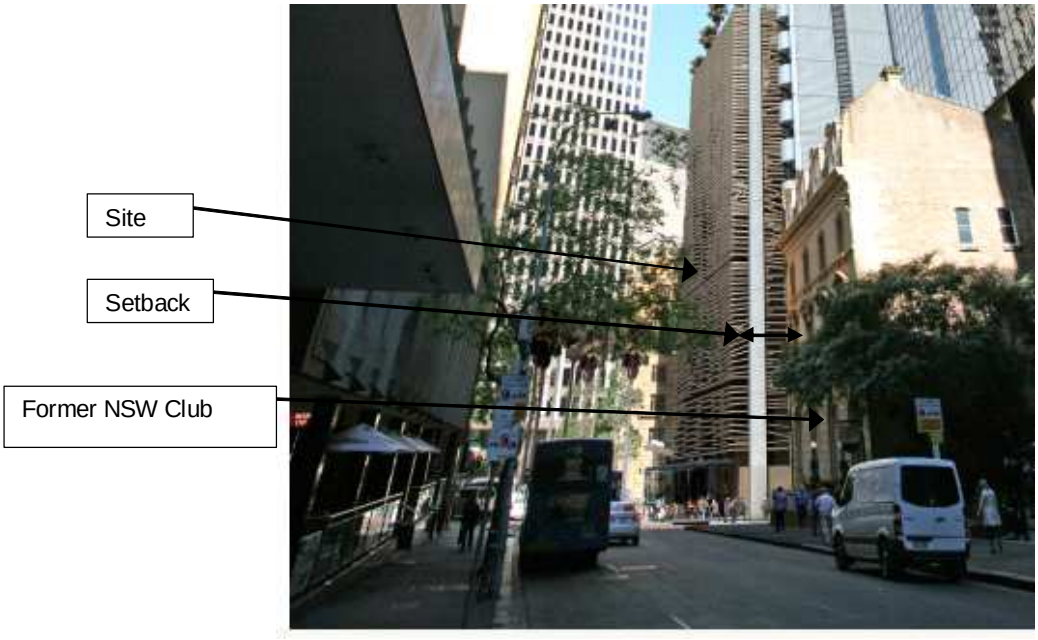


Figure 11: The relationship between the proposed site and former NSW Club building.



The SoHI states that the entry void for the proposal to both Bligh and O'Connell Streets has enabled the articulation and visibility of the southern façade of the former NSW club and AFT House. Whilst the proposal therefore will sit forward of the former NSW Club, the lobby and stair tower would be recessed back from Bligh Street to open up views to the corner and southern façade of the building. This is deemed to minimise negative heritage impacts on views and vistas to the heritage listed buildings, and frames the southern façades by providing a scale that is sympathetic to the heritage listed buildings.

The proponent has proposed that the adjoining wall is to be clad using a material that matches the original stone on the east elevation of the former NSW Club and exposed southern façade of the AFT building to further respect the cultural significance of both buildings. The Proponent states that the southern wall would incorporate a granite finish and sandstone to the upper floors to match the stone cladding used on the west elevation of the former NSW Club, which would respect the heritage of the building and seek to interpret new from old. Further, the sculptural reconstituted stone screen proposed for the O'Connell Street façade podium level would provide "*quality, fine grained articulation to minimise the appearance of bulk…which would help minimise the negative impacts of bulk and scale on the surrounding heritage items*".

The Heritage Council of NSW raised concerns that the proposed external fire stairs on both the Bligh and O'Connell Street elevations have the potential to impact visually on the architectural character of the surrounding historic buildings. The Heritage Council believes that a right angled external staircase would be the preferred option in place of the current rounded stairs. The Proponent however has stated that the form and materials of the fire stairs were tested both in physical and computer working models, and the current round nose version of the solid glass reinforced concrete railing to the front of an open precast concrete stair was selected as the preferred option. The round form is considered by the Proponent to provide a softer edge and allows more vision of the sides of the neighbouring buildings, particularly those fronting Bligh Street. The Proponent states that square formed stair elements would create a bulkier form and visually exaggerate the width of the stair and was considered by the design selection committee to create an uncomfortable junction with neighbouring buildings.

A branch of the Bennelong drain (one of the five original combined sewers built in Sydney), which passes beneath Bligh Street, also passes within the proposed construction zone. The

Proponent states that whilst excavation for the cable tunnel would pass below the drain, the separation distance is such that there are unlikely to be impacts to the structural integrity of the drain. The depth and location of the drain however would be confirmed prior to works commencing, and condition surveys would be undertaken pre and post construction inclusive of the implementation of measures to address any impact.

The Proponent further states that overall the proposal respects the significance and streetscape identity of the various heritage items in the vicinity of the site. Separation has also been provided between the podium and tower elements (via the "Office Tower Sky Lobby" and "Sky Garden") to reflect the difference between the early and mid 20th century medium rise heritage items and the surrounding existing high rise buildings.

Richard Johnson Square, which adjoins the site to the south east, has particular cultural heritage significance as it was the site of the first church and first Christian worship service in colonial NSW, and additionally it is an important example of 20th century civic planning. The square is owned by the City of Sydney Council, and the Proponent has provided a Public Domain Concept Plan to Council as part of the proposal, which includes how the quality of the square could be improved whilst respecting its historical significance.

However, works to Richard Johnson Square do not form part of the CityGrid project, nor the recommended conditions of approval. Notwithstanding, the proposal's interface with the square is important in helping to create a functioning vibrant active space of high amenity whilst respecting the historical significance of the square. In this respect the Public Domain Concept Plan provided by the Proponent seeks to ensure that the levels, access and grades of the square are integrated with the proposal and adjacent buildings opening up viewing catchments which would in turn contribute to the appreciation of the former NSW club building. The increased pedestrian activity would also promote greater awareness of the adjoining heritage items.

Consideration

The Department has considered the location of the proposal adjacent to two heritage buildings, the NSW club (listed on the State Heritage register) and the AFT Building (locally listed but identified as being of State Significance). Additionally, the Department has considered the wider setting of the proposal, amidst a number of heritage buildings, including five listed on State Heritage register (see figure 10).

The Department considers that given the former NSW Club has historically contained a recessive element, as evidenced in the SOHI and via its current relationship with the site, the Proponent has adequately justified that the proposed setback to Bligh Street would not have a negative impact on the historical significance of the former NSW Club or streetscape character. The Department also agrees with the Proponent that the entry void for the proposal to Bligh Street will improve the articulation and visibility of the southern façade of the former NSW club.

To ensure vibration limits are enforced to minimise any structural damage to surrounding heritage buildings from construction works, the vibration limits set out in the German Standard "*DIN 4150-3: Structural Vibration – effects of vibration on structures*" are recommended to apply in relation to heritage buildings. Additionally, the Department has also recommended conditions that ensure dilapidation surveys are prepared for structures up to and including a distance of 50m from any construction activities that generate vibration impacts (including Bennelong drain).

The Heritage Council raised particular concern with excavations that would occur within the footpath envelope of Bligh Street and within the Square, as any works would have the potential to impact on archaeology relating to the site of the first church. The Department notes however that the square is not part of the application.

The Heritage Council also notes that potential wells may exist beneath the project area. The Proponent however stated it considers the proposed excavation area to be of low archaeological potential, as it has already been disturbed by earthworks associated with the installation of existing services. The Proponent has committed to archaeological monitoring of the excavations in this area by an experienced archaeologist. The Department has strengthened this commitment by recommending a condition requiring the archaeologist meet the Heritage Council's Excavation Director Criteria (July, 2011) for State significant sites.

The Department has also recommended a condition requiring the Proponent to contribute to the restoration, lighting and landscaping work within the Richard Johnson Square area (and adjacent to the site in O'Connell Street)(see Section 5.5). Whilst the Proponent is not undertaking works as part of this application, the plan will be further developed by the Proponent in consultation with Council, separate to the current project application.

To manage the overall project in relation to heritage, the Department recommends that the Proponent be required to prepare a Heritage Management Plan, which will detail procedures and management measures for both historic heritage items and Aboriginal objects during construction. This will ensure the proper management of any additional heritage items found during the excavation process (including potential wells), and protection of existing heritage items (including any impacts to the Bennelong drain) throughout all stages of the projects development. The Department notes the proponent's consideration that the likelihood of Aboriginal sites surviving in an undisturbed context is remote. However, as Aboriginal objects have been found in a number of locations across the CBD, the Department's recommended condition will ensure this is appropriately managed should an unexpected find occur.

5.3 Electric and Magnetic Fields (EMFs)

Electrical infrastructure such as substations and underground cables generate electric and magnetic fields (EMF), which have been linked to human health risks. In general, assessments of EMF largely focus on magnetic fields, as electric fields have been known to diminish rapidly with distance from a source and are effectively shielded by common building materials such as brick and metal. Electrical fields are also known to be effectively shielded by human skin such that the electrical field inside a human body is around 100,000 times less than the external field. Consequently, any health risk concerns associated with EMF are largely related to magnetic fields (MFs). Consistent with this, the Proponent has focused its EMF assessment on MFs.

In Australia there is no established health standard for the assessment of MFs. In 1989 the National Health and Medical Research Council (NHMRC) issued the "Interim Guidelines on Exposure to 50/60 Hz Electric and Magnetic Fields" which advocated a short-term exposure limit for MFs of 1000 milliGauss (mG) to the general public. The NHMRC subsequently transferred the responsibility for reviewing and publishing an updated standard to the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). In 2006, ARPANSA issued a draft guideline for public comment ("Draft Standard on Exposure Limits for Electrical and Magnetic Fields") which proposes a 24 hour exposure limit for MFs to the general public of 1000mG, and is therefore consistent with the NHMRC guideline. The ARPANSA draft standard has not to date been finalised.

More recently (in 2010), the International Commission on Non-Ionising Radiation Protection (ICNIRP), an independent international organisation which works in close collaboration with organisations such as the World Health Organisation, published a guideline on EMF – "Guideline for Limiting Exposure to Time-Varying Electric and Magnetic Fields 1Hz-100kHz". This guideline recommends a MF exposure level for the general public unrelated to exposure time of 2000mG. This level has not been adopted in Australia.

Existing magnetic field levels

The EA has provided data on the existing MFs levels along Bligh Street. These are between 2 and 3mG, with levels increasing to about 6mG above 11kV cables that are laid below the footpath. On the O'Connell Street frontage, levels were generally between 4 and 7mG, increasing to about 14mG due to the possible presence of underground services.

MFs within the existing building were found to be less than 6mG, with localised peaks of up to 18mG along the northern wall.

Predicted Magnetic Fields

The Proponent presented an initial assessment of MFs based on the substation design in the EA. Based on the available design and loading information, the MF contribution from the proposed substation and associated underground feeder entries has been modelled using a computer software package. The model results indicate that:

- Within the substation, the highest MFs appear to be strong due to the capacitors and the transformer connections. Levels are in excess of 2000mG, but are expected to reduce to less than 100mG within 5 metres of the connections;
- The MFs across the bulk of the remainder of the substation are anticipated to be less than 50mG;
- The MFs in areas accessible to the general public are predicted to be between of 2 to 20mG. Localised peaks of 2000mG, may occur near 11kV risers on Levels 3 & 4 (car park levels);
- The substation's contribution to the MFs in adjoining commercial office buildings on the southern side would be less than 2mG above Level 12, and generally between 5 and 20mG between Levels 1 and 12, with localised peaks up to 50mG between levels 1 and 9, in the vicinity of the capacitor bank risers midway along the southern side;
- The predicted MF levels from the substation to the lowest level of the commercial tower above would be less than 2mG;
- The highest MF contribution from the substation to the adjoining building at No. 31 Bligh Street is predicted to be less than 10mG but may be slightly higher in the vicinity of the capacitors near the top of the adjoining building; and
- The MF levels along the street frontage are expected to be dominated by the outgoing underground feeders. Modelling predicts MFs directly above the cables of up to 20mG.

The model results indicate that MFs in most of the public areas would be within the range normally encountered in everyday life (refer Table 3). There would be localised areas of elevated MF levels in some areas accessible to the public in the vicinity of the substation and associated electricity infrastructure. These localised higher fields would be experienced for short periods of time as people pass through the car park.

MFs associated with the substation equipment is approximately inversely proportional to the square of the distance from the source. This means that the value of MF at a distance 5m from the source would be 25 times less than the value of MF at the source.

Compliance with the principles of prudent avoidance and Australian Standard AS2067-2008

The principles of prudent avoidance involves "doing whatever can be done at modest cost and without undue inconvenience to avoid the possible risk (to health)" – (Gibbs, 1991 "*Inquiry into Community Needs and High Voltage Transmission Line Development*", The Right Honourable Sir Harry Gibbs, February, 1991).

The Proponent has stated it applied the principles of prudent avoidance in developing the concept design for the City East Zone Substation and this included investigating technically feasible measures to reduce MF. The following measures have been incorporated:

- Using compact indoor switchgear which results in reduced MFs compared to larger outdoor facilities;

- The main source of MF are the transformers and associated vertical risers. The design places the transformers and associated vertical risers in the central part of the site to maximise the distance between these components and the property boundary. This minimises the influence of the transformer connections on the EMF levels at the boundary; and
- Locating the 11kV switchgear below street level to minimise the influence of MF from the 11kV transformer on areas that are accessible to the general public.

The Proponent has also committed to undertake further investigation during detailed design to further reduce EMF in accordance with the principles of prudent avoidance.

Australian Standard AS2067-2008 provides common rules for the design and erection of high voltage electrical installations and provides practical guidance to the adoption of precautionary measures as recommended by both WHO and ARPANSA.

The Proponent has committed to undertake work during detailed design to minimise MF impacts from the substation and its associated equipment in accordance with the guidance provided in Appendix D of AS2067.

The Proponent has stated the following measures would be implemented to minimise potential impacts associated with MF:
- Consistent with the principles of prudent avoidance, and to the greatest extent practical and feasible, during detailed design consideration would be given to the configuration and phasing of the 11kV and 132kV transformer connections and the 11kV capacitor cabling to achieve a degree of field cancellation and minimise MF; and
- further work would be undertaken during detailed design to minimise MF impacts in accordance with the principles of prudent avoidance, which includes those outlined in Appendix D of AS 2067 -2008.

The Proponent would also undertake pre-operational and post operational MF measurements to identify any changes in MF levels surrounding the site as a consequence of the operation of the substation.

Consideration

The Department notes that the Proponent has considered only MFs. Existing electric fields have not been measured. The Department accepts that the reasons being that the electric fields diminish rapidly with distance from the source and are effectively shielded by common building materials such as bricks, materials and also human skin. The electric fields exposure levels to the public, outside the substation will be negligible.

The Department notes that the key issues raised in submissions related to:
- concerns regarding possible high levels of MF along the southern substation wall, which shares a boundary with the neighbouring property;
- review of design configurations to ensure that all reasonable and practical measures, are considered and adopted to reduce the high levels of MF;
- MF exposure levels to the neighbouring property should not exceed 40mG under ultimate (85^{th} percentile) loading conditions;
- concern with respect to MF health impacts on people who are in close proximity of the facility for prolonged periods, such as office workers; and
- concern with the proposed car parking area on levels 3 and 4, which would be subject to high MF levels when the substation is operating at peak loads.

The Department is generally satisfied that the Proponent has undertaken a technically robust assessment to identify the potential MF loads associated with the proposal. The model only considered the contribution of the substation and its associated feeders and does not consider external sources.

In relation to exposure risks to the general public, the Department notes the numerical limit (1000mG) referred to in the current draft ARPANSA. There is not currently an Australian Standard for EMF exposure limits, however the International Commission on Non-ionising Radiation Protection (ICNIRP) sets a guideline level of 2000mG for public exposure.

There would be localised areas of elevated MF levels in some areas accessible to the public (transient receptors) in the vicinity of the substation and associated electrical infrastructure. The fields in areas within the car park that would be accessible to the general public are predicted to be generally in the range of 2 to 20mG. These intermittent fields, which may be experienced for short periods of time, are of a similar category to those we experience in everyday life. A series of typical MF levels associated with particular appliances at normal user distance is shown in Table 3.

Table 3 –MF levels associated with appliances

Appliance	Typical Measurement (mG)	Range of Measurements (mG)
Computer	6	2-20
Hair Dryer	25	10-70
Refrigerator	2	2-5
Stove	6	2-30

Localised peaks, exceeding 1000mG may occur near the 11 kV risers on levels 3 and 4 (car park levels), however these peaks occur at the edge of access ramps and any exposure will transitory. In regard to long term receptors (neighbouring buildings, hotels), the Department is aware that despite studies linking MF levels above 4mG with elevated risks of childhood leukaemia, due to lack of scientific evidence regarding a causal relationship, there are no international or national standards which recommend an exposure or restriction limit at this level. In contrast, the draft ARPANSA guideline and the ICNIRP guideline indicate that the exposure limits recommended in each (i.e. 1000mG and 2000mG respectively) have been set specifically on the basis of established biological effects, which have been observed and reproduced in laboratory studies at higher exposure levels. In this regard, the forward to the draft ARPANSA guideline states that “data regarding biological effects, at levels below the limits specific in the Standard are incomplete and inconsistent”.

The November 2010 ICNIRP factsheet states “it is the view of ICNIRP that the current existing scientific evidence that prolonged exposure to low frequency MF is causally related with an increased risk of childhood leukaemia is too weak to form the basis of exposure guidelines”. Similarly, the World Health Organisation (WHO) 2007 publication “*Environmental Health Criteria 238: Extremely Low Frequency Fields*” states that “only the acute effects (of MF exposure) have been established” and “there are uncertainties about the existence of chronic effects because of the limited evidence for a link between the exposure to extremely low frequency MFs and childhood leukaemia”.

In the absence of established international or national standards for long-term MF exposure, the Department does not consider it appropriate that an unestablished criterion (whether that be 4mG or an alternate limit) be used by the Department in assessing potential long-term MF exposure risks. Rather the Department has taken the approach recommended in the various guidelines, that is a precautionary approach which ensures that the risk of MF exposure is minimised as far as possible (taking into account reasonable and practicable considerations), even where the likelihood of elevated health risk has not been absolutely established.

The Department contacted the Public Health Unit of NSW Health as part of its assessment. The Unit noted that there will be an increase in MF levels. It did not object to the proposal,

but recommended that all feasible and reasonable measures be applied in the design and installation of the substation to reduce the predicted increase in MF levels.

Based on the above, the Department has focused its assessment of stationary receptors (which have the potential for longer-term exposure to MFs), on whether the Proponent has demonstrated that all reasonable and practicable measures have been considered in the design of the substation to minimise potential long-term MF exposure risks to surrounding stationary receptors, consistent with the precautionary approach.

The Department is satisfied that the Proponent has applied the principles of prudent avoidance in developing the concept design for the City East Zone Substation and this included investigating technically feasible measures to reduce MFs including the measures outlined above.

The Proponent has also committed to undertaking further investigations during detailed design to further reduce MFs in accordance with the principles of prudent avoidance.

The Department has recommended a condition of approval which states that the Proponent shall prepare, prior to the commencement of Construction (other than the works for the purpose of bulk excavation and cable tunnel), a MFs Management Protocol, that shall include details of measures to be applied to the Substation to ensure that the levels of MFs surrounding the cables, transformers, switchboards and air-core inductors are minimised during operation, including details on the application of Prudent Avoidance Principles and AS2067-2008.

5.4 Noise and Vibration Impacts (Construction and Operation)

The Environmental Assessment included a construction noise and vibration impact assessment prepared by Wilkinson Murray and an operational noise and vibration impact assessment prepared by ARUP. Both reports were prepared in accordance with the applicable guidelines, including the *Interim Construction Noise Guideline (DECC, July 2009)* (ICNG).

The project has the potential to generate noise and vibration impacts, including ground-borne noise (generated by vibration transmitted through the ground into the structure), particularly during the construction period.

Noise and vibration would be generated from excavation works, construction of the substation and tower and road traffic noise. In addition, tunnelling work using road headers and other ancillary tunnelling equipment (e.g. exhaust fan and dust collector) is another source of noise and vibration during construction.

The project also has the potential to generate noise impacts during operation (including road traffic noise), however, operational noise is considered to be a relatively minor contributor to the acoustic environment.

Construction noise (excavation and general building construction)

The overall duration of construction would be 41 months (with some tasks undertaken concurrently), including 8 months for bulk excavation, 8 months for the cable tunnel, 20 months for the substation and 18 months for the commercial tower.

The key noise sources during excavation include rock breakers, front end loaders and dump trucks for spoil removal, excavators and a mobile crane. The key noise sources for the building construction works would include concrete pumps, forklifts, compressors and a crane.

Land uses surrounding the site consist of commercial office towers with active street frontages, retail, hotels, restaurants and cafes. The Proponent identified four sensitive receivers surrounding the proposed site including:

- Radisson Hotel – O'Connell Street immediately to the west of the site - distance of 20m;
- Sofitel Wentworth Hotel - backing on to Bligh Street to the north east of the site - distance of 65 m;
- Commercial properties immediately to the north and south of the site; and
- Lowy Institute immediately to the north of the site.

The Department notes that for the purposes of the assessment the Sofitel Wentworth and Raddisson Hotels are considered 'residential' receivers and the adjoining Lowy Institute and other commercial buildings are considered 'commercial premises'.

The daytime construction noise criteria for residential receivers were determined in accordance with the EPA's *Interim Construction Noise Guideline (DECC, 2009)* by measuring the rating background level (RBL) and adding 10 dBA. This is known as the noise management level. This criteria applies for standard construction hours: Monday to Friday 7am to 6pm, and Saturday 8am to 1pm. Outside the standard hours the criteria is background plus 5 dBA. The construction noise management level/criteria for office and retail areas is $L_{Aeq\ (15\ min)}$ 70 dB(A).

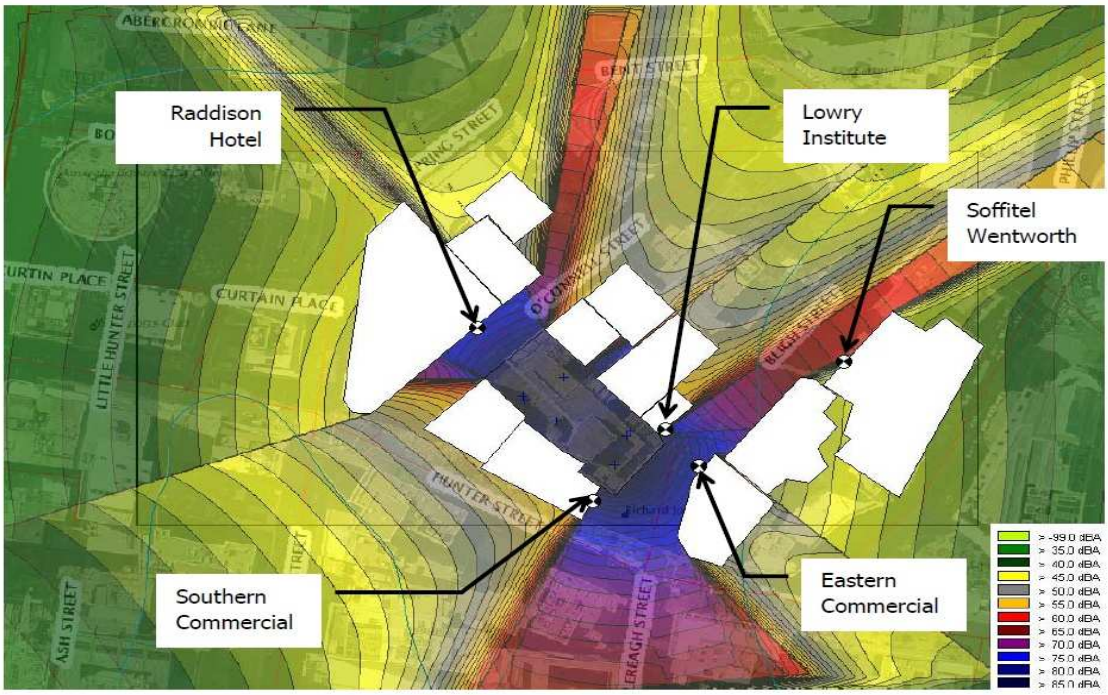
The predicted noise levels during construction, (day time and evening) are presented in Table 4 and compared with the quantified noise goals. Predicted noise levels for excavation are also illustrated in Figure 12.

Table 4 - Predicted Day & Evening Time Noise levels (Excavation & Construction)

Location	Predicted Noise levels dBA	*Day Time Noise Goals/Criteria (dBA)	Noise exceedance dBA	*Evening Time Noise Goals (dBA)	Noise exceedance dBA
During Excavation					
^Sofitel Wentworth	55 (day) / 43 (evening)	68	-	64	-
^Radisson Hotel	76 (day) / 74 (evening)	75	**1**	66	**8**
^^Lowy Institute	77 (day) / 67 (evening)	70	**7**	70	-
Southern Commercial	80 (day) / 73 (evening)	70	**10**	70	**3**
Commercial across Bligh Street	78 (day) / 75 (evening)	70	**8**	70	**5**
During Construction					
Sofitel Wentworth	46	68	-	64	-
Radisson Hotel	67	75	-	66	**1**
Lowy Institute	65	70	-	70	-
Southern Commercial	66	70	-	70	-
Commercial across Bligh Street	65	70	-	70	-

* Noise Goal based on *Interim Construction Noise Guideline* , ^ Considered residential premises,^^ Considered commercial premises

Figure 12 Predicted Construction Noise From Excavation



The noise assessment found that there would be exceedances of the noise criteria of up to 10 dBA when large rock breakers are used during excavation. To minimise the impact of works which exceed the noise criteria, activities such as rock breaking would be undertaken only during the following hours:

- Monday to Saturday 9 am to 12 pm;
- Monday to Friday 2 pm to 5 pm; and
- At no time on Sundays or public holidays.

The Department notes that measures such as using rock saws around the perimeter of the excavation and utilising smaller 'city' rock breakers would also reduce potential impacts associated with excavation. The Department further notes that the Proponent has committed to a comprehensive suite of mitigation measures to reduce noise impacts.

The Department is confident that the implementation of the proposed noise control measures will reduce noise impacts, but acknowledges there would still be some exceedances of the criteria due to these excavation works. This issue is discussed further below in the Department's overall consideration of noise and vibration.

Tunnelling noise

The Proponent has also assessed construction airborne noise at surrounding sensitive receivers from tunnelling under Bligh Street. Tunnelling is proposed to be undertaken 24 hours a day. However, the Department notes and accepts that noise (airborne) from tunnelling work using road headers is not likely to be significant as the noise associated with this work would be contained by the tunnel walls. Notwithstanding, the Department understands that the noise from the ancillary equipment associated with the tunnelling (including the exhaust fan and dust collector) has the potential to generate noise impacts. These noise sources have been considered in the noise assessment.

The modelling indicates that acceptable noise levels will occur at the surrounding hotels (residential receivers – see Table 5). In addition, the Department notes that these hotels have fixed windows and air conditioning and therefore internal noise levels will be further attenuated by this feature.

Table 5 –Predicted noise levels at sensitive receivers from tunnelling works

Location	Predicted noise level	*Night criteria	Exceedance dBA
Sofitel Wentworth	44	61	Nil
Radisson Hotel	64	64	Nil

Vibration from construction activities

Vibration assessment criteria is outlined in *Assessing Vibration*: *a technical guideline (DEC, February 2006).* This Guideline provides criteria for assessment of the effects of vibration on human comfort in terms of 'preferred and maximum vibration peak velocity criteria' for continuous vibration (refer Table 6).

Table 6: Criteria for exposure to continuous vibration (Appendix C, of Assessing Vibration: A Technical Guideline, DEC-2006)

Location	Time	Peak velocity (mm/s)	
		Preferred	Maximum
Residences	Day time	0.28	0.56
	Night time	0.20	0.40
Offices	Day or night time	0.56	1.1

In the case of intermittent vibration (repeated vibration events of variable magnitude, caused by plant such as rock breakers) the criteria are expressed as a Vibration Dose Value (VDV) and acceptable criteria are presented in Table 7.

Table 7: Acceptable vibration dose values for intermittent vibration (m/s $^{1.75}$), (Assessing Vibration: a Technical Guideline (DEC-2006)).

Location	Day time		Night time	
	Preferred value	Maximum value	Preferred value	Maximum value
Residences	0.10	0.20	0.10	0.20
Offices, educational institutions, place of worship	0.40	0.80	0.40	0.80

The British Standard BS 7385 sets guidance for structural vibration levels based on the lowest vibration levels above which damage has been credibly demonstrated. However the assessment of vibration in terms of Peak Particle Velocity (PPV) would also be relevant for the nearby heritage buildings. In this respect, the German standard *DIN 4150-3 "Structural Vibration Part 3 – Effects of Vibration on Structures"* provides more appropriate guidance on structural damage criteria for heritage buildings of 3m/s. The Department has also recommended dilapidation surveys are undertaken for all structures within 50m from construction activities that generate vibration impacts, or otherwise identified.

The Proponent stated that the excavation is likely to be conducted using rocksaws and rockbreakers. Measurements indicate that PPV vibration levels from heavy (1500kg) and medium sized (600kg) rock breakers will be in the order 4.5mm/s and 0.2mm/s respectively at a distance of 5m from the boundary. The Department notes that the above PPV vibration levels from the heavy rockbreakers would exceed the preferred vibration dose (VDV) of 0.4m/s $^{1.75}$ for human comfort, and the structural damage vibration goal for the nearby heritage building.

The Department is mindful that the operation of a large rock breaker over the entire day would exceed the human comfort criteria. Whilst the Proponent has proposed to use heavy rock breakers on a rotational basis, the Department considers the use of smaller 'city' rock breakers to the greatest extent possible is warranted for the project to provide respite to surrounding receivers, and to minimise the risk of damage to the nearby heritage buildings. In addition, the Department notes that rock breaking would be undertaken during the limited hours mentioned above. Vibration monitoring would also be conducted at nearby sensitive receivers to determine vibration levels, especially in relation to heritage structures. The Department is confident that vibration impacts can be managed. This issue is discussed further below.

Regenerated/ground-borne noise

Operation of roadheaders (for tunnelling activity) and rock breakers (for excavation work) would generate ground vibration that has the potential to transmit to nearby buildings as audible (regenerated) noise. Regenerated noise has a low frequency "rumbling" character. Predicted ground borne noise levels from rock breakers during excavation in surrounding properties are summarised in Table 8.

Table 8 – Estimated regenerated noise levels during rock breaking (Day time only and no rock breaking during night)

Location	Heavy rockbreaker (dBA)	Medium rockbreaker (dBA)	*Internal noise criteria (dBA)
Sofitel Wentworth	30 - 50	30 – 45	40
Adjacent Commercial receivers	45 - 80	40 – 65	45

*Construction Noise Guideline,

The Department notes that the predicted noise levels indicate that there is potential for significant exceedance of regenerated noise levels at the sensitive receivers, particularly with the use of heavy rockbreakers. Notwithstanding, the Department is confident that these exceedances could be reduced to levels within the noise criteria through the use of alternative excavation techniques, such as:

- Use of smaller 'city' rockbreakers to the greatest extent possible;
- Use of rock saws and rippers; and
- Providing respite to receivers particularly during shoulder periods of the day.

This issue is discussed further below in the Department's overall consideration of noise and vibration.

With regard to roadheaders – for tunnelling operations, regenerated noise is usually transitory in nature and increases in level as the tunnelling works approach a particular building. The Proponent has measured ground borne noise levels from a similar roadheader likely to be used for the project. The measured noise levels were used to predict noise in the basement of buildings near cable tunnel to be excavated by road header. The minimum slant distance from the head of the tunnel to the basements of commercial properties and the Sofitel Hotel is in the order of 30m and the predicted regenerated noise at this distance is 39dBA. This would comply with the daytime regenerated noise criteria (Table 8).

In the case of noise levels in the Sofitel Wentworth, the basements of the building are 15 m below ground level and this represents about four levels. Allowing for an attenuation of 2 dBA per level, the noise levels at the ground floor of the hotel are predicted to be in the order of 31 dBA which is well below the night time regenerated noise criterion of 35 dBA (refer-Interim NSW Construction Noise Guidelines for Ground-borne noise at residences). Based on this, 24 hour operation of the roadheader would comply with regenerated noise criteria.

Construction and operational road traffic noise

During bulk excavation, up to 20 trucks per hour are expected on site during day time works. Cable tunnelling activities would commence after excavation work. The maximum truck movements during tunnelling would be 2 per hour during the day time (no truck movements during night).

The Proponent has analysed the existing traffic data and estimated construction stage vehicle movements. Its analysis indicates that the 2dB limit (as set by the *Environmental Criteria for Road Traffic Noise* (ECRTN)) on the increase in road traffic noise levels would be applied since the existing traffic noise exceeds the traffic noise criteria. The department considers the predicted noise level represents a minor increase in road noise during peak construction activities, as it would be less than a 0.4dB increase.

With regard to operations, the project would include a two level car park which includes a maximum of 40 car spaces and an additional eight spaces for service vehicles. The existing building contained 43 car spaces and the Department is satisfied that very similar traffic movements would be generated during operation, i.e. there will be very little change from the existing situation in terms of traffic noise.

Mitigation measures by the Proponent

The Environmental Assessment identified that noise and vibration levels (airborne and ground-borne) from the construction activities are expected to exceed the applicable criteria at some surrounding receivers. Therefore, noise control measures with a range of possible approaches have been proposed by the Proponent in addition to the measures cited above to manage noise impacts.

These include:

- Implementing a community relations program to keep the community informed of the progress of the works and any anticipated changes; and
- The development of a comprehensive Noise and Vibration Management Plan to include monitoring procedures, reporting and the process for any corrective action (should it be required).

Consideration

The Department considers that the Proponent has applied appropriate methodology in analysing potential construction and operational noise and vibration from the project and its impact on the surrounding environment.

There are predicted noise and vibration exceedances to some sensitive receivers, particularly during construction (excavation) works. To mitigate the exceedances, the Proponent is committed to undertake the mitigation measures discussed earlier and, those summarised above and set out in detail in the EA.

The Department is confident that the implementation of the proposed noise and vibration control measures will reduce impacts, but acknowledges there would still be some exceedances of criteria, albeit they will be temporary. To reduce the impact of these exceedances, the most noise intensive activities are to be limited to the morning and afternoon periods only. The Department has also recommended that smaller rock breakers be used to the greatest extent possible to further reduce impacts to acceptable levels. In addition, the Department has also recommended measures for undertaking consultation with adjacent land owners are included in the Construction Noise and Vibration Management Plan identifying specific sensitive activities and any requirement for the scheduling of respite periods.

The Department has recommended conditions of approval requiring all reasonable and feasible mitigation measures to be considered and implemented for all construction works to

minimise noise and vibration emissions from plant and equipment operated on the site. This includes:

- including appropriate consultation with potentially affected neighbours, the use of less vibration intensive machinery and enclosures;
- vibration monitoring and testing to establish minimum buffer distances prior to the commencement of vibration intensive works and pre-and post dilapidation surveys of building structures which are at risk from vibration related damage;
- efficient silencers, low noise mufflers, use of smaller rock breakers to the greatest extent possible, and
- screening of work sites and replacement of reversing alarms on vehicles with alternative silent measures.

The Department has also recommended a condition requiring the Proponent to address construction noise and vibration as a part of the CEMP.

With regards to operational noise, the Proponent identified that the predicted operational noise levels are well within the nominated amenity noise criteria. The Department notes that the Proponent will be required to design, install, operate and maintain the project to ensure that the noise contribution from the project to the background acoustic environment does not exceed the maximum allowable noise contribution of Leq (15 min) 53 dB(A) during the day, evening and at night, at any sensitive receiver. The Department recommends the Proponent prepare a Noise Management Plan, as part of the Operation Environmental Management Documentation. The Department also recommends a condition to ensure that the vibration resulting from the operation of the substation does not exceed the relevant criteria.

Through the implementation of noise mitigation strategies such as the use of low noise plant, acoustic louvers and attenuators the operation of the substation is not expected to produce noise of an unacceptable level. The Department has however recommended conditions of approval requiring compliance monitoring during operation to confirm the performance of the project, and where noise criteria exceedances are identified, requiring remedial works to ensure that criteria are achieved at the nearest sensitive receptors.

In summary, the Department considers that with the implementation of appropriate mitigation measures, noise and vibration associated with the project can be appropriately managed so as not to result in significant impacts to surrounding receptors or significant risk of cosmetic and structural damage to surrounding buildings including heritage buildings.

5.5 Other Issues

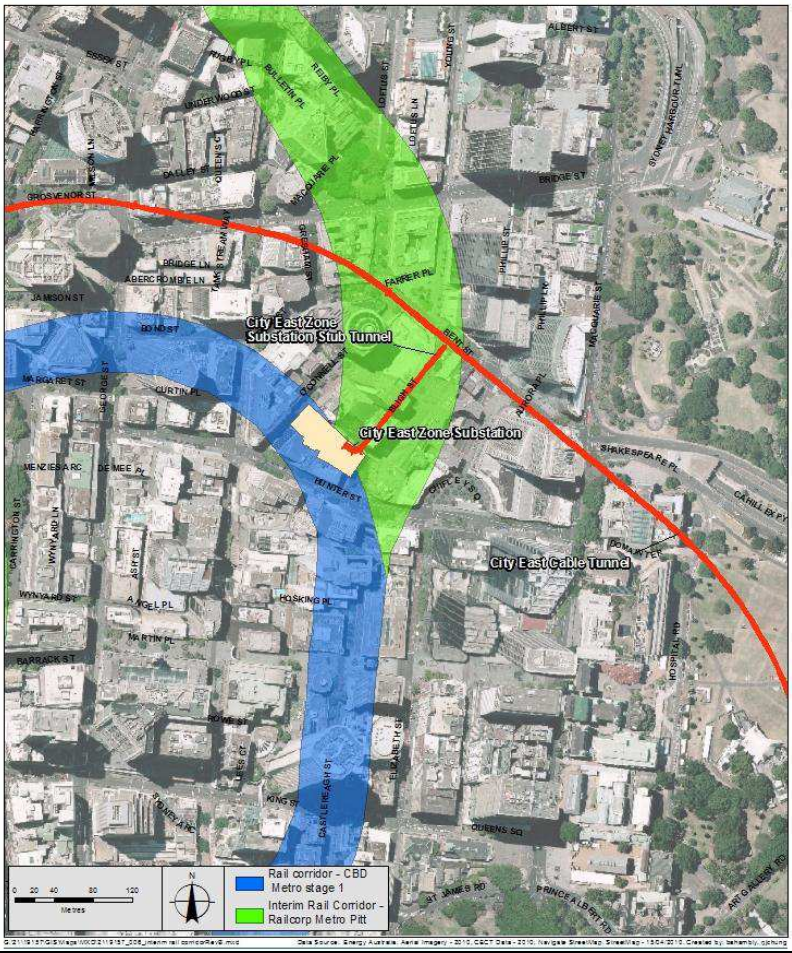
Issue	Department's consideration
Air Quality/Dust Management	Dust would be generated during excavation, tunnelling, truck movements and material handling. There is a risk that dust generated would impact on the amenity of the surrounding areas if appropriate controls are not implemented. The Proponent has stated that the tunnel would be fitted with a mechanical ventilation system to filter air and remove dust particles prior to the air being discharged from the tunnel. The potential for dust to impact on the surrounding environment from construction would also be minimised by installing site hoardings. Operation of the project would have negligible impact on air quality in the locality. The substation would be maintained and monitored in accordance with the Proponent's existing procedures to ensure its safe operation. All the ventilation systems have been designed to comply with the relevant Australian Standards.

	Consideration The Department is satisfied that dust can be managed appropriately through the CEMP and conditions of approval. The Department has recommended in the conditions that the Proponent provide mitigation measures to reduce dust from excavation, construction and tunnelling activities and a reactive management programme detailing how and when construction operations are to be modified to minimise the potential for dust emissions, should there be significant emissions.
Spoil/Waste Management	Spoil and waste would be generated throughout the duration of the project. The bulk of the material would be generated from the excavation of the basement, tunnelling and shaft installation. Estimated waste generation would be 40,510 m^3 (34,866 m^3 from base excavation and 5,644 m^3 from tunnelling and shaft excavation). The Proponent has stated that most of the material generated from excavation would be able to be recycled/reused offsite. The Proponent stated that a spoil /waste management sub-plan would be prepared as a part of the CEMP. The plan would identify how spoil and other waste material would be handled, stockpiled, reused and disposed. The project would generate 42,000 litres of waste per week associated with operation of the commercial and retail areas. All waste would be collected from the garbage room utilising the loading dock by a private contractor. Consideration The Department considers that the Proponent's proposed measures would ensure construction and operational waste materials can be adequately disposed of appropriately. The Department has recommended that a 'construction spoil management plan' be developed as part of the CEMP. The Proponent has committed to prepare and implement an operational stage waste management plan, which has been captured in the recommended conditions. The Proponent would take the following mitigation measures to reduce waste generation and recycling: • Arrangements to reduce the volume of materials brought onto site such as packaging. In addition, required construction materials would be ordered in the correct quantities to minimise waste; • Sites for disposal of surplus spoil would be selected according to the rate of development activity and the volumes of material generated elsewhere; and • Ongoing training would be provided for construction personnel to ensure correct sorting of waste and recyclable materials.
Groundwater/ Surface water	*Construction stage* Groundwater is likely to flow into excavations that extend below RL-7m, including those for the basement, cable tunnel and shaft. There is also the potential for rain and runoff to accumulate in the excavations for the basement. A temporary groundwater treatment system would be installed at the site

	to manage groundwater that seeps and/or flows into the basement and cable tunnel excavations during construction. Any groundwater intercepted would be treated to comply with the requirement of Section 120 of the POEO Act and this would focus on removing iron and manganese which are generally in relatively high concentrations in groundwater in the Sydney CBD. The system would also treat surface water that accumulates in the basement excavation. The treated water (ground and surface) would then be discharged to the Sydney's CBD stormwater drainage system that ultimately discharges to Sydney Harbour at Circular Quay and Bennelong Point. The specifications and capacity of the treatment system would be confirmed by the construction contractor and detailed in the CEMP, consistent with the ANZECC standards, *Operational stage* The groundwater would be collected in a sump at the junction of the cable tunnel and the City East Cable Tunnel (CECT). Water would then be pumped to the existing City South Cable Tunnel (CSCT) water treatment plant (via the CECT), which is located at the Campbell Street Zone Substation. Groundwater would be treated to the relevant ANZECC standards prior to discharge to the stormwater system which ultimately enters Cockle Bay. Rain water from the roof would be collected and stored in a tank at the plant level of the tower. Rainwater surcharged from the tank will be discharged to the stormwater main. <u>Consideration</u> The Department is satisfied that the Water Quality Management Sub-Plan to be developed as part of the CEMP for the project would ensure the output from the treatment system is suitable for discharge to the stormwater system. The Sub-Plan would detail the treatment process to be implemented and the associated monitoring program to verify that the treated water meets the water quality objectives prepared in accordance with the guidelines developed by the Australian and New Zealand Environment and Conservation Council (ANZECC). The Department is also satisfied that the Proponent would undertake consultation with the Sydney Water Corporation and/or the City of Sydney to determine whether there are any capacity limitations within the stormwater system that would influence the location of the connection for the water discharged from the treatment system. The Department noted that the Campbell Street Substation WTP is designed to treat 3.5 litres per second (L/s) under normal conditions and it currently treats about 2 L/s. The basement and cable tunnel would be designed to minimise ingress of groundwater. Calculations for the City East Cable Tunnel included seepage from the cable tunnel and estimated that less than 0.1 L/s would need to be treated. Based on this, the inflow treated at the Campbell Street Substation would increase from approximately 2 L/s to 2.1 L/s and this increase would be well within the design capacity of the treatment plant.
Traffic Management	*Construction* The overall construction activities are expected to take approximately 41 months. Traffic volumes would be dependent on the activities being undertaken at the time. The construction phases include site preparation,

	bulk excavation, cable tunnel and shaft excavation, installation of substation, construction of commercial tower, commissioning of substation and fit out of the tower. The Proponent has stated in its Statement of Commitments that a Traffic Management Plan (TMP) will be developed as a part of the CEMP in consultation with the RMS and Council prior to construction. Access to the construction site would be provided via O'Connell Street and Bligh Street. The works would result in a change in traffic conditions. It is anticipated that approximately 5-10 onsite car spaces will be available for personnel during construction, therefore limiting the amount of light vehicle traffic. Heavy vehicles would be required for the removal of spoil and waste, delivery of construction materials, delivery and removal of construction equipment and machinery. The Proponent has estimated that 192 truck loads per day would be required during excavation whilst 30 truck loads per day are expected at later stages of the project. The traffic analysis concludes that the project will have a minor impact on the surrounding road network in the morning and evening peak periods (with an approximate traffic movement increase of up to 16%). The Bent and Hunter/Pitt Street intersections also currently operate with significant spare capacity, and so queue lengths are not expected to increase significantly as a result of the project. The Proponent has stated that partial and temporary road closures along Bligh and O'Connell Streets may be required. These closures may impact on commuters, but appropriate approval would be sought from Council. Construction work zones would also be required along the Bligh and O'Connell Street frontages which would utilise the existing parking lane. A work zone for construction vehicles would be required for the full length of O'Connell Street. Street parking may be impacted by the work zones and the Proponent has identified that parking restrictions may be necessary. The creation of work zones would impact on the operation of both Bligh and O'Connell Streets. There is potential for short term pedestrian delays along Bligh and O'Connell Streets during vehicle access/egress to the site. The work zone would include a portion of Richard Johnson Square which would alter pedestrian paths. Hoardings would be installed around the construction zone and adjacent businesses to allow for pedestrian access. The Proponent has stated that the TMP will include a pedestrian management plan. A detour for cyclists would need to be included in the TMP. The nearest bus routes are on Bent Street and Hunter Street. The project is not expected to impact on nearby bus services. Adjacent properties would continue to be accessed using the existing vehicle and pedestrian entry points. *Operation* There would be approximately 45 car/motorcycle spaces available during operation. Given that the previous building had 43 car spaces available

	the impacts are expected to be minimal. The basement would also provide 184 bicycle spaces. The Department supports the provision of bicycle spaces as it will provide sustainable transport options for workers and visitors. <u>Consideration</u> To manage potential impacts on the traffic and transport network, the Department has recommended a condition that requires the Proponent to prepare, in consultation with the RMS, Council and Transport for NSW, a construction TMP which is to be included in the CEMP. This Plan would be submitted for the approval of the Director-General prior to the commencement of any construction works associated with the Project. The Department recommends that road closures are to be scheduled and appropriate notification given to minimise disruption to road users. Detour routes are to be identified in the TMP. The Proponent is also required, as part of a recommended condition, both prior to the commencement of construction, and after construction is complete, to commission road dilapidation/footpath for all roads/footpaths in the immediate vicinity of the site nominated in the Traffic Management plan. The Department is satisfied that the construction impacts will not have any significant adverse impact on traffic conditions and these can be managed by the implementation of recommended conditions. At the operation stage, there will be very little change from the existing situation.
Infrastructure Corridors	Two corridors for railway infrastructure are located in the vicinity of the site. As indicated in Figure 12, the alignment of the tunnels for the CBD Metro Stage 1 pass beneath the site. Project Approval has been granted under Part 3A of the EP&A Act and the tunnel alignments form part of a rail corridor as defined by State Environmental Planning Policy Infrastructure (ISEPP). Figure 12 also shows that a portion of the site is within an interim rail corridor as defined by the ISEPP. This interim rail corridor is referred to as the 'CBD Rail Link' in the ISEPP and is commonly known as the 'Metro Pitt' alignment to distinguish it from another interim rail corridor generally located to the west of George Street. The Department has recommended conditions requiring the Proponent to enter into agreements with Transport for NSW in relation to CBD Metro Stage 1, and Metro Pitt, to ensure that their project does not have any detrimental impacts on the railway proposals.

	Figure 13 – Alignment of rail corridors in the vicinity of the site 
Property damage	The submissions by Council, RMS and some commercial neighbours raised issues regarding potential construction related damage to buildings, roads and/or public infrastructure. The project has the potential to cause structural damage to the properties and public infrastructure including utilities and services due to vibration, settlement or groundwater change. <u>Consideration</u> The Department is confident that impacts to adjoining structures can be managed to appropriate levels but has recommended conditions to further mitigate the potential for vibration related structural damage during construction and operation of the project. (See section 5.4). Geotechnical investigations in the vicinity of the site indicate that it is unlikely that groundwater drawdown would cause settlement of buildings. The Proponent must undertake a condition survey of surrounding buildings including heritage buildings, services and structures prior to commencement of construction and a post construction survey would also be undertaken. The Department has recommended conditions to ensure that this occurs. Any property damage caused directly or indirectly (for example from vibration, settlement or ground water change) by the project must be rectified at no cost to the property owner(s).

	Conditions are also recommended requiring the Proponent to prepare a dilapidation report prior to the commencement of construction works to assess the current condition of roads/footpaths. Following completion of construction, a subsequent dilapidation report needs to be prepared to assess any damage that may have resulted from the construction. Any road/footpath damage must be repaired to a standard at least equivalent to that existing prior to the damage, at the cost of the Proponent.
Contributions	Section 61 of the City of Sydney Act 1988 allows for a 1% levy to be imposed on development over $200,000 including commercial components of Government, Public Authority or Council developments, determined under Part 4 of the EP& A Act. The contributions (which would equate to approximately $1million based on the CIV for the commercial tower component of the project) are payable to Council to assist with funding of public infrastructure, community projects and facilities. The Department has included a condition that requires the Proponent to make a contribution of $1 million to Council for the purpose of kerb and gutter installation and restoration, lighting and landscaping work within the Richard Johnson Square area and adjacent to the site in O'Connell Street. The contribution will be adjusted to take account of any increase in the Consumer Price Index over time, commencing at the date of the approval. Furthermore, the project will benefit the broader public interest such as increasing the capacity of electricity distribution in the Sydney region which would mean that adequate power supply can be maintained and improved in circumstances where new commercial and residential developments are approved across the City of Sydney LGA and beyond. It is the Department's opinion that, given the extent of infrastructure and public domain contributions proposed to be provided, that the imposition of a levy under Section 61 of the City of Sydney Act, in addition to the $1 million being contributed to the upgrade of the square, would be unreasonable in this case.
Remaining issues	All other remaining issues are considered to be adequately addressed by the Proponent's Environmental Assessment, Submissions Response Report and/or final Statement of Commitments.

6 CONCLUSION AND RECOMMENDATION

The City East Zone Substation and associated tunnel would help ensure a reliable electricity supply to the Central Business Centre (CBD) and immediate suburbs and will provide capacity to meet future demand for electricity. It will also support the operation of the overall Sydney CityGrid Project and will assist Ausgrid to meet licence requirements. The integrated commercial tower would provide additional commercial space in the CBD and achieve a high quality urban design outcome.

The key environmental impacts associated with the proposal relate to the urban design and visual amenity, heritage, electric and magnetic fields and construction noise to receptors in the area.

The Department has assessed the Proponent's Environmental Assessment, Submissions Response Report and Statement of Commitments, public authority and the general public submissions received on the proposal. Based on its assessment, the Department is satisfied that sufficient justification exists for the project and that the Proponent has undertaken a robust and conservative assessment of the impacts of the proposal and that the impacts can be managed and/or mitigated through design or other mitigation measures to an acceptable level.

The Department considers that while the project has the potential to result in some short term adverse construction impacts, these need to be balanced against the substantial public benefit that would result from the overall Sydney CityGrid Project. The substation is considered to be in the public interest, as a reliable electricity supply is critical to allowing the CBD to function efficiently and effectively, particularly given Sydney's function as Australia's only recognised global city, and hub for commercial and financial operations. The Department considers the benefits of the project would outweigh the adverse impacts.

In order to manage potential impacts resulting from the proposal, a range of conditions of approval are recommended. These conditions would ensure that the key issues addressed in this report are appropriately addressed and managed to acceptable levels. The conditions would also ensure that commitments made in the Environmental Assessment and Submissions Response Report are implemented and reinforced.

The Department considers that on balance the project is justified and in the public's interest. Consequently, the Department recommends that the project be approved subject to the recommended conditions of approval.

Felicity Greenway 30/11/12

A/Director
Infrastructure Projects

30.11.12

Executive Director
Major Projects Assessment

Deputy Director-General

APPENDIX A – ENVIRONMENTAL ASSESSMENT

See the Department's website at:
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=4888

APPENDIX B – SUBMISSIONS

See the Department's website at - https://majorprojects.affinitylive.com/

APPENDIX C – PROPONENT'S RESPONSE TO SUBMISSIONS

See the Department's website at -
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=4888

APPENDIX D – SUPPLEMENTARY INFORMATION

See the Department's website at -
http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=4888

APPENDIX E – CONSISTENCY WITH LOCAL PLANNING INSTRUMENTS

Item	Comments
	Sydney Local Environmental Plan 2005
Zoning	The site is located in the City Centre zone. The objectives of this zone are: • to encourage Central Sydney's role and growth as one of the Asia-Pacific region's principal centres for finance, commerce, retailing, tourism, cultural activities, entertainment and government; • to permit a diversity of uses which reinforce the multi-use character of Central Sydney; • to facilitate the development of buildings and works that are of a scale and character consistent with achieving the other objectives of this zone; • to recognise and enhance the character of Special Areas; • to facilitate the conservation of items and areas of heritage significance; • to protect the fine-grained urban fabric of Central Sydney, especially the existing network of streets and lanes, and to provide for high quality development that contributes to the existing urban form; • to extend retail uses on frontages to retail streets; and • to provide active frontages to streets. The proposed public utility and commercial development would be consistent with the above zone objectives
Height of Buildings	A maximum building height of 235 metres applies to the site. The project would have a maximum building height of 161.73 m which is well below the maximum permitted on the site. Taking the average of the RL of the entrances (Bligh Street Foyer RL.19.2 and O'Connell Street Entry RL 12.3), the average is RL. 15.75. Based on this, the maximum building height RL is 177.48
Floor Space Ratios (FSR)	As indicated in the Central Sydney Floor Space Ratio Map (Sheet 1), Sydney LEP 2005, the Floor Space Ratio for the substation site is 8:1. A maximum floor space ratio of 12.5:1 (4.5:1 being additional for the commercial site) applies to commercial developments on the site. Under clause 10 of the LEP 2005 the FSR control can be varied up to 13.75:1 (i.e. by 10%) if it meets certain criteria: e.g. if the development contribute positively to the public domain and would achieve design excellence, and would not create an undesirable precedent for other development.
Car Parking	LEP 2005 sets a maximum parking provision of 40 spaces on the site. The project would have up to 40 parking spaces for the commercial tenants, one for a courier, and five service vehicle spaces for the substation, and two for truck parking. The final number of car parking spaces would be finalised during detailed design.
Heritage Provisions	LEP 2005 requires within its heritage provisions that any development does not adversely affect the heritage significance of heritage items; provide greater certainty in the management of the heritage of central Sydney; encourage high quality design etc. The proposed development would meet these provisions through its design and implementation.
	Draft Sydney Local Environmental Plan 2011
Zoning	The site is located in Zone B8 Metropolitan under Draft LEP 2011. The objectives for this zone are generally consistent with the objectives for the City Centre zone under LEP 2005. The proposed uses are permissible with development consent in the draft B8 zone.

Height	Under the Draft LEP the maximum building height for the site will remain at 235 m. The project would have a maximum building height of 161.73 m which is below the maximum permitted on the site.
FSR	A maximum base FSR of 8:1 applies to the site with an additional 4.5:1 permitted for commercial development. The LEP allows for a further 10% variation to the FSR development standard for sites which have been subject to a design competition. The project would have a maximum FSR of 13:75:1 and therefore complies with the maximum FSR development standard on the site.
Development Control Plan (DCP) 1996	
This Development Control Plan (DCP) 1996 has been prepared in accordance with Section 72 of the *Environmental Planning and Assessment Act 1979* (the Act) and under clauses 15 to 24 of the *Environmental Planning and Assessment Regulation1994.* A detailed assessment against all the relevant provisions in DCP 1996 has been undertaken in the EA which indicates that the project generally complies with the objectives and controls in the DCP. There are a few areas where non-compliances occur and include street frontage heights, front setbacks and side setbacks (see section 5.1). The Department has considered these variations and is satisfied that they are justified.	

APPENDIX F - RECOMMENDED CONDITIONS OF APPROVAL