

20.0 Assessment of Environmental Factors

20.1 Built form and visual impact

The Concept Plan will deliver a built form that:

- Is appropriate to the site's city edge context and to the desired urban form for the southern part of the Sydney CBD.
- Reinforces the landmark significance of the site as one of the pre-eminent gateways to the CBD.
- Recognises and celebrates the site's heritage significance.
- Provides a transition in building height across the site, limiting the height of buildings on the south-western part and ensuring that taller buildings are located towards the northern-eastern part of the site, where it is compatible with the adjoining higher density of development in Central Sydney.
- Is of a density consistent with the site's size and strategic location within the broader metropolitan area and its accessibility to a wide range of services and infrastructure.
- Ensures permeability throughout the site, with pedestrian through site links secured.
- Provides a high level of residential amenity, by virtue of the parks and urban domain and good level of solar access.
- Provides an urban structure and street layout that opens up internal view corridors and vistas and integrates visually and functionally with adjoining streets.
- Provides for future design innovation and creativity, whilst providing certainty over the structure of the public domain and the bulk and scale of development.

The bulk and massing of the development is to be controlled by the envelopes for each development block. While the detailed design of the buildings will be the subject of future Project Applications and most are expected to involve a competitive design process, COX/ATA have prepared indicative perspective sketches and photomontages to provide a clearer image of what the envelopes may represent. Those images, included in **Appendix A5** illustrate a number of key attributes of the Concept Plan and its potential visual impact.

20.2 Verification of Solar Access Planes and Shadow Study

An overshadowing Study of the project has been undertaken by JM Modelling and is included at **Appendix V**. The brief to JM Modelling was to:

- confirm the accuracy of the solar planes established to protect solar access to the main park for the times recommended by the EAP; and
- test the extent of shadows cast by existing development within the site and external to the site to establish the nett shadow and/or solar access that would result from the proposed Concept Plan.

The study applied the same methodology in establishing the solar access planes as for CSLEP 1996 and unchanged for SLEP 2005. JM Modelling confirms the accuracy of the solar access planes proposed in the SEPP amendment as solar access controls and height controls.

The extent of existing and new shadow was tested JM Modelling on an hourly basis from 10.00am to 3.00pm inclusive at the equinox (March 21st) and mid winter (June 22nd)

The study demonstrates that the CUB site and adjoining surrounding area is already heavily shaded in winter from existing buildings, both within the site and external to the site. Where additional shadow is generated by the proposed envelopes, it typically falls on road surface or railway tracks. The exception to this occurs in two locations where new shadows generated increases the extent of shadow falling on Mortuary Station from 1.30pm and a group of buildings in Wellington Street in mid winter on June 22nd. However, during the March equinox, no shadow is cast on the Mortuary Station and the Wellington Street buildings enjoy new solar access where none previous existed, during the times tested.

20.3 Shadow Analysis – Proposed Main Park

The study assessment also demonstrates that the Concept Plan will result in significant areas of increased sunlight being generated as a result of the proposed site planning. The additional sunlit areas have importantly been designed to fall mainly on the area designated as the location of the public park. During the March equinox the main park has almost full sunlight between the hours of noon and 2pm, with a substantial proportion of the park being in sunshine ranging from approximately more than 75% at 10 am and 3pm to 50% at 11am.

In midwinter the park will receive a reasonable level of solar access compared to many inner city parks with between 50% sunlit area at noon and approximately 25% at 2.00pm.

This reflects tests carried out of schematics of the Concept Plan at a lesser technical accuracy in the development of the Concept Plan. See **Figure 58** below.



Figure 58 - Sun access to park

20.4 Wind impacts study

An assessment of the existing and the future wind conditions affecting the site and the adjoining area has been undertaken by Heggies Australia Pty Ltd. The wind impact assessment is included in **Appendix W**.

The report observes that the CUB Site is surrounded primarily by medium-rise residential and commercial/retail buildings from the northeast clockwise around to the northwest. To the north and northeast lies Sydney's CBD area which will provide considerable shielding for winds approaching the site from this direction. Northeast winds (which are the prevailing winds in summer) will receive moderate sheltering from Sydney CBD buildings and areas of elevated terrain, as they approach the CUB site. These winds will normally provide a beneficial cooling effect to the site and are generally not expected to produce high velocity winds of most concern in the assessment of pedestrian comfort.

Southeast (mainly summer) and particularly southerly (summer and winter) winds will receive minimal shielding as they approach the site and should be considered in the assessment of pedestrian level winds.

Similarly, west quadrant winter winds (northwest around to the southwest) will receive minimal shielding as they approach the site and should be considered in the assessment of pedestrian level winds.⁷

The following conclusions have been made in response to the assessment of the proposed Concept Plan.

Westerly winds

Relatively high wind speeds are experienced along the north perimeter of the site due to channelling of westerly wind flow along Broadway. The speed of these winds is similar to those experienced for the existing condition. Nevertheless, localized wind flow patterns and the distribution of higher velocity regions will change slightly with the new buildings. This is probably as a result of the influence of increased building massing along the north CUB site perimeter (southern side of Broadway).

Westerly winds also channel and accelerate along east/west aligned internal roadways, in particular those running parallel to Broadway, e.g. in Tooth Avenue. Confinement of the wind flow between building gaps causes winds to further accelerate through these passageway as shown in **Figure 6** of the Heggies Australia report, with localized winds in this region approaching and/or potentially exceeding the 16 m/sec walking criterion.

Conditions within the proposed main park remain relatively calm under westerly winds. Meandering blue streamlines in the lee of the park west perimeter building illustrate wake flow of significantly reduced velocity. Winds throughout much of the park remain below the 13 m/sec comfort criterion at ground level. Wind speeds further downstream from the proposed park regain some intensity as they flow between building gaps.

7 Activity Concerned Common Experience:

24 m/s Knockdown in Isolated Areas Safety People blown over by gusts
23 m/s Knockdown in Public Access Areas Generally impedes progress, great difficulty with balance

16 m/s Comfortable Walking Difficulty experienced walking for most people, umbrellas distorted by wind, wind noise on ears unpleasant

13 m/s Standing, Waiting, Window Shopping Force of wind felt on body, hair disarranged Comfort

10 m/s Dining in Outdoor Restaurant Raises dust and loose paper, clothing gaps

Southerly winds

The general increase in building mass across the site provides some sheltering to existing high southerly wind velocities on Broadway.

The towers on Block 2 positioned directly upstream of the UTS tower provide significant shielding to southerly winds. The results presented in **Figure 8** of the Heggies Australia report suggest this shielding effect significantly reduces winds contributing to the downwash flow off the UTS tower, in turn enhancing wind amenity at locations on Broadway as compared to the existing conditions. High southerly wind velocities may also be experienced at localized ground level locations intermittently distributed throughout internal passageways across the site. Higher winds at these locations are the result of complex flow combinations of channelling and funnelling between gaps, flows accelerating around building corners and previously described downwash effects.

The above results demonstrate high velocities in the passageway adjacent to the south perimeter of Block 2. High winds at these locations occur as wind flow over the site is brought to ground level off the broad south facades of these building envelopes causing high wind velocities at ground level in the street.

Similarly, southerly wind flow impacting the broad facades of Blocks 4 and 5, turns toward ground and spills out into the park area. At ground level the wind flow are almost fully reversed when compared to the wind conditions occurring at upper levels. Winds throughout the majority of the site's park remain below the 13 m/s comfort criterion.

The Heggies report makes the following summary conclusions and recommendations.

- Existing westerly wind conditions at various locations along Broadway already exceed the Sydney City Council (SCC) benchmark 16 m/sec walking comfort criterion. The highest winds occur as westerly winds channelling along Broadway combine with the effects of downwash flow from taller developments along the roadway.
- With the proposed Concept Plan it is predicted that there will only be a marginal change to the westerly wind condition. For winds approaching the site from the south there will be a general reduction in wind intensity along Broadway, in particular at locations in the vicinity of the UTS tower.
- High wind velocities are likely to be experienced at localized ground level locations intermittently distributed throughout the proposed passageways internal to the site. Higher winds at these locations are the result of complex flow combinations of channelling and funnelling between gaps, flows accelerating around building corners and previously described downwash effects.
- Windbreak treatments at locations exceeding the SCC 16 m/sec walking comfort criterion will be investigated during the detailed design phase of the project. Such amelioration treatments will be refined utilizing more precise environmental wind tunnel test studies to accurately identify wind hot spots and quantify the impact of wind mitigation options. These would include judicious placement of street trees and building treatments such as footpath awnings.

20.5 Noise

An assessment of the noise and vibration effects has also been undertaken by Heggies Australia Pty Ltd. The assessment is included in **Appendix W**. The impact of surrounding potential source of noise on the development considered included:

- Road traffic noise intrusion; and
- Rail noise and vibration impact.

The scope of the assessment includes the impact of existing noise on the amenity of the proposed residential areas, provides criteria for noise emission from the development and establishes sound insulation requirements between residential dwellings. The key findings of the assessment are as follows:

Road Traffic Noise Intrusion

The report predicts that noise levels on facades of buildings will exceed Environmental Criteria for Road Traffic Noise (ECRTN) of 55dBA between 7am to 10pm and 50dBA between 10pm and 7am. It recommends that the internal amenity of residential premises specifically be protected by way of improved glazing and the provision of air-conditioning and mechanical ventilation to give residents the choice of shutting windows to limit noise intrusion. This will also enable compliance with the internal noise standards applied by the Council of the City of Sydney. The extent of the acoustic treatment should be further developed during the project application phase when the detailed design of residential buildings is finalised.

Sleep Disturbance

Sleep disturbance criteria measured at LA1 will be exceeded to some extent. As a minimum, it is recommended that bedroom windows and doors facing the major roads may need to be kept closed to comply with the criterion. Further investigation of the potential for sleep disturbance should be conducted during the project application phase of the project.

Aircraft Noise Intrusion

Based on the latest ANEF 2023/4 charts, the proposed development lies outside of the 20 ANEF contour. As such, the development is classified as acceptable and there is no need to provide protection specifically against aircraft noise.

Rail Vibration

The Central Railway Line is approximately 100 m from the CUB site, which is beyond the RIC compliance distance of 60 m. Therefore rail related vibration will not impact upon the proposed residential development.

Sound Insulation Requirements

Compliance with the sound insulation requirements of BCA 2006 will be required for the proposed development.

Proposed Public Park

The computer model predictions suggest that the ECRTN criteria (LAeq(15hour) 55 dBA) will be achieved at all locations within the Park, which is largely sheltered from the main noise sources at the location proposed.

Mechanical Noise Emission

Specific plant selections have not been made at this stage of the project. It is recommended that this issue be reviewed at the detailed design stage to ensure compliance with the established criteria at all future residential receivers.

20.6 Solar access and internal residential amenity

State Environmental Planning Policy (SEPP) 65 – Design Quality of Residential Flat Development, which aims to improve the design quality of all residential flat buildings in NSW, applies to the CUB site. To create high quality residential buildings, all new residential buildings should generally comply with or exceed the design standards set out in SEPP 65 and the accompanying guidelines in the Residential Flat Design Code (RFDC).

The building envelopes designated for residential development are typically orientated to the north, east and west to ensure excellent light and solar access and consequently provide a high level of internal residential amenity. Where this cannot be practicably achieved, dwellings are compensated where possible by an outlook to the park.

COX/ATA Joint Venture has confirmed that the development block controls contained within the Concept Plan proposal will generally allow the requirements of SEPP 65 to be met.

However, in relation to solar access, COX/ATA developed a methodology as the criteria upon which the adequacy of solar access within the CUB site should be tested. The Methodology is outlined in the paper included in **Appendix X** entitled '*Sunlight Access to Apartments for Residential Amenity – A discussion on planning controls and their practical application*' prepared by COX/ATA and dated November 2005.

The paper examines the development controls and other guidelines for solar access to residential apartments that affect development within the City of Sydney. The three documents examined included the Central Sydney Development Control Plan 1996 (CSDCP 1996), the Residential Flat Design Code (RFDC) guidelines referred to in SEPP 65 and Technical Bulletin 13 – Sunlight Indicators (TB13) published by the New South Wales Planning and Environment Commission.

The CSDCP 1996 contains the following requirement in Clause 6.1.14:

'Living rooms and private open space should be the main recipients of sunlight in dwelling units. Where possible, sun access should be for a minimum of two hours per day on the equinox (March 21) measured on the main window of the rooms or at the front edge of the open space. Buildings should be designed to maximise the number of dwelling units with sun access to the principal windows.'

The RFDC contains the following 'rule of thumb' for the control of sun access in part 3 (p. 85).

'Living rooms and private open spaces for a least 70 percent of apartments in a development should receive a minimum of three hours direct sunlight between 9am and 3pm in mid winter. In dense urban areas a minimum of two hours may be acceptable.'

The site currently has a maximum FSR of 5:1 under SLEP 2005 for residential development. It is therefore assumed that at this density the site would qualify as being located within a dense urban area and that two hours of solar access is a relevant performance standard. The practicality of achieving more than two hours in a city location surrounded by dense built form is also recognised by the City of Sydney in CSDCP 1996 which requires two hours solar access at the less onerous time of year (March 21).

The paper acknowledges inconsistencies between the controls in CSDCP 1996 and the RFDC contained in SEPP 65, and proposes instead that 'effective sunlight' as defined in TB13 be applied as an appropriate measure of solar access and recommends the following as a more effective development control:

- Modify reference to the times of the day contained in the RFDC;
- Add the definition for effective sunlight from TB13;
- Require 70% of apartments in mid-winter to have 'effective sunlight' for 2 hours;
- Measure sun access at the main window of the principal room or at the front edge of the open space (balcony); and
- Require a minimum of 50% of the measured area receive sunlight.

The recommended control was the methodology applied to measure solar access to residential apartments in the CUB site. Staff at the Department of Planning have been briefed in relation to the methodology, as was Chris Johnson, the Chair of the Expert Advisory Panel. Applying the COX/ATA methodology, the aggregate number of apartments that can satisfy the requirements of solar access is 70% with no development block achieving solar access below 60%. This figure is consistent with the recommendations of the Minister's Expert Advisory Panel.

A peer review of the extent of solar access was carried out by Heggies Australia Pty Ltd and concluded that the Concept Plan scheme was found to provide at least 70% of the residential development with 2 hrs sunlight on the winter solstice between the hours of 7.30am to 4.30pm using the COX/ATA methodology. The assessment is included in **Appendix Y**.

20.7 Access and mobility

Equitable access is required for all persons as a design requirement for the site. A Strategy for Provision of Access for People with a Disability was prepared by Access Associates Sydney and is included at **Appendix Z**.

The report states that appropriate access for all persons is to be provided throughout the site in the following locations:

- from the adjacent locality via links from existing footpaths to proposed new footpaths;
- from public transport stops;
- from onsite parking;
- to the proposed principal building entrances;
- to all unique use facilities, including open space/park and landscaped facilities;
- to any proposed public accessible sanitary facilities; and

The detailed design of the buildings within the CUB development will meet relevant Building Code of Australia standards to achieve equitable access for all.

20.8 Crime and Public Safety

The Concept Plan has been designed in accordance with the principles of Crime Prevention through Environmental Design (CPTED).

Safety and security issues were considered as important elements in the development of the street layout of the Concept Plan. There is anecdotal evidence that Chippendale is perceived as an unsafe area, particularly at night. Both Chippendale and the City of Sydney LGA have a higher crime rate when compared with the NSW average in crime categories associated with assault, robbery, 'break and enter' and fraud.

A CPTED review of the Concept Plan Application for has been carried out by Elton Consulting and is included at **Appendix AA**.

Crime and safety issues were identified through a workshop on 7 September 2006. The workshop involved NSW Police (including representatives of Redfern LAC and a representative of the Commissioners Inspectorate), Elton Consulting (social planners) and COX/ATA (project design team). The aim of the workshop was to provide NSW Police with an understanding of the concept design and provide opportunity to discuss concerns regarding CPTED with the project design team. The workshop also provided the project design team with an opportunity to suggest planning and design responses to these crime and safety issues and incorporate any feedback. The following is a summary of the key issues:

Site and context

- Natural surveillance and sight lines;
- Adequate lighting to deter crime and increase safety;
- Clear signage;
- A legible public realm free of spaces of entrapment;
- Privately owned publicly accessible streets;
- Emergency access; and
- Issues relating to the public open spaces within and around buildings.

Public open spaces within and around buildings

A broad range of issues relevant to the creation of a safe public domain which deters crime were identified. These issues included:

- The provision of natural surveillance and sight lines;
- The provision of adequate lighting to deter crime and increase safety; clear signage; design of the public open space (park etc);
- Placement of public toilets and other amenities;
- Location of pedestrian routes;
- Design of shared ways; and
- Placement of bus stops and taxi ranks.

Building design, materials and maintenance

- Letter boxes should be located in a secure room so as to reduce the potential for identity fraud. It was noted that identity fraud was a growing concern within the Sydney LGA;
- Appropriate lighting is installed to enhance the security of the site after dark;
- Landscaping provides for open sightlines and does not offer opportunities for concealment;
- Robust materials are used in building construction which are vandal resistant and which facilitate ease of general maintenance; and
- Car parks are suitably lit, are configured in such a way as to open up sightlines, and where appropriate technical surveillance measures are incorporated.

It was agreed that matters of detailed building design, material and maintenance issues were better addressed at the Project Application stage.

In response to matters concerning of privately owned publicly accessible streets, use of technical surveillance techniques, and emergency access, the proponent will propose to dedicate all street and lanes (in stratum).

In response to the need to the create a safe public domain which deters crime the concept design team proposed solutions for the shared ways, safety in park design in particular. These solutions have been incorporated into the Concept Plan. Refer to the CPTED Report included at **Appendix AA** for further details.

The draft Statement of Commitments incorporates the recommendations of the report.