Transport
for NSW

Central Precinct Renewal Program

GFA, FSR and Density Report

October 2023

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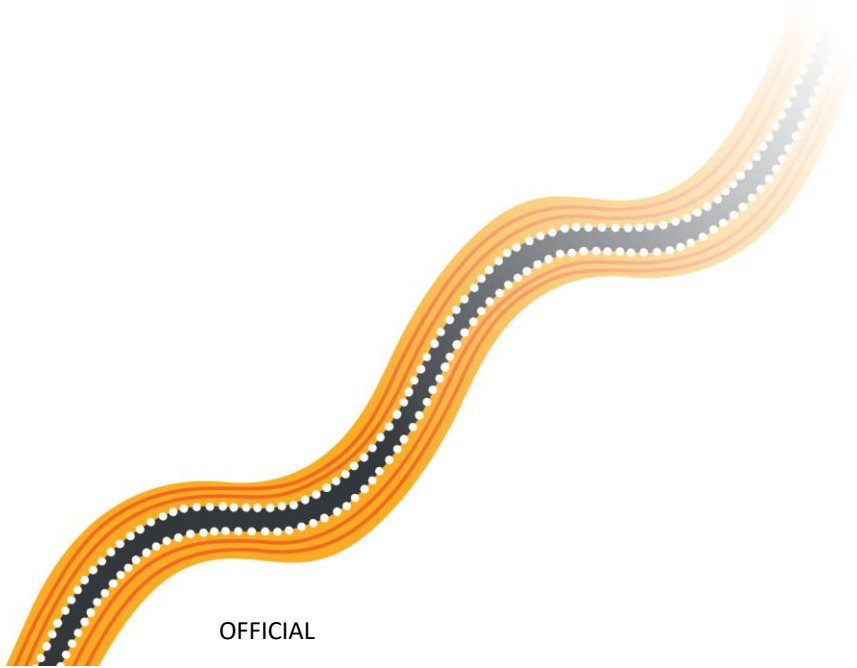
NSW GOVERNMENT

Acknowledgement of Country

We respectfully acknowledge the Traditional Custodians of the Central Precinct, the Gadigal and recognise the importance of the place to Aboriginal people and their continuing connection to Country and culture. We pay our respect to Elders past, present and emerging.



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Document control

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Versions

Version	Amendment notes
1	Issued to TfNSW for Review
2	Issued to TfNSW in response to Test of Adequacy feedback

1. Introduction

Following public exhibition of the Central State Significant Precinct Study, and subsequent discussions with the Department of Planning and Environment (DPE) and Central Precinct Project Review Panel, this paper provides further clarity and justification on the process used to calculate the proposed gross floor areas (GFA) and floor space ratios (FSR) for the Central Precinct.

To assist the DPE in its considerations, the paper includes an overview of the process used for Central Precinct and a comparison with the site-specific planning proposal process that is used by the City of Sydney Council (CoS). Specifically, this paper steps through the following:

1. Understanding of the issue
2. Clarification of the different methods used to calculate overall GFA and FSRs, and determine density for the Precinct
3. A comparison of the outcome of the different approaches to built form and density, and
4. A discussion on why the proposed approach and outcome is appropriate for Central Precinct.

2. The exhibited SSP Study

The Central SSP Study and supporting documents were made available for public comment from 22 August to 4 October 2022. During the exhibition period, community members and stakeholders were invited to provide their comments and feedback on the rezoning proposal.

2.1 The exhibited proposal

The exhibited rezoning proposal included a Place Strategy, Urban Design Framework, draft Design Guide, Explanation of Intended Effect and supporting technical studies, which seek to enable the delivery of:

- approximately 269,500 square metres of commercial gross floor area (GFA)
- approximately 22,850 square metres of retail GFA
- approximately 47,250 square metres of education/ tech GFA
- approximately 14,300 square metres of community/ cultural GFA
- approximately 84,900 square metres of residential GFA
- approximately 53,600 square metres of hotel GFA
- approximately 22,500 square metres of student accommodation GFA
- 15% of new dwellings to be provided as affordable housing
- over two hectares of new and improved publicly accessible spaces, including:

- Central Square, a new 7,000 square metre publicly accessible square located at the George Street and Pitt Street junction
- Central Green, a new 6,000 square metre publicly accessible park located immediately south of the Sydney Terminal building
- Mortuary Station Plaza, a 4,470 square metre publicly accessible plaza (excluding the Mortuary Station building) located at Mortuary Station
- Sydney Terminal building western rooftop, a 970 square metre publicly accessible space above the Terminal building roof
- upgrades to Eddy Avenue Plaza and Ibero-American Plaza.

- an integrated network of streets, laneways and other movement corridors, including:

- Central Avenue, as Central Precinct's new main street
- Devonshire Link, as Central Precinct's main east-west street
- a north-south link as an intimately scaled, active laneway
- a supporting network of other open-to-the-sky laneways generally running east-west through the Precinct
- a number of through-block links to provide further permeability for pedestrians
- an eastern colonnade, having a generous, double-storey height
- three new active transport over-rail bridges
- a revitalised Goods Line.

Figure 1: Exhibited Urban Design Framework

Source: Architectus, 2022

3. Understanding the issue

The Department's submissions letter dated 27 October 2022 identifies the proposed built form, scale and density in Central Precinct as a matter that required further consideration. Specifically, it states:

> '*4. Built form, scale and density*
>
> *Concern was raised that the proposal is an overdevelopment of the site, with the built form being excessive, the towers too dense and visually dominating (when viewed from new and surrounding public spaces/ domain). While many submissions were supportive of the idea of redevelopment of the Central Precinct, this must be balanced with a built form that supports high quality public spaces and pedestrian amenity while respecting the heritage significance of the site'.*

DPE provided a number of recommendations to address this, including:

> *'Review the proposed floor space ratio (FSR), having regard to the inclusion of streets and laneways and the City's comments on the calculation of gross floor area (GFA) and FSR'.*

Following this, the Central Precinct Project Review Panel (PRP), in its advice from February 2023, also made a number of recommendations in relation to GFA, these being:

Table 1 – PRP Recommendations

Issue	PRP Recommendation
GFA method needs clarification	*The GFA calculation method needs to be resolved and include an agreed allowance for articulation and floor plate efficiency. The Panel noted its preferred method for calculating GFA is in accordance with the City of Sydney's Central Sydney Planning Strategy (CSPS).*
Provide a worked example to demonstrate that GFA is appropriate	*To demonstrate the above, the panel request 3D images (with calculations) showing the proposed envelopes and theoretical building design. The aim is to demonstrate that the envelopes and GFA will result in an acceptable built form, articulation, façade depth, sun shading and modulation, scope for design excellence outcomes and suitable visual impacts.*
Need flexibility for innovation space	*The maximum GFA should consider flexibility for tech and innovation uses, including the allowance for higher floor to floor heights. This could be achieved by allocating a portion of the floorspace toward tech and innovation with a GFA that would be more flexible than standard A-grade commercial floorspace.*

Based on further discussions with DPE apart from clarifying the GFA calculation method further, the key matter to be addressed is whether the proposed built form, scale and density is appropriate for the Precinct, taking into consideration the need to ensure a high level of amenity for public spaces, and the achievement of an appropriate visual outcome.

Accordingly, while GFA needs to be considered in detail, the broader overall question is whether the proposal results in an overdevelopment of the Precinct.

Like amenity and character, 'overdevelopment' is a broad all-encompassing term that is often not well defined. The term overdevelopment generally talks to a perception of built form having too much scale and bulk for its context. To make judgements about this meaningfully in the context of a State Significant Precinct proposal, it is often helpful to consider in detail what typically contributes to scale and bulk. The main contributors to scale and bulk are acknowledged to be:

- GFA
- site cover
- built form and massing strategy
- height
- setbacks and separation distances
- articulation.

In order to respond directly to the points raised by the PRP, this report first addresses GFA as requested, and then other matters more broadly.

4. Clarification of the State Significant Precinct approach used for Central Precinct

In accordance with the SSP Study Requirements, the proposal for renewal of Central Precinct has been informed by a Place Strategy and Urban Design Framework that includes a detailed site and context analysis and a set of appropriate urban design principles that underpin the Central Precinct proposal.

Moreover, the Reference Master Plan as submitted integrates the urban design related study requirements and demonstrates that the proposed GFA can achieve high quality place outcomes in accordance with Study Requirements 1.1 & 1.2.

In recognition of its complexity and State Significance, Central Precinct has also been the subject of an initial strategic planning process to develop a Strategic Framework between mid-2019 and 2021 and an extensive State Design Review process since December 2020, both of which have been instrumental in shaping the built form outcome represented in the Reference Master Plan.

The design led process used for Central Precinct has involved the following steps to arrive at a built form outcome:

- **Step 1** – Define the extent of the developable area within the Precinct taking into consideration key opportunities, constraints, and challenges within the Precinct (e.g., unable to build over the suburban rail lines due to technical difficulties and likely interruption of train services).
- **Step 2** – Analyse the surrounding context to determine the key attributes and connections that future renewal of the Precinct needs to respond to.
- **Step 3** – Identify key urban design moves for the Precinct, including:
    a. establish key community connections (east-west and north-south)
    b. create a primary axis in Central Avenue maintaining clear sightlines to the Central Station Clock Tower
    c. establish appropriate setbacks for towers from key heritage items (Sydney Terminal Clock Tower and Mortuary Station)
    d. integrate a high-amenity public space strategy for open spaces and plazas,
    e. ensure generous separation of tall buildings from the proposed Western Gateway towers (Atlassian, Central Place)
    f. establish key development blocks in the precinct, and
    g. provide a secondary network of fine grain connections, in particular, the inclusion of the north-south laneway.
- **Step 4** – Undertake iterative testing and analysis of solar, daylight and wind amenity, and refine the Reference Master Plan scheme in response to outcomes from the technical analysis.
- **Step 5** – Determine a density based on the envelope achieved using floor space efficiencies consistent with the City of Sydney Development Control Plan 2012 (DCP).

The key urban design moves carried out in Step 3 of the design led process are illustrated in **Figures 2** and **3** below.

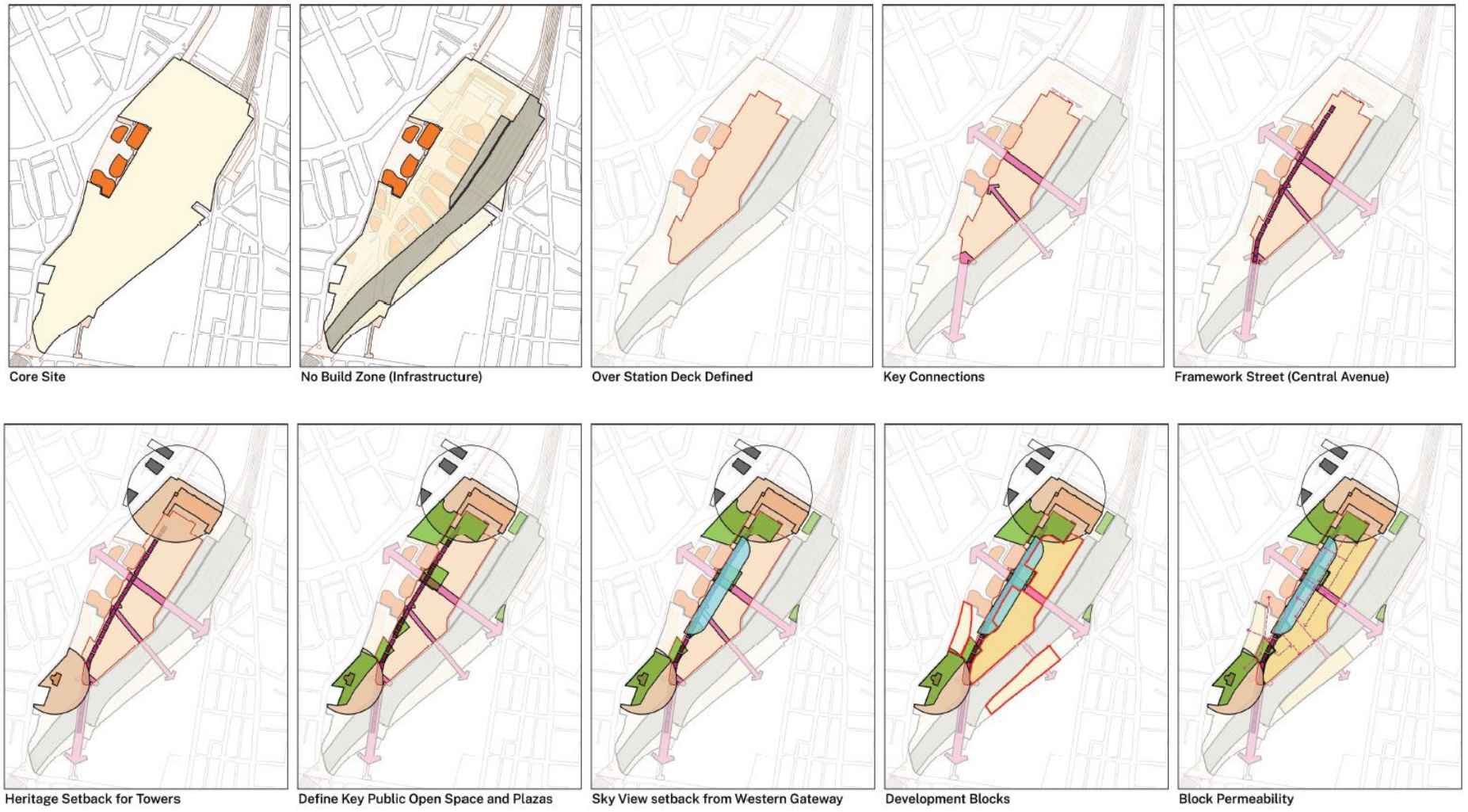


Figure 2 – Key Urban Design Moves for the Precinct

Figure 3 – Combined Key Urban Design Moves

In addition to the State Design Review Panel, the design led process for Central Precinct has also been informed by regular engagement with the Project Working Group (PWG) and Project Review Panel (PRP), which has included key stakeholders from DPE, the City of Sydney Council (CoS), the Greater Cities Commission (GCC) and the Government Architects NSW (GANSW).

The outcome of this process is an Reference Master Plan that has evolved considerably since it was first developed. Key changes undertaken as a result of this process have included:

- the relocation of Proposed tower locations from areas capable of achieving the greatest height and GFA, as defined by the solar height plane for Prince Alfred Park, to more limited locations to enable increased separation from the Sydney Terminal clock tower and the proposed Western Gateway towers
- proposed towers have been pushed to the eastern side of the Over Station Development (OSD) deck to prioritise long views of the Sydney Terminal Clock Tower with the introduction of the Central Avenue.

- the alignment of deck access locations have been adjusted to minimise impacts on Prince Alfred Park
- a series of significant new public spaces have been introduced in areas of high amenity and/or high connectivity
- a network of lanes and mid-block connections have been introduced to enhance precinct permeability, encourage building diversity for podiums and low-rise buildings, and land use adaptability
- a strategy to deliver building and land use diversity has been introduced to allow for the provision of a mix of smaller, mid-size and larger floorplate buildings
- design measures have been introduced that will enhance the capacity for the transport functions of the Sydney Terminal to grow and be better connected with the renewal of the precinct
- connecting with Country design initiatives have been integrated
- strategies have been implemented to enable flexibility to accommodate an emerging Tech employment sector.

The evolution of the Reference Master Plan during the design review process is illustrated in the **Figure 4** below.

Figure 4 – Evolution of the Reference Master Plan (2020 - 2022)

Updates in Response to Submissions

Continued refinement of the Reference Master Plan has since been undertaken to address matters raised by DPE and the PRP as part of the Response to Submission process. This has led to the further evolution of the Reference Master Plan from the proposal that was

exhibited as part of the SSP Study in August 2022, and is shown in **Figure 5** below. The most recent changes to the Reference Master Plan include:

- revision to the interface between the OSD and the terminal building to give primacy to the rail functions, improving both the heritage response and the customer experience
- reduction in height of the northern low scale building to improve the scale transition from the main OSD towers and the terminal building
- revision of the Central Avenue from a linear spine to be a sequence of active public spaces joined by 18m wide connections
- creation of a new civic square at the Devonshire Link OSD station entrance
- adjustment to the bus layover development site to reduce the podium by putting the bus layover facility underground
- subsequent enlargement of the open space to the north of Mortuary Station, improving the heritage outcomes from the development as well as retaining existing fig trees in the area
- revisions to the urban layout to remove the eastern colonnade and provide additional mid-block through site links
- increased separation of towers to enhance east-west view lines
- reduction in GFA by approximately 8,000 square metres.

Figure 5 – Reference Master Plan - May 2023

In reading the above it is important to recognise that the purpose of the Reference Master Plan is two-fold:

- firstly, it is to develop a design solution that responds to the vision and objectives set out in the Central Precinct Strategic Framework, and which responds to the key challenges, opportunities, and constraints for the Precinct
- secondly, it is intended to inform the preparation of future planning controls for the Precinct, which are to comprise amendments to the Sydney Local Environmental Plan 2012 (LEP) and the Central Precinct Design Guide.

Following completion of the State Significant Precinct process, the Reference Master Plan itself will not carry any statutory weight in the consideration of future development proposals for the Precinct. Its role is therefore to both inform and demonstrate what type of development outcome could be achieved under the proposed planning controls.

5. Applying the Guideline for Site Specific Planning Proposals in Central Sydney and Schedule 12 of the Sydney DCP 2012

Pursuant to SSP Study Requirement 2.2 and in response to DPE and the PRP requests, the following section undertakes an analysis of the methodology used by CoS to determine built form and maximum FSR as set out in their document titled the '*Guideline for Site Specific Planning Proposals in Central Sydney'* and Schedule 12 of the Sydney DCP 2012. Prior to stepping through this analysis, it is worth noting that while TfNSW are willing to use the site-specific planning proposal methodology as a tool to help understand the proposed possible density for Central Precinct, TfNSW disagree with the idea that generic numerical standards, (e.g., above podium setbacks) must be applied to the Precinct for the built form to be acceptable. There are several reasons for this including:

- the Central Precinct has undergone an extensive design led process in response to the State Significant Precinct (SSP) Study requirements, which has led to the proposed built form outcome
- to retrospectively apply the site-specific planning proposal methodology to determine FSRs for the Precinct, it fails to acknowledge, and significantly undermines the extensive first principles design led process that TfNSW has undertaken to get to this point
- the process set out in the *Guideline for Site Specific Planning Proposals in Central Sydney* has been formulated specifically for 'site-specific' planning proposals, in which new built form is being proposed within an already established public street network and development block layout
- Central Precinct is fundamentally different to a site-specific planning proposal scenario as it is essentially establishing both precinct wide public domain and development sites as part of the SSP process.

Given the above, it is TfNSW's firm view that the site-specific planning proposal methodology for calculating built form and FSRs should, at most, be used as a reference tool to benchmark and validate whether the GFA and FSRs proposed for Central Precinct are within an acceptable density range that reflects its Central Sydney context.

Recognising that the DPE and the PRP has requested further information regarding this, TfNSW has undertaken the exercise as a means of demonstrating that the density proposed for Central Precinct is consistent with what would otherwise have been arrived at if TfNSW adopted the site-specific planning proposal methodology from the outset.

This section should be read together with the slides provided at **Attachment A.**

The CSPS approach to calculating floor space ratios

It has been requested that the calculation of FSRs for the Central State Significant Precinct be undertaken in accordance with the methodology set out in the CoS's *Guideline for Site Specific Planning Proposals in Central Sydney.* This Guideline sets out the CoS's preferred approach to determining built form and calculating FSRs for sites within Central Sydney that are the subject of a site-specific planning proposal. The steps involved in the approach set out in the Guideline are as follows:

- **Step 1** – identify a site complying with the Guidelines minimum site area

- **Step 2** – define a podium form in compliance with Sydney DCP
- **Step 3** – define a tower form in compliance with the Guideline in relation to maximum height and Sydney DCP in relation to built form controls
- **Step 4** - test and define a non-compliant podium and tower form in line with Schedule 12 of Sydney DCP and a negotiated Block Agreement with neighbouring sites
- **Step 5** - determine a density based on the envelope achieved using floor space efficiencies consistent with the Guideline.

Based on discussions with City of Sydney they are of the view that the process for calculating FSR for Central Precinct should strictly comply with the above methodology and all numerics as set out in the *Guideline for Site Specific Planning Proposals in Central Sydney*.

Applying the site-specific method to Central Precinct

In applying the site-specific method to Central Precinct, this approach has applied the first three (3) steps of the methodology to determine a density for the precinct, and then applied these steps to two alternative compliant City of Sydney envelope scenarios, these being:

- **Scenario 1** – guideline / Schedule 12 controls applied assuming a typical city block, with the land located along the eastern boundary of the OSD
- **Scenario 2** – applying the CoS's site-specific methodology to the Reference Master Plan proposal.

A key difference between the two scenarios is the location of the north-south laneway. Under Scenario 1, the north-south pedestrian laneway is in a different location, running along the eastern edge of the OSD deck. The reason for this is because applying the site-specific method to the precinct from the outset would most likely result in development parcels that were more consistent with traditional city blocks. These blocks would have frontages on all sides, with the laneway along the eastern side of the precinct, as opposed to being in close proximity to the wider Central Avenue. In comparison, the location of the laneway under Scenario 2 has occurred in direct response to a design led process in consultation with the State Design Review Panel.

TfNSW believes that the alternative base case scenario (i.e. Scenario 1) represents a more appropriate version of the CoS's methodology. It has therefore been included in the analysis as it provides a useful insight into the built form and FSRs that would be achieved for the Precinct if the approach undertaken had initially followed the steps (i.e. Steps 1 to 3) set out in site-specific planning proposal methodology, as opposed to being informed in the first instance by a design led process with the State Design Review Panel.

The resultant outcomes for Scenarios 1 and 2 are shown in **Figure 5** below.

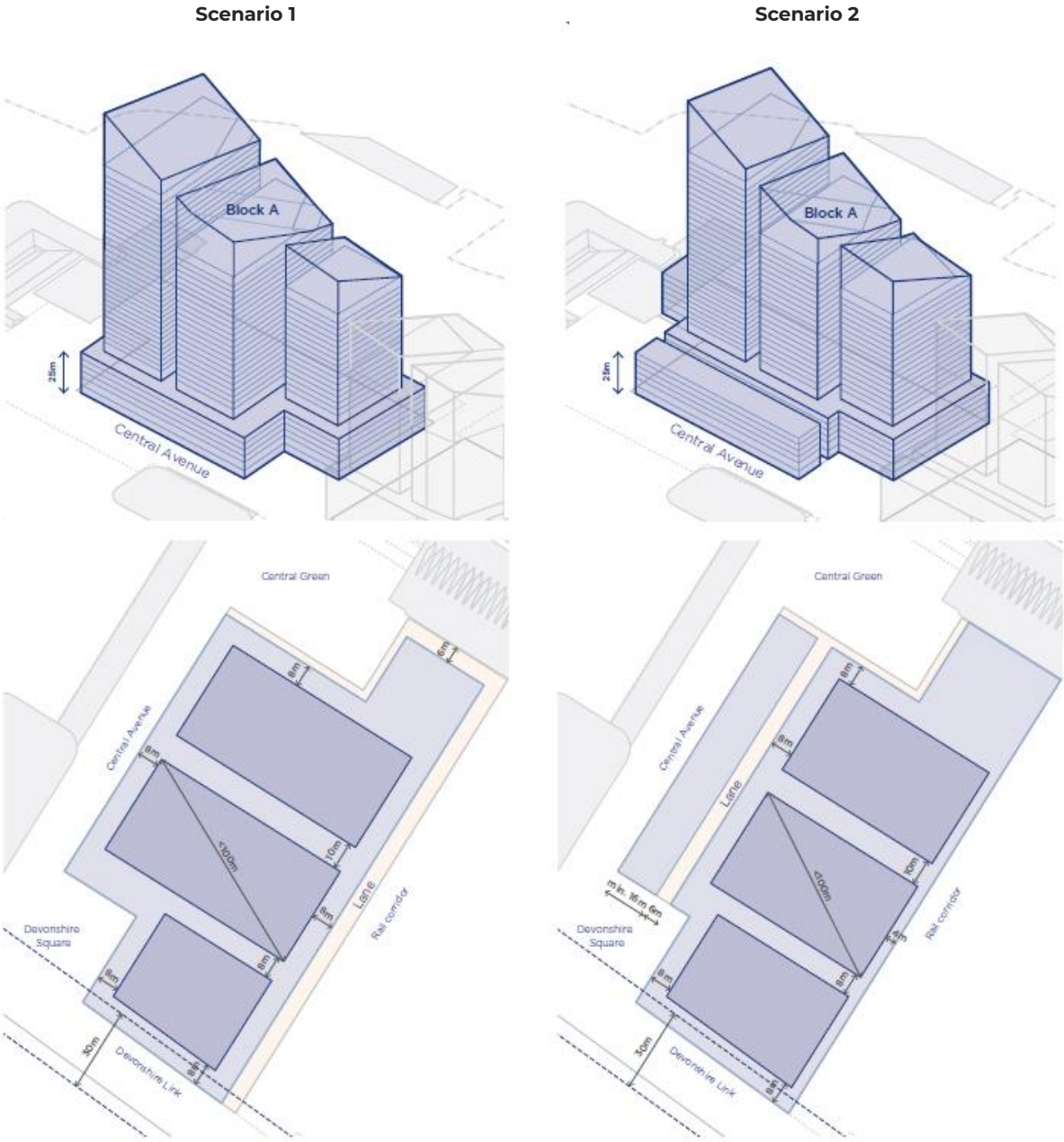


Figure 5 – Building Envelopes achieved for Block A under the Guideline/Schedule 12 site specific planning proposal methodology

6. Comparing the State Significant Precinct outcome to the site-specific planning proposal methodology outcome

The following section provides a comparative analysis of the Central Precinct proposal against the built-form outcomes from the two different scenarios using the site-specific planning proposal methodology. Specifically, the analysis examines the following scenarios:

1. **Scenario 1** – applying the CoS's site-specific planning proposal methodology to a base case using development blocks on the OSD that are more typical of the CBD block structure. Under this scenario, the lane has been located along the Precinct's eastern boundary. Central Avenue, Central Green and Devonshire Square are unchanged
2. **Scenario 2** – applying the CoS's site-specific planning proposal methodology to the Reference Master Plan proposal
3. **Proposed Massing** - the proposed massing under the Reference Master Plan, which illustrates how a design outcome can be achieved under the proposed controls within the draft Central Precinct Design Guide
4. **Design Guide Envelope** – the building envelopes as set out in the draft Central Precinct Design Guide.

The analysis includes a review of the achievable GFA and FSR figures under Scenarios 1 and 2 and provides a benchmark against the Design Guide Envelope and the proposed Reference Master Plan massing, the latter of which forms the basis for the proposed GFA for the Precinct.

To undertake the comparison, the analysis examines the outcomes of each scenario for the different development blocks that make up the Precinct.

6.1 Block A

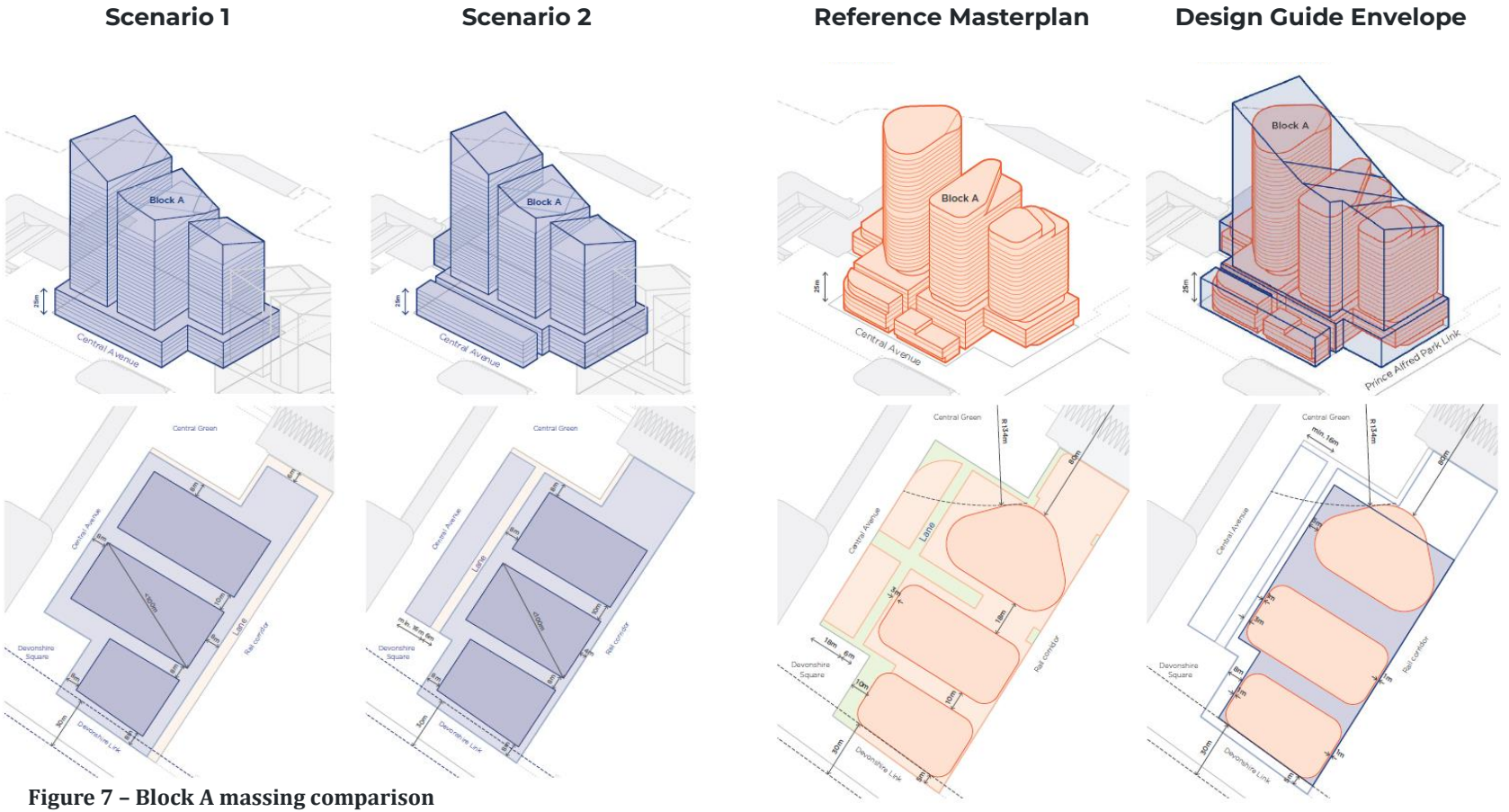


Figure 7 – Block A massing comparison
**massing includes 10% design excellence bonus*

Table 2 – Block A floorspace and density comparison

OSD Block A (Site Area – 14,378sqm)	Scenario 1 Compliant Envelope V1	Scenario 2 Compliant Envelope V2	Central Precinct Reference Master Plan	Central Precinct Design Guide Envelope
BEA (sqm)	236,896sqm	220,629sqm	**246,090**	246,090sqm
GBA (sqm)	216,735sqm	201,990sqm	**198,004sqm**	225,155sqm
GFA (sqm)	182,057sqm	169,672sqm	**165,383sqm**	188,539sqm
GFA (–10%)	165,507sqm	154,247sqm	**150,348sqm**	171,399sqm
Articulation Allowance	8.5%	8.4%	**19.5%**	8.5%
Max FSR (n:1)	12.7	11.8	**11.5**	13.1
Base FSR (n:1)	11.5	10.7	**10.5**	11.9

Base FSR = GFA (-10%) / Site Area

As shown in **Figure 7** and **Table 2**, key observations for Block A are:

- A total maximum GFA of 182,057 square metres is achieved under Scenario 1, which reduces to 165,507 square metres when factoring in a 10% provision for Design Excellence. This equates to a base FSR of 11.5 and a maximum FSR of 12.7 under this scenario,
- A total maximum GFA of 169,672 square metres is achieved under Scenario 2, which reduces to 154,247 square metres when factoring in a 10% provision for Design Excellence. This equates to a base FSR of 10.7 and a maximum FSR of 11.8 under this scenario,
- A total maximum GFA of 165,383 square metres is achieved under the Reference Master Plan, which reduces to 150,348 square metres when factoring in a 10% provision for Design Excellence. This equates to a base FSR of 10.5 and maximum FSR of 11.5 under the Reference Master Plan,
- A total maximum GFA of 188,539 square metres is theoretically possible under the Design Guide Envelope, which reduces to 171,399 square metres when factoring in a 10% provision for Design Excellence. This equates to a theoretical base FSR of 11.9 and a theoretical maximum FSR of 13.1 under the Design Guide Envelope, and
- The proposal under the Reference Master Plan allows for an articulation allowance of 19.5%, representing a 130% increase on the other Scenarios.

As can be seen from the above, the Reference Master Plan, which forms the basis of the proposed GFA for the Central Precinct, is:

a. 10.1% or 16,674 square metres lower than the GFA that could theoretically be achieved under Scenario 1.

b. 2.6% or 4,289 square metres lower than the GFA that could theoretically be achieved under Scenario 2.

c. 12.7% or 21,051 square metres lower than the GFA that could theoretically be achieved under the Design Guide Envelope.

The above figures therefore confirm that the GFA proposed for Block A, as a result of the design led process, is below that which could be achieved for the Precinct under the CoS's

site-specific planning proposal methodology. It is also below the theoretical maximum under the Design Guide Envelope, which highlights that the Design Guide Envelopes will provide sufficient flexibility for variance in the future building design.

6.2 Block B

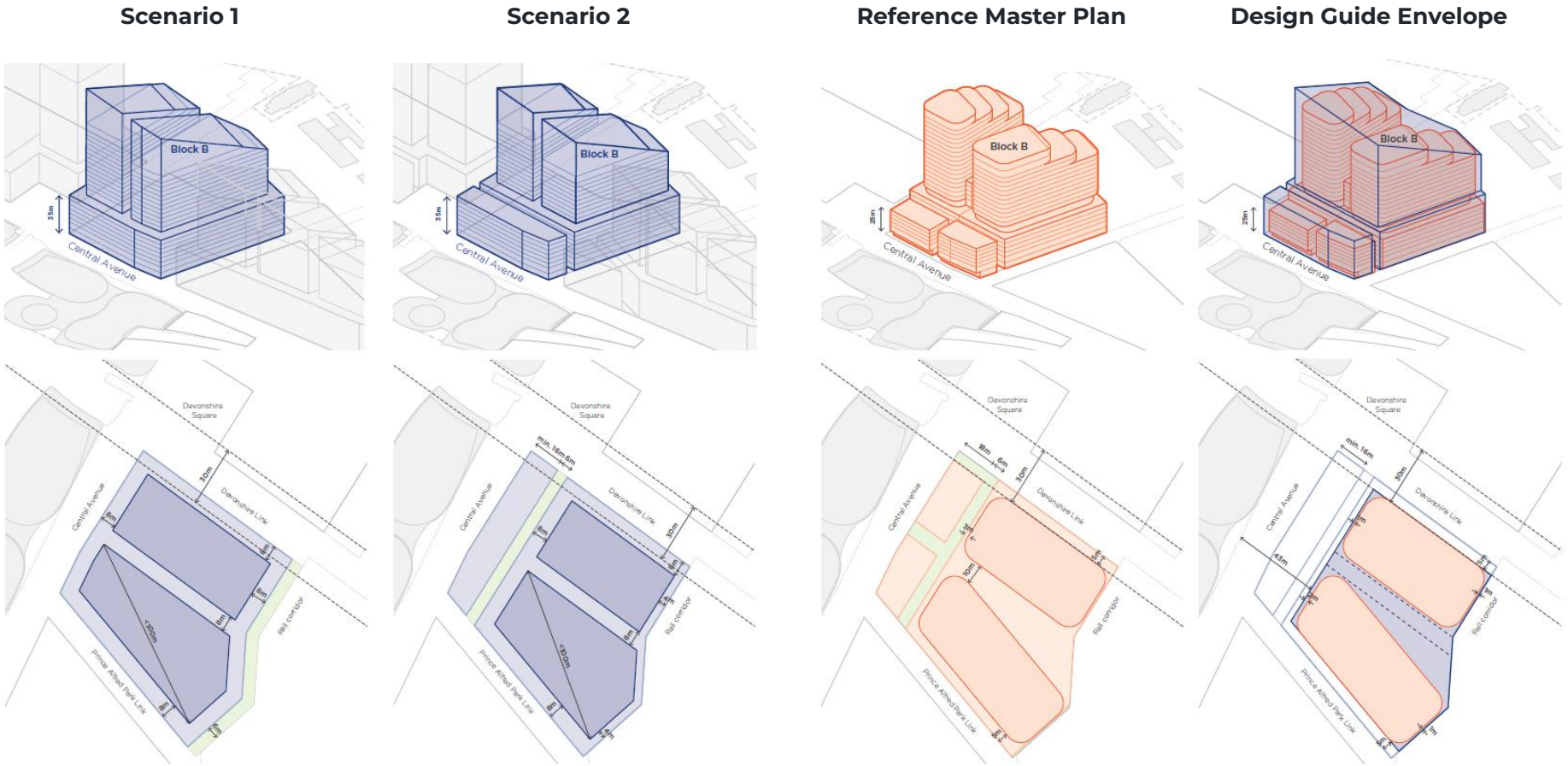


Figure 8 – Block B massing comparison
**massing includes 10% design excellence bonus*

Table 3 – Block B floorspace and density comparison

OSD Block B (Site Area – 9,483sqm)	Scenario 1 Compliant Envelope V1	Scenario 2 Compliant Envelope V2	Central Precinct Reference Master Plan	Central Precinct Design Guide Envelope
BEA (sqm)	135,468sqm	122,852sqm	138,523sqm	138,523sqm
GBA (sqm)	124,631sqm	113,024sqm	**120,463sqm**	127,441sqm
GFA (sqm)	104,690sqm	94,940sqm	**100,132sqm**	107,051sqm
GFA (–10%)	95,172sqm	86,309sqm	**91,029sqm**	97,319sqm
Articulation Allowance	8.0%	8.0%	**13.0%**	8.0%
Max FSR (n:1)	11.0	10.0	**10.6**	11.3
Base FSR (n:1)	10.0	9.1	**9.6**	10.3

Base FSR = GFA (-10%) / Site Area

As shown in **Figure 8** and **Table 3**, key observations for Block B are:

- a total maximum GFA of 104,690 square metres is achieved under Scenario 1, which reduces to 95,172 square metres when factoring in a 10% provision for Design Excellence. This equates to a base FSR of 10.0 and maximum FSR of 11.0 under Scenario 1
- a total maximum GFA of 94,940 square metres is achieved under Scenario 2, which reduces to 86,309 square metres when factoring in a 10% provision for Design Excellence. This equates to a base FSR of 9.1 and a maximum FSR of 10.0 under Scenario 2
- a total maximum GFA of 100,132 square metres is achieved under the Reference Master Plan, which reduces to 91,029 square metres when factoring in a 10% provision for Design Excellence. This equates to a base FSR of 9.6 and a maximum FSR of 10.6 for Block B under the Reference Master Plan
- a total maximum GFA of 107,051 square metres is theoretically possible under the Design Guide Envelope, which reduces to 97,319 square metres when factoring in a 10% provision for Design Excellence. This equates to a theoretical base FSR of 10.3 and a theoretical maximum FSR of 11.3 under the Design Guide Envelope
- the proposal under the Reference Master Plan allows for an articulation allowance of 13.0%, representing a 62.5% increase on the other Scenarios.

As can be seen from the above, the Reference Master Plan, which forms the basis of the GFA proposed for the Central Precinct, is:

a. 4.5% or 4,558 square metres lower than the GFA that could theoretically be achieved under Scenario 1

b. 5.5% or 5,192 square metres higher than the GFA that could theoretically be achieved under Scenario 2

c. 6.9% or 6,919 square metres lower than the GFA that could theoretically be achieved under the Design Guide Envelope.

The above figures therefore confirm that the GFA proposed for Block B as a result of the design led process, is within the range of GFAs that could be achieved for Block B under the Guideline's site-specific planning proposal methodology. It is also below the theoretical maximum under the Design Guide Envelope, which highlights that the Design Guide Envelopes provide sufficient flexibility for variance in the future building design.

6.3 Block C

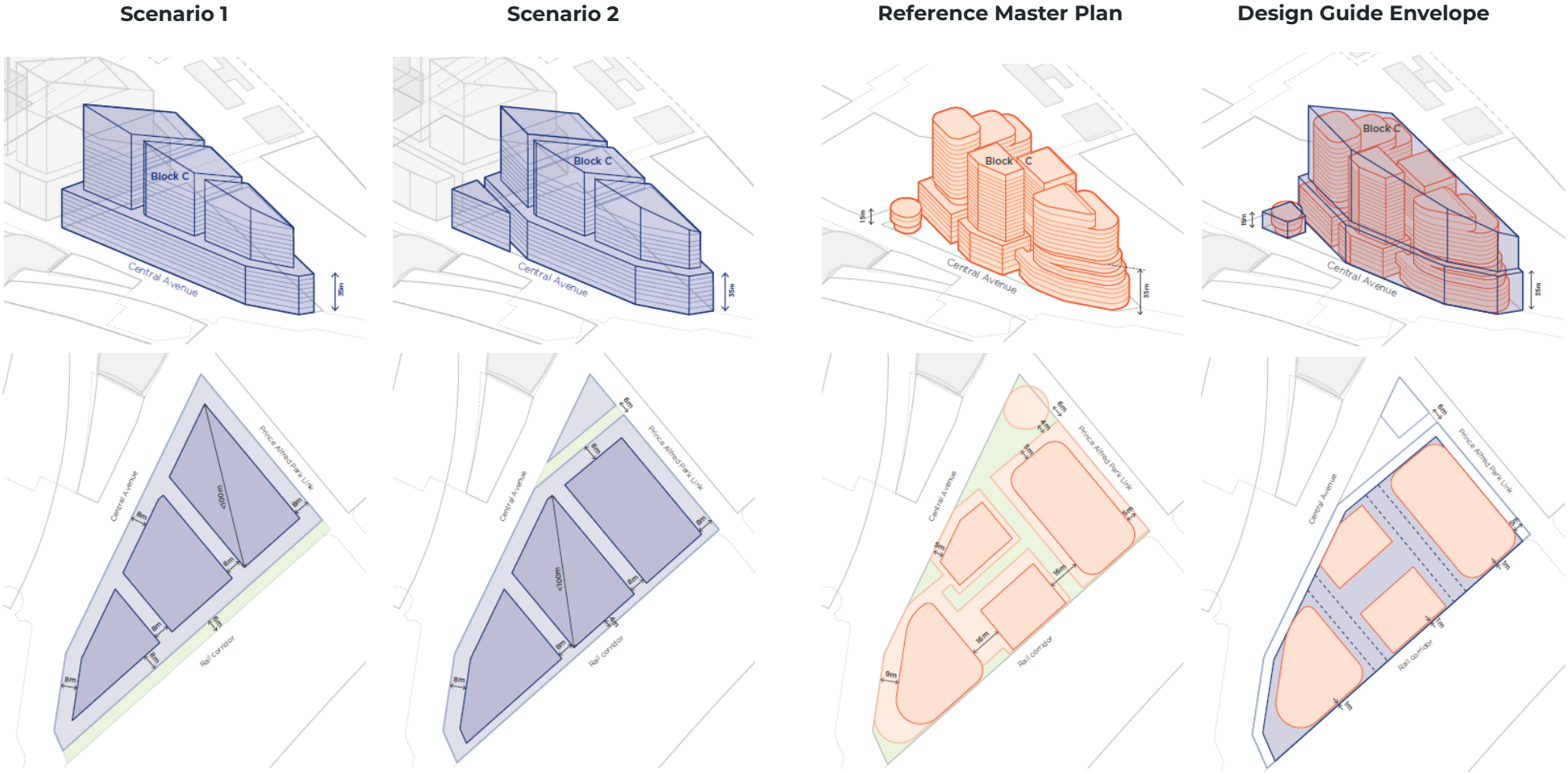


Figure 9 – Block C massing comparison
**massing includes 10% design excellence bonus*

Table 4 – Block C floorspace and density comparison

OSD Block C (Site Area – 10,548sqm)	Scenario 1 Compliant Envelope V1	Scenario 2 Compliant Envelope V2	Central Precinct Reference Master Plan	Central Precinct Design Guide Envelope
BEA (sqm)	122,527sqm	128,315sqm	**132,409sqm**	132,409sqm
GBA (sqm)	112,725sqm	118,050sqm	**106,428sqm**	121,816sqm
GFA (sqm)	94,689sqm	99,162sqm	**88,050sqm**	102,325sqm
GFA (–10%)	86,081sqm	90,147sqm	**80,045sqm**	93,023sqm
Articulation Allowance	8.0%	8.0%	**19.6%**	8.0%
Max FSR (n:1)	9.0	9.4	**8.3**	9.7
Base FSR (n:1)	8.2	8.5	**7.6**	8.8

Base FSR = GFA (-10%) / Site Area

As shown in **Figure 9** and **Table 4**, key observations for Block C are:

- a total maximum GFA of 94,689 square metres is achieved under Scenario 1, which reduces to 86,081 square metres when factoring in a 10% provision for Design Excellence. This equates to a base FSR of 8.2 and maximum FSR of 9.0 under this scenario
- a total maximum GFA of 99,162 square metres is achieved under Scenario 2, which reduces to 90,147 square metres when factoring in a 10% provision for Design Excellence. This equates to a base FSR of 8.5 and a maximum FSR of 9.4 under this scenario
- a total maximum GFA of 88,050 square metres is achieved for Block C under the Reference Master Plan, which reduces to 80,045 square metres when factoring in a 10% provision for Design Excellence. This equates to a base FSR of 7.6 and a maximum FSR of 8.3 under the Reference Master Plan
- a total maximum GFA of 102,325 square metres is theoretically possible under the Design Guide Envelope, which reduces to 93,023 square metres when factoring in a 10% provision for Design Excellence. This equates to a theoretical base FSR of 8.8 and a theoretical maximum FSR of 9.7 under the Design Guide Envelope
- the proposal under the Reference Master Plan allows for an articulation allowance of 19.6%, representing a 145% increase on the other Scenarios.

As can be seen from the above, the Refence Master Plan, which forms the basis of the GFA proposed for the Precinct, is:

a. 7.5% or 6,639 square metres lower than the GFA that could theoretically be achieved under Scenario 2

b. 12.6% or 11,112 square metres lower than the GFA that could theoretically be achieved under Scenario 2

c. 16.2% or 14,275 square metres lower than the GFA that could theoretically be achieved under the Design Guide Envelope.

The above figures confirm that the GFA proposed for Block C as determined by the design led process, is below that which could be achieved for the Precinct under the Central Sydney site-specific planning proposal methodology. It is also below the theoretical

maximum under the Design Guide Envelope, which highlights that the Design Guide Envelopes will provide sufficient flexibility for variance in the future building design.

7. Why the approach and outcome proposed for Central Precinct is appropriate

The following section sets out the key reasons why the approach and outcome proposed for the Central Precinct is appropriate and acceptable having regard to the SSP Study Requirements. They are:

1. Central Precinct has site and context characteristics that make it unique from other sites in Central Sydney
2. the Central Precinct proposal has been informed by a design led process that has been instrumental in shaping the proposed design and massing solution
3. the scale, bulk and mass of the built form is largely consistent between the different approaches
4. the GFA and FSRs proposed for Central Precinct under the design led approach is lower than would be achieved using the *Guideline for Site Specific Planning Proposals in Central Sydney* and *Schedule 12* of the *Sydney DCP 2012*
5. technical analysis confirms the preferred massing solution achieves an appropriate environmental and pedestrian amenity outcome
6. the proposed massing supports an appropriate interface to Prince Alfred Park
7. the proposed design positively responds to the intent and objectives of the *Sydney DCP 2012* and *the Guideline for preparing site specific planning proposals*.

These key reasons are discussed in further detail below.

7.1 Central Precinct has unique site context and characteristics

Central Precinct has inherent characteristics that warrant a tailored approach to its planning and design. Fundamentally, it does not involve planning for a single site (or even multiple sites) within an existing CBD street and block layout, where the need to 'fit' a new building into existing adjacent built form attributes is an imperative. Key characteristics that are inherent and unique to Central Precinct include:

1. its primary function as Sydney's and Australia's largest transport interchange
2. it's location above Central Station which makes it the most highly accessible land in Sydney and an entirely appropriate location for density. It is therefore a once in a century opportunity to deliver significant economic and employment growth to a CBD that is intrinsically constrained by its geographic limitations to expand in the future
3. its setting in a part of Central Sydney with a varied built form typology with little consistency or uniformity to street wall heights and setbacks
4. its requirement to create an entirely new ground plane over operational rail lines that must fully integrate in a vertical manner with the station and rail corridor below. This has implications for the location and nature of enabling infrastructure and therefore public space and built form on the OSD deck
5. its distinct linear shape, whereby the land created is considerably longer in length than in width, which constrains options for the location of public space and built form

6. its elevated position above the natural ground level at the edge of Central Sydney, which expose the Precinct to all the key prevailing wind directions (south, north-east and north-west)
7. its size, which makes it the largest urban renewal site in Central Sydney and provides the opportunity to create a precinct scale place character that responds to its unique location and setting, without necessarily having to directly replicate every aspect of the built form character that typifies the established CBD
8. the fact the Precinct does not include pre-existing streets, blocks and lots, with its renewal instead involving the creation of new public space, including streets and lanes, that create and define development blocks.

7.2 The design of Central Precinct has been informed by a design led process

As required by the SSP Study Requirements, consideration has been given to the CSPS and the *Guideline for Site Specific Planning Proposals in Central Sydney*. Whilst this is the case, in response to other Study Requirements, the State Significant Precinct proposal for renewal of Central Precinct has been developed from a first principles, design led philosophy that also appropriately considers other, at times competing interests such as economic and environmental factors.

This is reflected in the 'key urban design moves' that have shaped public space and built form within the Precinct, and which have been guided by an extensive engagement process with the State Design Review Panel, industry experts and key stakeholders.

This process has resulted in the significant evolution of the Reference Master Plan and has led to a proposed density and built form that will support a high-quality place outcome for the Precinct as required by the SSP Study Requirements.

Consequently, this iterative development, testing and refinement process has led to the achievement of a well-considered proposal that is comprehensive, grounded in evidence and sufficiently robust for the current rezoning stage of the planning and design process.

The planning framework prepared in conjunction with the Reference Master Plan provides clear guidance on the intended outcome for Central Precinct and enables further opportunities through the Design Excellence process to ensure that all future development proposals deliver on the vision and objectives for the Precinct.

7.3 The resultant built form and massing outcome is consistent between different approaches

As shown in the slides at **Attachment A**, the design led process for Central Precinct has led to a built form solution that differs in parts when compared to the outcome achieved using the site-specific planning proposal methodology. Whilst this is the case the differences are minor in the context of the broader renewal proposition for Central Precinct, and importantly:

a) don't change the nature of the proposal, which still consists of a podium and tower form

b) don't result in any substantive difference in the overall built form outcome for the Precinct

c) don't fundamentally change the visual impact of the proposed built form

d) don't result in any significant material difference to the environmental impacts, either within the Precinct itself, or the surrounding external environment.

Notably, all scenarios for the Precinct still:

a) include a significant provision of public open space, which represents circa 54.4% of the overall Precinct under the RTS Reference Master Plan

b) are generally consistent in the way they approach the overall layout and configuration of public domain, in particular the inclusion of Central Green, Central Avenue, the Devonshire Link, and the Prince Alfred Park Link

c) achieve generous separation between the proposed built form and the Central Terminal Building

d) maintain clear view lines to the clock tower from key locations

e) enhance pedestrian permeability across the Precinct through the creation of laneways and inclusion of pedestrian bridges

f) incorporate building heights designed to comply with the solar access plan

g) have a similar approach to tower locations and configurations within the Precinct

h) use the same amount of land within the OSD as 'developable area'.

Where the built form solution does differ this is in direct response to design guidance received through the design review process, or in response to detailed technical analysis that has been aimed at maximising pedestrian amenity and achieving an optimum built form outcome for the Precinct. The reasons for these points of difference are summarised below:

1. **Above podium setbacks** – above podium setbacks are proposed to be between 3 metres and 5 metres, compared to the 8 metre numeric requirement under the CoS's site-specific planning proposal methodology. The reduced podium setbacks are proposed as:

    a. they allow for greater flexibility in locating towers within the same development block

    b. technical wind analysis shows that the reduced separation distances between towers help with improving pedestrian wind amenity at ground level within the OSD public spaces

    c. they continue to support the achievement of high quality solar and sky view outcomes that are generally consistent with, or better than what is achieved for similar spaces in Central Sydney

    d. they continue to provide an appropriate spacing to the Western Gateway towers along the Central Avenue (43 metres), Devonshire Link (30 metres) and Prince Alfred Park Link (22 metres), ensuring that these public domain areas achieve an appropriate pedestrian scaled environment.

2. **Tower separation** – the proposed tower separation under the Reference Master Plan exceeds the numeric requirement under the CoS's site-specific planning proposal methodology. The increased separation of towers within the same development block is achieved as:

a. The towers are designed to have a longer east-west axis compared to their north-south axis

b. it responds to the outcomes of technical wind analysis which has shown that the proposed level of tower separation helps optimise wind performance for the Precinct

c. it enables greater visual separation between the buildings when viewed from the east

d. it maximises the ability for the tower forms to be viewed "in the round" as much as possible

e. it improves outlook and amenity from within the towers.

3. **Setback from north-south lane** – the above podium setback along the north-south lane is proposed to be 3 metres compared to the 8-metre numeric requirement under the site-specific planning proposal methodology. This reduced podium setback is proposed as:

    a. a generous 43 metre setback is still achieved between towers in the Central Precinct and the Western Gateway

    b. the low-rise built form along Central Avenue was introduced into the Reference Master Plan to specifically act as a podium street condition, enabling the towers to be setback 25 metres from Central Avenue, being well in excess of the 8-metre requirement under the CoS's site-specific planning proposal methodology

    c. the height of low-rise buildings (25 metres) complies with CoS's built form controls for street frontage heights, and in doing so meet the objective of creating a more pedestrian scaled environment along Central Avenue

    d. it supports a greater level of building diversity within the Precinct

    e. it does not compromise the outcome for the laneway, which TfNSW introduced early in the design led process to provide a more intimate fine grain environment that acts as a point of difference from the more civic scaled Central Avenue. The towers sit above a 25 metre (6 storey) high podium and as such the difference between a 3 metre and 8 metre setback will be visually imperceptible to a pedestrian walking along the 6-metre-wide laneway

    f. technical analysis confirms that the north-south lane will achieve a combination of sitting and standing criteria for pedestrian wind amenity, will have a level of sky view that is comparable and/or exceeds other laneways in Central Sydney, and achieves good levels of solar access.

In addition, the site-specific planning proposal methodology under the Guideline does not contemplate or require the provision of a laneway within development blocks for the purposes of site testing, and the scenario proposed for the Central Precinct has always envisaged the laneway being delivered through the design and development of each development block.

Conversely, applying the site-specific planning proposal methodology under the Guideline would have the potential to result in a range of outcomes, including the removal of the laneway from its proposed location to enable the achievement of a

more typical podium and tower form with an 8-metre setback (Scenario 1). Whilst being fully compliant with the site-specific planning proposal methodology this would result in a reduced separation between the Central Precinct and Western Gateway and deliver a less optimal urban design solution compared to the preferred Reference Master Plan.

4. **Articulation zone –** The Guideline requires a minimum proportion of the design envelope of 8% plus 0.5% for each 10-metre segment in height above 120 metres provided as an articulation zone to enable sufficient building articulation at the design stage. The CSPS also requires an articulation zone of 900 millimetres to buildings to enable sun shading and similar devices.

   Using Block A as an example, an articulation provision (i.e. BEA/GBA %) of circa 9.3% is required to be achieved under the Guideline's site specific planning proposal methodology. By comparison the design led approach used for the Central Precinct results in an articulation allowance of 19.5% when comparing the Building Envelope Area with the proposed Gross Building Area. The amount of articulation allowance within the building envelope therefore significantly exceeds the numerical requirements under the Guideline and confirms that the Design Guide envelopes will provide ample opportunity for built form variance and articulation.

   The Design Guide envelopes allow for 1 metre of articulation around the buildings, while the guidelines have also been updated to include a provision that requires sun shading devices to be provided on building facades.

   Finally, TfNSW is now including a design excellence bonus provision which will see an additional 10% allocated to the available GFA as an award, as a result of achieving design excellence. The introduction of the design excellence bonus mechanism will provide a further lever for the assessing authority to use as a means of controlling the scale, mass and architectural design of the built form.

5. **GBA to GFA efficiencies –** A GBA to GFA efficiency of 85% has been applied to the building envelopes in the Reference Master Plan, compared to the 84% set out in the Guideline. The 85% efficiency rate is proposed as this is what has been achieved by the industry for other CBD buildings. The slight increase in efficiency is considered appropriate given built form within the Precinct is being designed from first principles and will enable the creation of buildings with a high floorspace efficiency. Engagement with the PWG indicated that CoS planning and design officers are generally supportive of this approach.

7.4 The resultant GFA and FSRs are consistent between the different approaches

Under the CSPS, land within Central Sydney is subject to a 'base' FSR of between 7.5:1 to 8:1. A separate bonus FSR and Design Excellence bonus is also available that enables sites to achieve a maximum overall FSR of between 9.9:1 to 15.4: 1. This is shown in **Figure 10** below.

Area	General Location	Base	Bonus	Bonus Use	Design Excellence	Max
1	Core	8	4.5	Office, business, retail, residential, serviced apartments	10%	13.75
		8	6	hotel, motel	10%	15.4
2	Midtown to Central	8	4.5	office, business, retail	10%	13.75
		8	6	residential, serviced apartments, hotel, motel	10%	15.4
3	Western edge	8	2	office, business, retail	10%	11
		8	3	residential, serviced apartments, hotel, motel	10%	12.1
4	Chinatown and Haymarket	7.5	1.5	residential, serviced apartments, hotel, motel	10%	9.9
Other	Chippendale	site by site	NA	NA	none	site by site

Figure 10 Summary of Floor Space Ratios within Central Sydney (Figure A_12)

Source: Central Sydney Planning Strategy – Capacity Study 2012 (City of Sydney, 2016)

Separate to this, land within Central Sydney's super tower clusters, which have been subject to the CoS's *Guideline for Site Specific Planning Proposals in Central Sydney,* have achieved FSRs in the order of circa 16:1 (55 Pitt St) and up to 22.8:1 (Sydney Metro East Hunter Street Station site).

While it's difficult to directly compare site specific densities, the range of densities achieved across Central Sydney provides a useful reference point when seeking to understand whether the density proposed for Central Precinct is reasonable.

Relevant to this is the fact that Central Precinct is located directly above Central Station and is therefore possibly the most well connected location in Greater Sydney. In accordance with the long established planning principles of land use and public transport integration, Central Precinct is therefore an ideal location to optimise GFA, in particular for the 'destination' (as opposed to origin) uses such as the offices being proposed.

As discussed throughout this paper, the GFA and resultant FSR proposed for Central Precinct is the direct result of a design led, first principles approach undertaken in accordance with SSP Study Requirements, and which has involved a comprehensive precinct and context analysis, exploration and technical analysis of alternative options, and extensive engagement with the SDRP and other key stakeholders.

To assist DPE with its assessment, TfNSW has carried out a comparative analysis of the Central Precinct proposal against the outcomes that could be achieved for the precinct under the Central Sydney site-specific planning proposal methodology. What the analysis shows is that while the different methodologies result in slight variations to the built form outcome, they all deliver a density that is largely consistent. **Table 5** below shows the resultant GFA and FSR outcomes under the alternate scenarios.

Table 5 – Block C floorspace and density comparison

Blocks A + B + C	Scenario 1 Compliant Envelope	Scenario 2 Compliant Envelope	Reference Master Plan	Design Guide Envelope
Building Envelope Area (BEA)	494,891sqm	471,796sqm	N/A	512,778sqm
Gross Building Area (GBA)	454,090sqm	433,064sqm	424,895sqm	470,596sqm
Gross Floor Area (GFA)	381,436sqm	363,774sqm	353,565sqm	395,300sqm
GFA – 10% Design Excellence	**346,760sqm**	**330,703sqm**	**321,423sqm**	**359,364sqm**
Articulation Allowance (BEA/GBA %)	8.2%	8.2%	17.1%	8.2%
Max FSR (n:1)	11.1	10.6	10.3	11.5
Base FSR (n:1)	10.1	9.6	**9.3**	10.4

As can be seen in **Table 5**, the Reference Master Plan, which forms the basis for the density that is proposed for Central Precinct, results in an overall GFA that is below the overall maximum GFA that could be achieved for the Precinct using the Central Sydney site-specific planning proposal methodology (Scenarios 1 and 2).

The analysis also highlights that the GFA under the Reference Master Plan is well below the theoretical maximum GFA that could be achieved within the building envelopes under the Design Guide. This confirms that the proposed building envelopes under the Design Guide will allow sufficient flexibility for variance in future building design and a further reduction in the ultimate built form when factoring in Design Excellence.

The fact that the Reference Master Plan results in a lower overall GFA highlights that the design led process has delivered an appropriate density outcome, particularly when taking into account Central Precinct's inherent and unique characteristics. This lower overall GFA is largely due to several key urban design moves that have been implemented during the design evolution process, including the introduction of the low-rise built form along Central Avenue, the inclusion of the north-south lane, and the increased separation of towers from the Western Gateway within the same development block.

Overall, the comparative analysis demonstrates that the density being sought for Central Precinct is well within an acceptable range when compared to the Central Sydney site-specific planning proposal methodology and as such does not represent an overdevelopment of the Precinct.

7.5 The proposal is of an appropriate scale and bulk of the Precinct

As noted earlier in this paper, the issue of 'overdevelopment' is a multi-faceted, broad, all-encompassing term that is often not well defined. In our view the term overdevelopment talks to a perception of built form having too much scale and bulk for its context. The

debate about height and bulk can therefore only be meaningful against the background of planning controls, such as maximum height, floor space ratio, site coverage and setbacks.

Use of these built form controls enables an informed and guided approach to deliver an outcome that is consistent with community expectations for the Precinct. As such, it requires consideration of a range of contributing factors. In our experience, in addition to GFA, these are the form based provisions of:

- amount of public space to built form (e.g., site cover)
- height
- setbacks and separation distances
- length and width of towers.

Bringing this all together, the proposal performs as follows in relation to the key factors that in our opinion make up bulk and scale.

Table 6 – Review of Central Precinct proposal against key planning controls

Matter	City of Sydney LEP and DCP	The Proposal	Compliance
Site cover	100% possible for sites in Central Sydney	45.6% of precinct	Performs well
Height	Solar access plane	Solar access plane	Full compliance
Tower separation distances	8m – 10m	10m – 30m	Full compliance
Above podium setbacks	8m	3m, 5m and 9m	Partial compliance
Maximum diagonal tower measurement	100m	100m	Full compliance

As can be seen, the proposal is largely compliant with the Central Sydney built form controls as set out in the Sydney LEP 2012 and DCP 2012.

The matter of above podium setbacks and tower separation distances is a matter of both non-compliance and compliance. While the Reference Master Plan does not meet all numeric provisions for above podium setbacks, this variance is proposed as it allows for greater separation of towers within the same block whilst also supporting an appropriate pedestrian wind amenity outcome within the Precinct.

The resultant built form outcome is one that has more generous separation distances between towers at more regular intervals. These increased tower separation distances are considered to support a superior visual impact outcome when seen from locations in the ground plane public domain to the east, such as Prince Alfred Park.

It is noted that while the Design Guide 'locks in' the minimum width of the east-west laneways, the building envelopes for each development block provide sufficient flexibility for future towers to meet upper-level setback requirements if desired. The proposed planning controls for the Precinct therefore enable the final built form for each development block to be explored and varied through the design excellence process as part of the future DA process.

7.6 The proposed massing supports an appropriate visual interface to Prince Alfred Park

The Precinct's location on the CBD's southern fringe combined with the fact that it is currently operational rail land with no built form above, means that any future development of scale will inevitably result in a perception of density and overdevelopment.

A key contributing factor to the perception of density and overdevelopment is the scale and proximity of towers to each other. Towers that are wider and closer together will typically have a higher level of perceived density than towers that are narrower and further apart.

The Precinct's adjacency to Prince Alfred Park also contributes to a higher perceived density due to the ability to view the Precinct's entire eastern elevation from the parkland. A key challenge has therefore been to achieve a massing solution that effectively balances the need for built form to respond to this edge of the city context, whilst ensuring future development capitalises on the city making renewal opportunity that Central Precinct represents.

Recognising this, the proposal adopts a deliberate context and precinct responsive massing strategy to deliver an appropriate distribution of built form. Key design measures used to achieve this balanced outcome include:

- a deliberate layering of building scale (as measured by height) from south to north and from east to west
- the siting and design of the Prince Alfred Park Sidings Building so that it screens much of the precinct from eye level when standing in Prince Alfred Park
- the stepping of individual tower forms in accordance with the sun access plane (SAP)
- the use of greater separation distances between towers within the same development block (compared to DCP requirements) to visually break up the building mass and enable an improved ability to perceive individual buildings within the overall composition
- maintaining a minimum 30 metre separation distance between buildings at Devonshire Link and 22 metres at the Prince Alfred Link
- promoting tower forms that are narrower along their eastern façade to help maximise visual permeability through the Precinct when viewed from the east.

To illustrate how this massing strategy has worked in practice, **Figure 11** below is an analysis of the proportion of built form to tower separation along the Precinct's eastern elevation for the full length of the OSD deck, while **Figure 12** shows the same outcome using the City of Sydney's DCP setback and separation requirements.

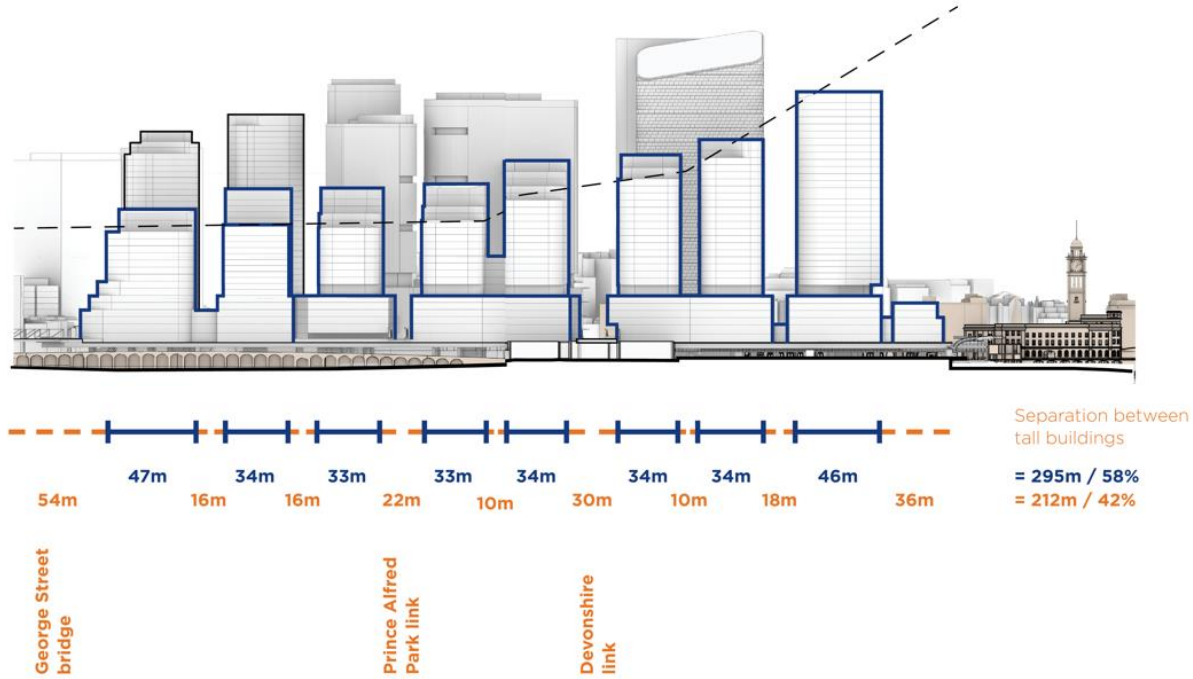


Figure 11 – Eastern elevation built form and tower separation under Reference Master Plan

Source: Architectus

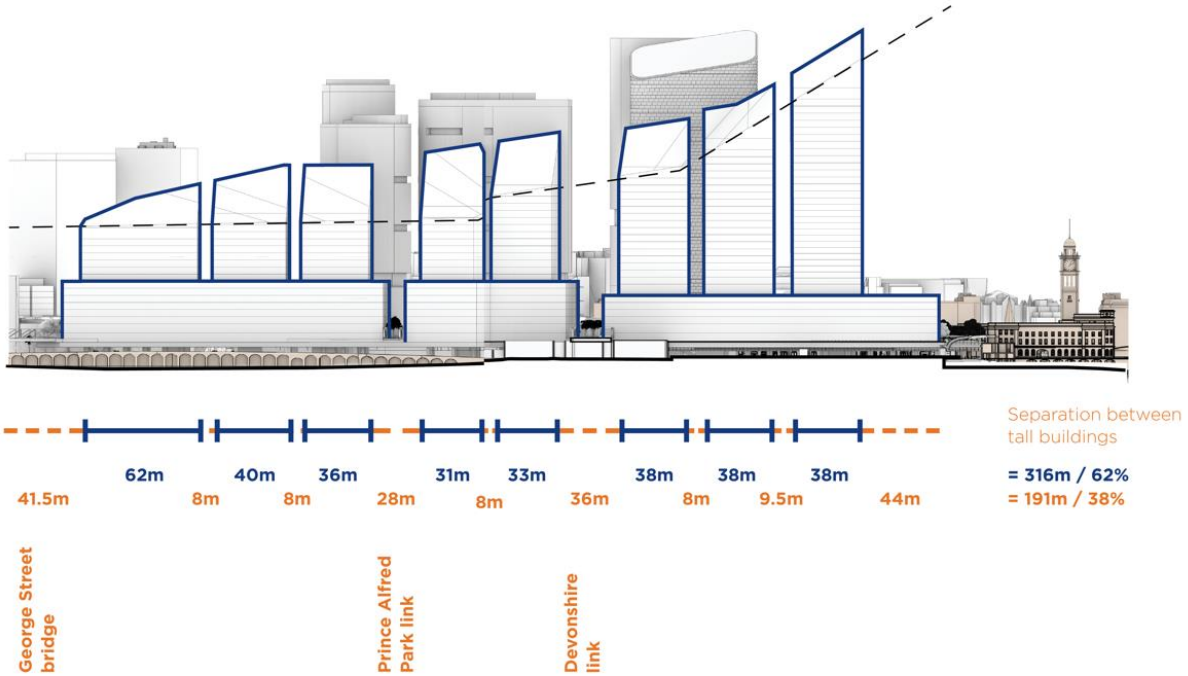


Figure 12 – Eastern elevation built form and tower separation under the CoS DCP requirements

Source: Architectus

Key observations from the above are:

The massing strategy used for the Reference Master Plan results in a cumulative total building mass along the Precinct's eastern elevation of 295 metres (58%) and a cumulative total building separation of 212 metres (42%).

The massing strategy under Compliant Envelope Scenarios would allow for a potential cumulative building mass along the Precinct's eastern elevation of 316 metres (62%) and a cumulative total building separation of 191 metres (38%).

The massing strategy used for the Reference Master Plan, and which forms the basis for the proposed planning controls for Central Precinct, results in a cumulative additional 21 metres of separation between buildings along its eastern frontage to Prince Alfred Park.

While comparing the Reference Master Plan with Scenarios 1 and 2 helps provide an understanding of what is proposed against what could be achieved under the Sydney DCP controls, a more useful indicator is to compare the Reference Master Plan with an existing real-life example.

Based on our review, the built form along Elizabeth Street that frames the western edge of Hyde Park is considered to most closely resemble the relationship between Central Precinct and Prince Alfred Park. This section of Elizabeth Street spans approximately 868 metres and includes four (4) street crossings in Liverpool Street, Bathurst Street, Park Street and Market Street. By comparison the eastern edge of Central Precinct spans 487m and includes three (3) pedestrian links that break up the built form. The outcome of the analysis of the Elizabeth Street frontage to Hyde Park is shown in **Figure 13** below.

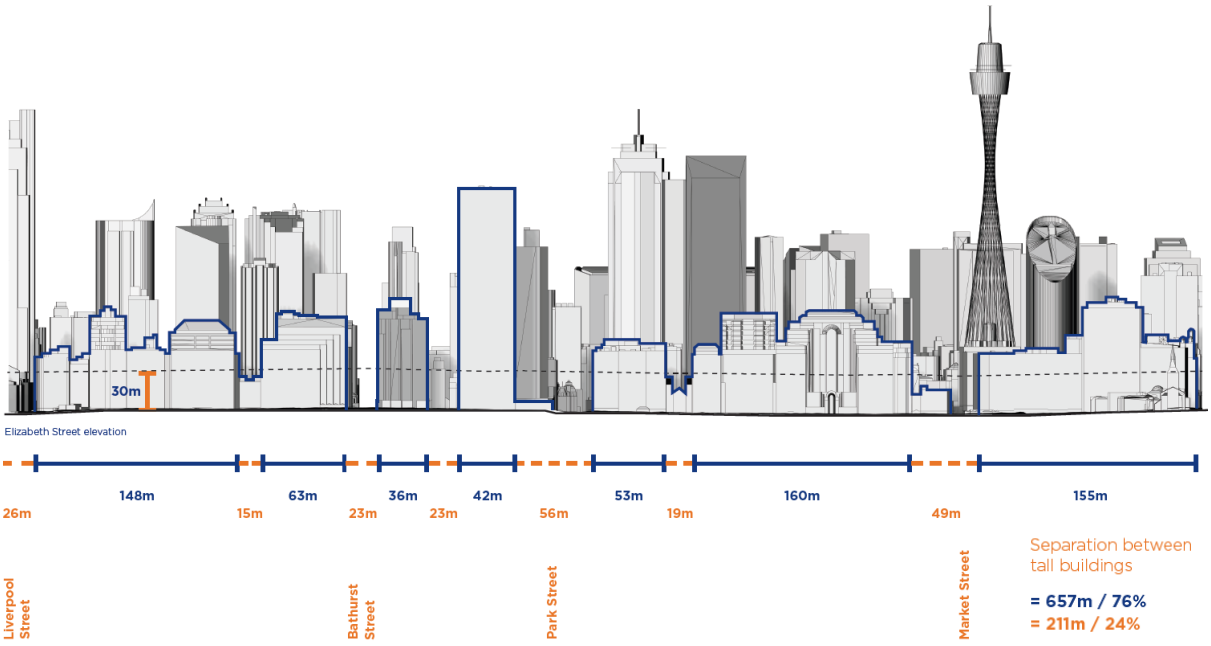


Figure 13 – Elizabeth Street elevation built form and tower separation

Source: Architectus

As illustrated, taken at a height datum of 30 metres above ground level, Elizabeth Street has a cumulative total building mass of 657 metres along its frontage to Hyde Park and a cumulative total building separation of 211 metres. This equates to a building mass to tower separation ratio of 76% to 24%, being higher than the proposed outcome for

Central Precinct, which has building mass to building separation ratio of 60% to 40%. Other observations include:

- there are only seven (7) points along the 868 metre length of Elizabeth Street where there is separation between towers at the 30 metre height datum, four (4) of which occur due to the crossing of Liverpool Street, Bathurst Street, Park Street and Market Street
- the Elizabeth Street frontage has three (3) sections of continuous building mass that span 148 metres, 160 metres and 155 metres
- the Central Precinct proposal has nine (9) points along its 487 metre eastern façade where there is separation between towers, three of which are due to pedestrian links
- the maximum continuous stretch of built form above the 30 metre height datum on the OSD is 46 metres, both of which are located at the bookends of Central Precinct's eastern frontage. The remainder of the built form elevations are no wider than 34 metres at any one point.

From the above it is evident that Central Precinct has a lower building mass to tower separation ratio compared to the CBD interface condition to Hyde Park. Towers within Central Precinct will be spaced at more regular intervals, resulting in a perceived density that is generally lower than that experienced from Hyde Park looking west towards the CBD.

While it is acknowledged that the above analysis is not an exact science, what it does demonstrate is that the Central Precinct proposal will support a future built form outcome that is consistent with other existing interface conditions along the eastern edge of the CBD. In doing so, it will reinforce the well-established principle of having a built form arrangement that clearly defines the edge of the CBD.

Further to the above observations, it is also worth highlighting that when seen from locations to the east such as Prince Alfred Park, the massing strategy employed for Central Precinct will result in a 'layering' of built form, with the proposed OSD buildings sitting in the foreground and integrating with the taller southern CBD tower cluster and Western Gateway buildings, both of which will form a visual backdrop to the Precinct. This arrangement is again entirely consistent with Elizabeth Street, which as shown in **Figure 13** sits in the foreground and has a number of taller and more significant buildings that act as a backdrop to the street façade.

Overall, the combination of graduated building heights in response to the SAP and generous tower separation distances supports the achievement of an acceptable interface outcome to the east. This is particularly the case when considering the aspirations for the Precinct as the anchor of Tech Central, its location above Australia's busiest transport hub, and the fact that each building will be the subject of a future design excellence process that will ensure a more refined design solution as part of an overall built form composition. **Figure 14** below shows an indicative photomontage of what Central Precinct could look like when viewed from Prince Alfred Park.

Figure 14 – Photomontage of Central Precinct as viewed from Prince Alfred Park

Source: Virtual Ideas

7.7 Technical analysis confirms that the Reference Master Plan achieves an appropriate amenity outcome

Detailed and iterative technical analysis of key amenity considerations has been instrumental to informing the preferred massing solution under the Reference Master Plan. This has enabled TfNSW to achieve a design solution that is grounded in evidence, which demonstrates that the proposed planning controls for Central Precinct will support a high-quality pedestrian amenity outcome. A summary of the key amenity considerations is provided below.

Solar

A detailed solar and overshadowing analysis was undertaken to ensure the preferred built form and massing solution does not have an unacceptable impact on surrounding public spaces and will support the creation of new public spaces with high levels of solar amenity. The analysis, as shown in the Urban Design Framework, demonstrates that:

- overshadowing impacts to Prince Alfred Park will be fully compliant with the solar access plane that applies to this space under the Sydney LEP 2012
- overshadowing impacts to Belmore Park will be fully compliant with the solar access plane that applies to this space under the Sydney LEP 2012
- Central Green attains direct sunlight to at least 50% of its area from 9am through to 2pm (5hrs) in mid-winter
- Central Square attains direct sunlight to almost all of its area from 9am through to 12noon (3hrs) in mid-winter

- the proposed Central Precinct massing creates no additional overshadowing to Central Green or Central Square in mid-winter
- Mortuary Station Plaza will attain direct sunlight to at least 50% of its area from 11am to 1pm (2hrs) in mid-winter
- there will be no change to direct sunlight achieved to Eddy Avenue Plaza
- solar impacts on the residential apartments along Regent Street are acceptable.

Skyview

A Skyview analysis has been undertaken for the Precinct to determine the Skyview Factor for public domain areas in accordance with the CoS's methodology under CSPS. It demonstrates that:

- Central Square (49.8%), Central Green (56.2%) and Mortuary Station Plaza (63.3%) all achieve SVF's that are higher than similar scaled public open spaces within Sydney such as Central Park, Chippendale (42.7%) and Darling Square, Haymarket (31.3%). These spaces therefore fall within the areas of the highest SVF category based on the Central Sydney condition
- Central Avenue (28.3%) also achieves a higher SVF result compared to comparative streets such as George Street (17.6%) and the Pitt Street mall (14.8%). Central Avenue therefore falls within a high SVF category based on the Central Sydney condition
- the north-south lane (9.8%) achieves a SVF that is higher than Ash Street, but lower than Kensington Street (18.3%). Laneways within Central Precinct therefore fall within lower SVF category based on the Central Sydney condition, but importantly are consistent with the CSPS which recognises that laneways typically have SVF's lower than 15%. The laneway also achieves a better skyview outcome than an alternative, CSPS compliant scheme that has towers on both sides as opposed to the proposed podium block. The level of skyview in our opinion is also consistent with the intimate character that is trying to be achieved for the laneway.

Visual Impact

A Visual Impact Assessment has been undertaken to determine the acceptability of the proposal from a visual impact point of view.

From the outset of the renewal process, a key design consideration for TfNSW has been visual impact of the proposal when seen from locations in the public domain to the east, and in particular Prince Alfred Park.

Firstly, it needs to be acknowledged that any form of CBD development within the precinct will result in a high level of visual impact compared to the existing rail yards environment.

To mitigate this impact, the proposal incorporates a number of measures, including a deliberate layering of height moving from south to north and from east to west, the siting and design of the Prince Alfred Park Sidings that screens the precinct from eye level in Prince Alfred Park, and the stepping of individual tower forms in accordance with the SAP.

In relation to the specific issue of density of built form when seen from the east, separation distances between towers within the same block have now been increased to be equal to or greater than those applying under the Sydney DCP provisions. This further breaks up massing and enables a greater ability to perceive individual buildings within the overall composition.

While it's acknowledged that this has resulted in lesser separation distances between towers on either side of Devonshire Link and Prince Alfred Link, minimum tower separation distances of 30 metres and 22 metres are achieved for these links respectively.

The combination of these generous widths at key links and separation distances between individual towers supports the achievement of an acceptable visual outcome in the future, particularly when considering the aspirations for the precinct, its Central Sydney context, and the fact that each building will be subject of a design excellence process that will result in a more refined design solution for each of the tower forms.

Based on the above, the Visual Impact of the proposal is not considered to result in a significant, unacceptable visual impact that cannot be justified on environmental planning grounds or adequately mitigated through the new planning framework and development assessment process, including the design excellence process and any conditions of development consent.

Wind

Detailed and extensive wind analysis has been undertaken throughout the design led process for Central Precinct and has involved a combination of wind tunnel testing and the use of Computational Flow Dynamics (CFD) testing to help deliver an optimized built form outcome for OSD buildings within the Precinct.

The wind-engineering effort has focused on the likely environmental pedestrian-wind comfort and safety conditions expected in and around the Precinct as a result of the proposed built form, with the fundamental aim of ensuring an outcome that supports a safe and comfortable pedestrian wind environment. The assessment has been based on the comfort criteria outlined in the CSPS and has been undertaken using an envelope model excluding any wind amelioration and/or mitigation measures, such as, trees, screens, awnings and detailed building design features.

Following a further round of iterative CFD and wind tunnel testing, the outcome of the most recent wind analysis confirms that:

- the proposed built form does not result in any pedestrian wind safety issues within the Precinct
- a standing comfort standard is now achieved for the full length of Central Avenue, with the exception of a single point at the Avenue's intersection with the pedestrian connection from Western Gateway (Test Location 55), which achieves a walking comfort standard
- the North-South Lane now achieves a combination of standing and sitting comfort standards
- Devonshire Link now achieves a standing comfort standard, including the pedestrian bridge
- Prince Alfred Link now achieves a mix of standing and sitting comfort standards, including the pedestrian bridge
- Mortuary Station Plaza achieves a standing comfort standard
- Central Green achieves a combination of sitting, standing and walking standards
- Central Square achieves a combination of standing and sitting comfort standards
- Prince Alfred Park achieves a standing comfort safety standard, with the exception of a single point (Test Location 82), which achieves a walking comfort standard

- the suburban and regional rail platforms achieve a combination of sitting and standing comfort standards.

It is noted that Test Locations 87 and 90, still register as being above the safety standard. This is largely due to wind conditions during strong north-easterly winds that wrap around the Western Gateway buildings and run along Lee Street. These locations also achieved similar outcomes with just the Western gateway in place. Further wind testing will continue to be undertaken in collaboration with the Western Gateway proponents to see what localised mitigation measures can be introduced into their building and public domain design to help improve wind conditions in these locations.

The wind tunnel testing undertaken for the most recent Reference Master Plan demonstrates that the proposal will achieve the relevant safety and comfort criteria in accordance with the requirements of the CSPS and Sydney DCP 2012.

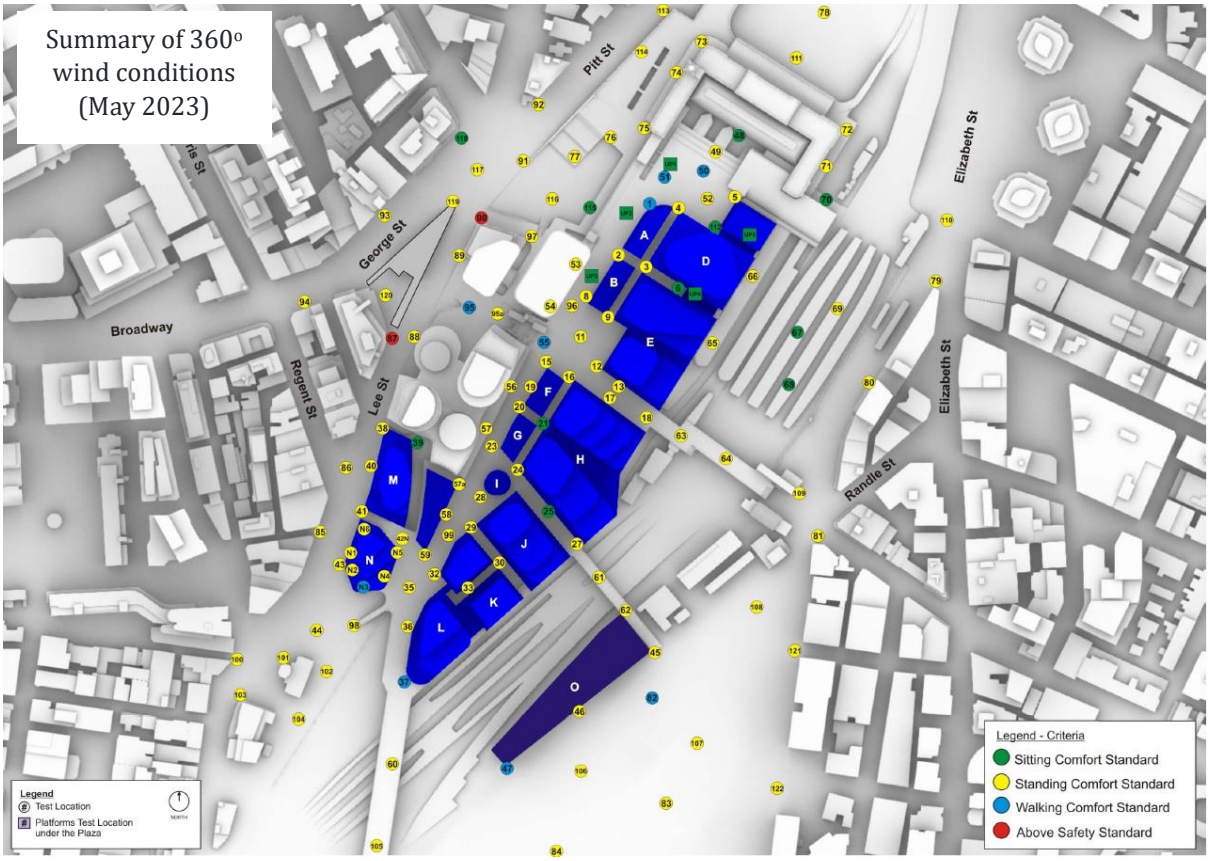


Figure 15 – Summary of 360º wind condition for Reference Master Plan (May 2023)

To assist with DPE's review, TfNSW has also recently undertaken CFD tests that compare the proposal with the built form outcome achieved under Scenarios 1 and 2 using the site-specific planning proposal methodology. The outcome of this analysis is shown in **Figures 16, 17** and **18** below and confirms that the proposal will support a precinct wide pedestrian amenity outcome that is superior to that achieved under the alternate CoS base case scenarios. Particularly in Central Square, Central Green, Mortuary Station Gardens and along Central Avenue. Prince Alfred Park also experiences overall improvement in its pedestrian comfort levels as demonstrated by the lighter green colours that predominate this space under the RTS proposal, compared to the darker shaded green areas under the alternative compliant scenarios.

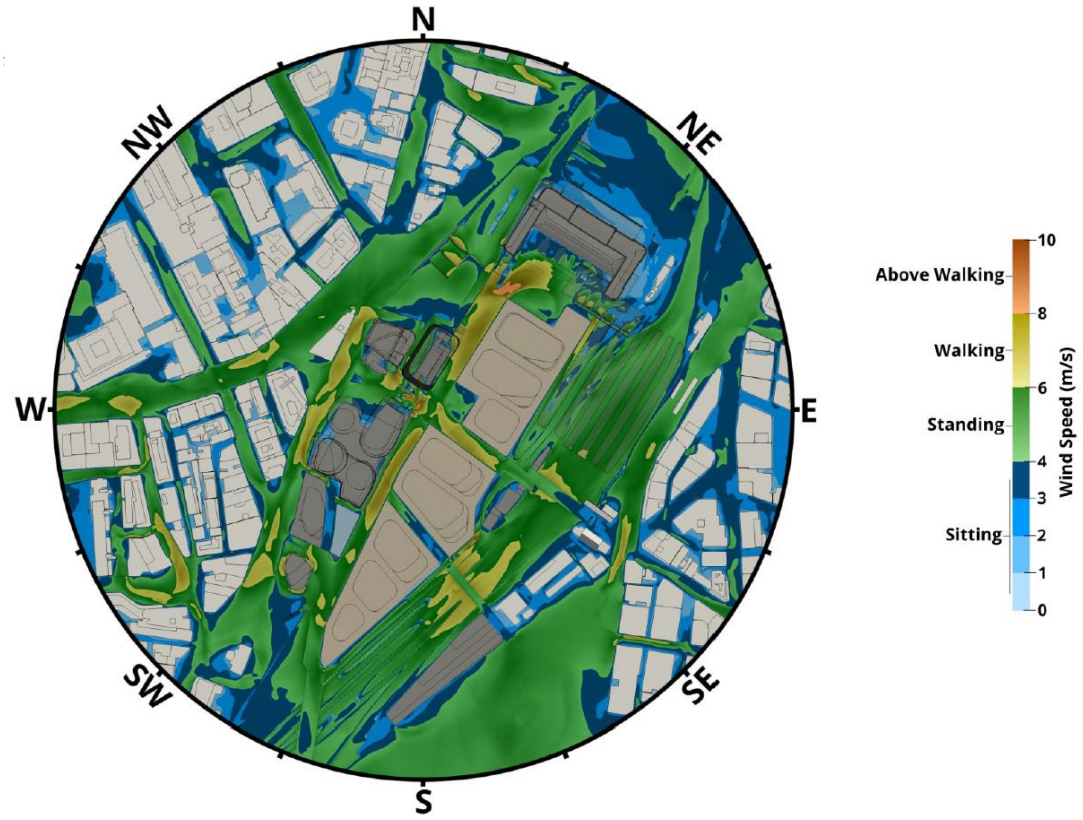


Figure 16 – CFD results for Scenario 1 – Reference Master Plan Proposal with compliant envelopes

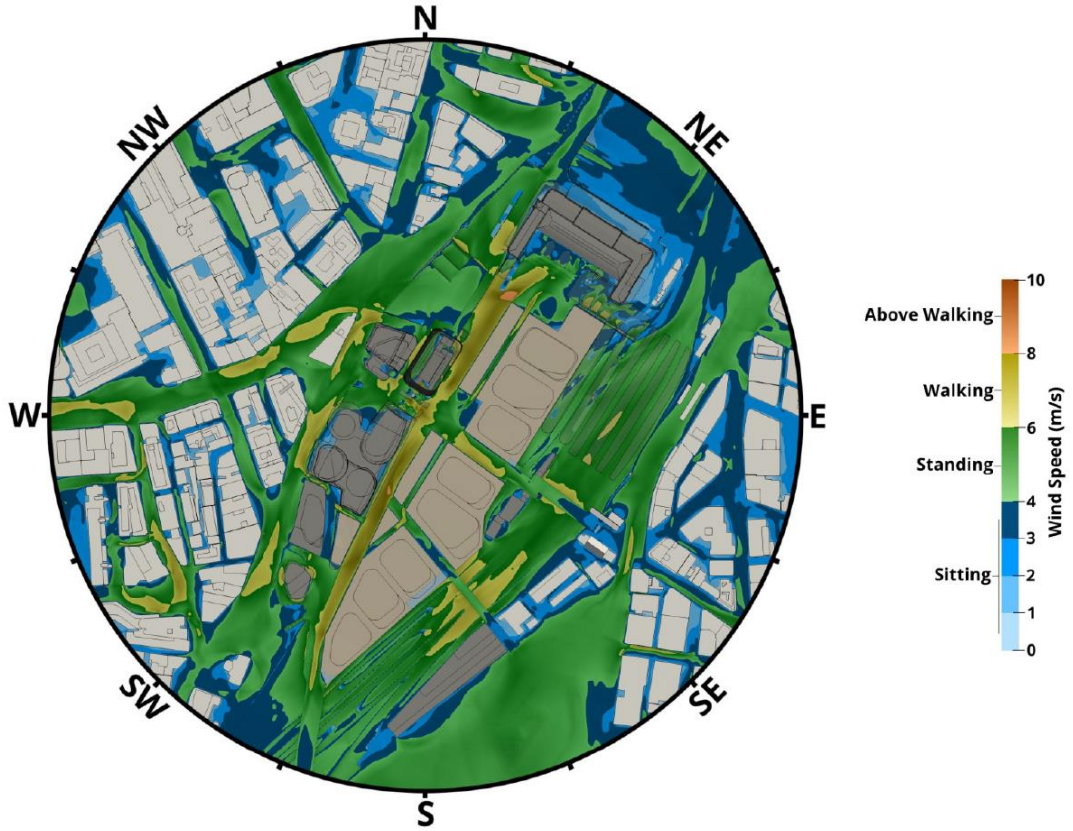


Figure 17 – CFD results for Scenario 2 – Alternate City of Sydney compliant envelopes

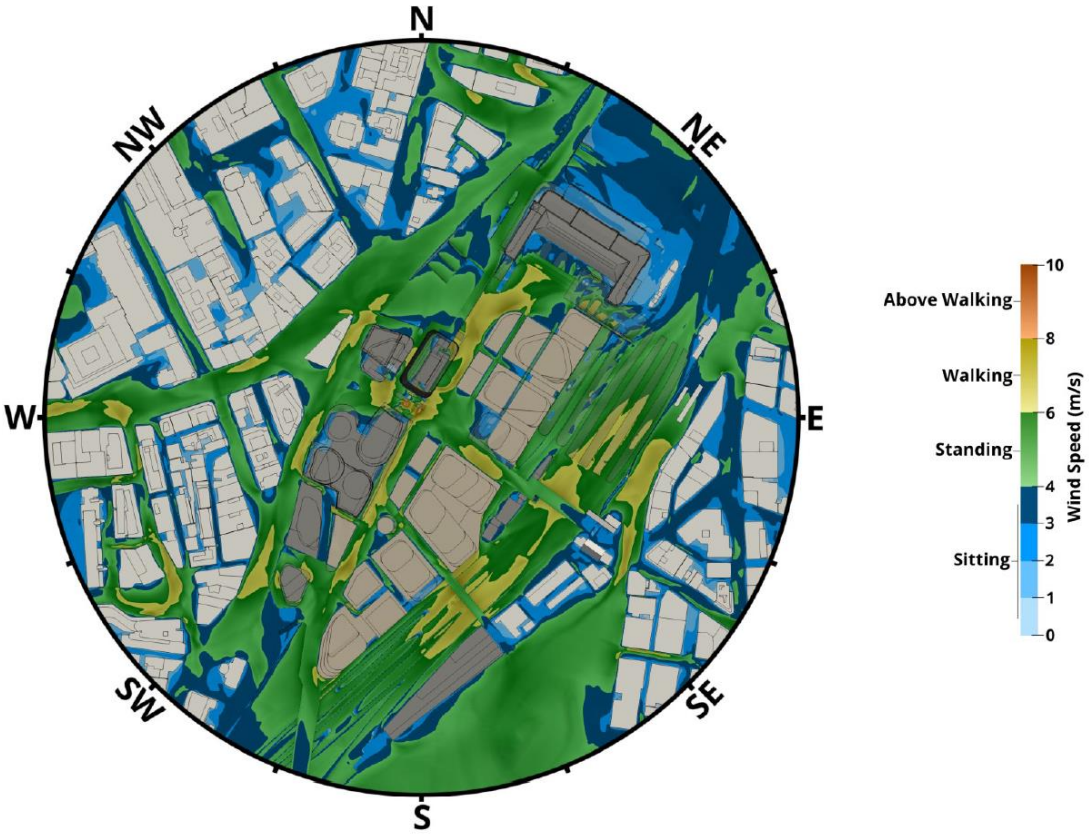


Figure 18 – CFD results for Central Precinct Proposal

7.8 The proposal is consistent with the intent and objectives of the CSPS and Guideline for preparing site specific planning proposals in Central Sydney

The 'Central Sydney Planning Strategy' (CSPS), which has now been translated into the 'Sydney Local Environmental Plan 2012' (SLEP 2012), 'Sydney Development Control Plan 2012' (SDCP 2012) and supported by the '*Guideline for Site Specific Planning Proposals in Central Sydney*' (The Guideline), is used by the CoS to assess the acceptability of site-specific rezoning proposals within Central Sydney.

The proposal for Central Precinct is considered to be entirely consistent with the spirit and intent of the CSPS which is perhaps best captured in the '10 key moves' that it sets out to achieve in Central Sydney to 2036 and beyond. These key moves are:

- prioritise employment growth and increase capacity
- ensure development responds to context
- consolidate and simplify planning controls
- provide for employment growth in new tower clusters
- ensure infrastructure keeps pace with growth
- move towards a more sustainable city
- protect, enhance and expand Central Sydney's heritage, public places and spaces
- move people more easily
- reaffirm commitment to design excellence

- monitor outcomes and respond.

While the Reference Master Plan does not fully align with some of the CoS's preferred numerical dimensions for designing built form and calculating FSRs, the CSPS is a strategic guide for the future of Central Sydney. Consistent with its strategic nature, it recognises that a one size fits all approach does not always translate well to a complex, varied setting such as Central Sydney. Accordingly, the CSPS adopts a performance-based approach to planning. This is acknowledged on page 15 of the CSPS relating to 'Key move 2', where it states:

> *'Flexible planning controls for tall buildings mean buildings will better respond to their context. Site specific considerations, such as adequate building setbacks and outlook, heritage curtilage, wind impacts, sunlight and air movement will determine where a new tower can appropriately be accommodated.' (pg. 15, CSPS)*

This means that variation to numeric controls is allowed where it can be demonstrated that the objectives, or the 'why', underpinning the metrics, can be achieved notwithstanding any inconsistency with preferred metrics. In reviewing the Central Precinct, it is therefore important to understand the intent and objectives of the CSPS and the Guideline for preparing site specific planning proposals in Central Sydney.

To assist with this, an analysis of the Central Precinct proposal has been undertaken against the objectives of the CSPS and the CoS's *Guideline for Site Specific Planning Proposals in Central Sydney* (**Attachment B**). As shown in this analysis, despite the Reference Master Plan proposing a built form solution that differs from the numeric above podium setback requirements, the proposal still:

- positively responds to the 'key considerations' of the CoS's *Guideline for Site Specific Planning Proposals in Central Sydney*
- facilitates a future built form and design outcome for the Precinct that is entirely consistent with the relevant objectives of the CSPS.

Accordingly, while the proposal may deviate slightly from the CoS's numeric standards, it still fundamentally aligns with and will positively contribute to realising the CoS's vision and aspiration for Central Sydney. This is further reinforced in extracts from the CSPS, including:

> *'Our greatest challenge is ensuring longer-term economic and employment growth. The economy needs space to grow. New workers need space. New business services need offices and meeting places. Retail businesses need shopfronts. The infrastructure required to support growth also demands a share of Central Sydney. Public spaces, theatres and community facilities all need spaces.' (pg.33, CSPS)*
>
> and
>
> *'For metropolitan Sydney to retain its global city status, and Central Sydney its primacy as Australia's commercial core, it is critical that economic and employment growth opportunities are protected. It is clear from the gap analysis above that a business-as-usual approach cannot achieve this objective. Without intervention, there will be a shortage in the supply of employment floor space.' (pg. 189, CSPS)*

8. Conclusion

DPE's submission letter from 27 October 2022, noted that concerns had been raised that the proposal represents an overdevelopment of the precinct, with the towers being too dense and visually dominating when viewed from new and surrounding public spaces. It advised that redevelopment of the Central Precinct must be balanced with a built form that supports high quality public spaces and pedestrian amenity.

In addition, the PRP sought clarification of the method used to calculate GFA, requested that TfNSW provide a worked example to demonstrate that GFA is appropriate, and to consider the need for flexibility for innovation space as opposed to just standard commercial office space.

In response to these matters, this paper:

- clarifies how the design led process used for the State Significant Precinct has resulted in the proposed built form and density outcome for the Precinct, and ultimately led to the calculation of the proposed GFA and FSR figures
- provides two (2) alternate worked examples of the GFA calculation for the Precinct using the *Guideline for Site Specific Planning Proposals in Central Sydney* and *Schedule 12 of the Sydney DCP 2012*
- undertakes a comparative analysis of the Central Precinct Proposal against the alternate fully compliant massing scenarios under the site-specific planning proposal methodology as set out in the *Guideline for Site Specific Planning Proposals in Central Sydney* and *Schedule 12* of the *Sydney DCP 2012*
- sets out the reasons why the SSP design led approach undertaken and the outcome that it has resulted in, is appropriate for the Central Precinct.

In response to key matters raised by DPE and the PRP, the additional work undertaken by TfNSW confirms the following:

- **Building articulation** - The GFA proposed for the Precinct, as informed by the Reference Master Plan, is below the maximum GFA that is theoretically possible under the proposed Design Guide building envelopes. This arrangement allows for an average Precinct wide articulation allowance of 17.1% compared to 8.2% that is required under the *Guideline for Site Specific Planning Proposals in Central Sydney*. The analysis also confirms that the Design Guide envelopes are sufficiently sized to allow 1 metre of articulation along building facades and will therefore support variation in future building design so they can be shaped and tailored as part of the future design excellence process.
- **Flexibility for innovation and tech uses** – The Design Guide envelopes are sufficiently sized to enable flexibility in future built form. Based off the Reference Master Plan, the cumulative base GFA proposed for the OSD buildings is 9.3:1, with the potential to reach a maximum 10.3:1 when factoring in Design Excellence. By comparison, the Design Guide envelopes have the potential to theoretically accommodate up to 11.5:1, which means there is flexibility to enable building mass (and GFA) to be configured in a variety of ways within the envelope. The ability for mass and GFA to be configured and shaped within the envelope will support flexibility to accommodate tech and innovation uses as required. For instance, should podium buildings require higher floor to floor heights, then envelopes are flexible enough to allow GFA to be redistributed and accommodated in other ways. Working together with other planning controls, this flexibility will open up opportunities for innovation and tech uses to be integrated into the Precinct.

- **Built form, scale and density** - The proposed built form and massing solution is appropriate and acceptable as:
    - Central Precinct has site and context characteristics that make it unique from other sites in Central Sydney
    - the proposal has been informed by a design led approach which has resulted in the significant evolution of the Reference Master Plan to arrive at a proposed density and built form that will support a high-quality place outcome for the Precinct
    - the proposed scale, bulk and mass is consistent with what would be achieved under the approach using the *Guideline for Site Specific Planning Proposals in Central Sydney* and *Schedule 12 of the Sydney DCP 2012*
    - the GFA and FSRs proposed for Central Precinct under the design led approach are lower than what could be achieved for the Precinct using the *Guideline for Site Specific Planning Proposals in Central Sydney* and *Schedule 12* of the *Sydney DCP 2012*
    - detailed technical analysis confirms that the proposed massing solution for Central Precinct achieves a high quality environmental and pedestrian amenity outcome (i.e., solar, skyview and wind) within key public domain areas
    - the proposal will result in an appropriate interface to Prince Alfred Park and the east more broadly, supporting an outcome that is consistent with other existing interface conditions along the eastern edge of the Sydney CBD. It will therefore reinforce the well-established principle of having a built form arrangement that clearly and strongly defines the edge of the CBD
    - the proposed design clearly meets the intent and objectives of the Sydney DCP 2012 and the *Guideline for Site Specific Planning Proposals in Central Sydney*.

Overall, based on the analysis undertaken, TfNSW is of the firm view that the design led process undertaken for Central Precinct has resulted in the achievement of an entirely reasonable and appropriate proposal that is well-considered, comprehensive, grounded in evidence and sufficiently robust for the current rezoning stage of the planning and design process.

Attachment B – Assessment against the objectives and key considerations of the CSPS and Guideline for preparing site specific planning proposals

Table 1 – Key considerations when calculating FSR under the Guideline

Key Consideration	Central Precinct Response
• ***Maintaining sunlight access to parks and places***	• The proposal has been designed to be fully compliant with the solar access plane that relates to Prince Alfred Park. The proposed massing has also been subjected to extensive solar access testing to ensure that new public places (e.g., Central Green, Central Square, Mortuary Station Plaza) receive excellent levels of sunlight access. This level of sunlight protection will be ensured through provisions for sunlight access which align with typical standards set by City of Sydney's DCP.
• ***Maintaining and enhancing important public views***	• The proposal has been designed to maintain important public views of the Central Station clocktower and Terminal Building. This was achieved through the 'key urban design moves' that are shown in the attached presentation slides, and which were heavily informed by discussions with the Design Review Panel.
• ***Ensuring the efficient and effective operation of Sydney Airport***	• The proposed building heights for Central Precinct will not interfere with the efficient and effective operation of Sydney Airport.
• ***Respecting the existing predominantly low scale setting of Sydney Harbour, its built icons and surrounding heritage and special character areas***	• The proposal will have no impact on the setting of Sydney Harbour.
• ***Maintaining appropriate daylight access to public places***	• The proposal has been designed to provide appropriate daylight access to proposed streets and links in the precinct. Sky view factor testing has been undertaken to ensure that key new places, in particular streets and laneways within the Precinct (Central Avenue, Devonshire Square and North-South Laneway) receive a level of daylight access that is equivalent or exceeds the typical level of daylight experienced on the streets and laneways of Central Sydney.
• ***Managing wind impacts in public places***	• The proposal has been the subject of an extensive and iterative wind analysis process that has incorporated Computation Fluid Dynamics analysis as well as wind tunnel testing. This testing has been key to informing the built form scale and massing, in order to mitigate wind impacts and maximise pedestrian amenity.

The Central Sydney Planning Strategy is another important reference point for determining whether the proposed massing is appropriate for the Precinct. It states:

'The predominant typology of Central Sydney's built form is a consistent street wall, with tall buildings and towers set back above the street wall. This configuration manages impacts on the amenity of the public domain and surrounding development. Elements will perform in the following ways:

- ***a tower** that is set back from its site boundaries and sits on a building podium creates a space around it that provides light and air into the street*
- ***a building podium** maintains definition of the street at a reasonable scale while managing the climatic effects of tall buildings including downdrafts, wind funnelling, reducing daylight and overshadowing*
- ***street walls** establish areas of special character throughout Central Sydney as a result of variations in their scale and articulation*

- ***heritage items*** *create space between towers that allow more sunlight, daylight and air to reach the street.*

Issues of scale, daylight, wind and character arising from tall buildings can be managed by controlling Street frontage heights, Setbacks, Building separations, Maximum tower area and dimensions.'

The CSPS also sets out a series of 'Objectives' that relate to:

1. *general Built Form*
2. *street Frontage Height and Setbacks*
3. *side and rear setbacks, separation and outlook.*

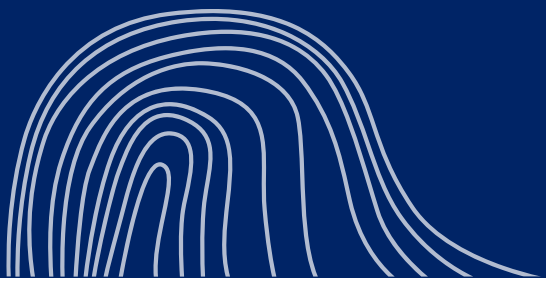
These objectives set the overarching expectation for what the CSPS is seeking to achieve in terms of a built form outcome for Central Sydney. An analysis of the proposal against these objectives is provided below.

Table 2 – Assessment of Central Precinct proposal against the relevant CSPS built form objectives

CSPS Objectives	Central Precinct Response
General built form objectives	
• ***To maintain daylight and sunlight in streets, lanes and public places.***	• The proposal has been designed to maintain daylight and sunlight access to streets, lanes and public places.
• ***To manage the wind impacts of development on streets, lanes and public places so that they are safe and comfortable for people.***	• The proposal has been subject to an iterative wind testing process to ensure that the design effectively manages and mitigates wind impacts of the development.
• ***To allow air movement to disperse pollution and to cool streets, lanes and public places.***	• Tower forms are still separated sufficiently to allow air movement through the precinct that will help with dispersing pollution and colling of the streets, lanes and public places on hot days.
• ***To ensure that occupants of tall buildings have access to daylight and outlook by providing good separation from site boundaries (and surrounding buildings as a result).***	• Towers are sufficiently separated to enable occupants of building to have adequate access to daylight and outlooks.
• ***To ensure small sites that are unable to provide setbacks do not develop as towers.***	• Not applicable.
• ***To establish street wall heights in Central Sydney appropriate to context and location***	• The proposal will deliver a uniform street wall height across the Precinct.
• ***To ensure that tall buildings are designed to be seen from all sides.***	• The proposal has been designed to enable tall buildings to be seen "in the round".
• ***To promote streets and laneways as important public places.***	• A network of streets and laneways are provided across the Precinct, these will be designed and

	highlighted as important public places that are key to pedestrian movement and amenity.
• ***To ensure adequate setbacks, separations and articulation are provided to maintain a layered edge of towers on the perimeter of Central Sydney.***	• The proposal provides setbacks and separation that allow for a stepped approach to built form along the eastern edge of the Precinct. • The proposal will allow for future articulation of built form through massing variations and building materiality that will help further break up the visual massing of the Precinct when viewed from the east, which aligns with representing a layered edge of towers on the perimeter of Central Sydney.
Street frontage height and street setback objectives	
• ***To define streets in Central Sydney with consistent building edges at the street frontage to an appropriate height that provides a comfortable scale, interesting character, and environmental safety for pedestrians.***	• The proposal incorporates defined street walls throughout the Precinct and along Regent Street, Prince Alfred Park and Goulburn Street where the future built form interfaces with existing streets and public domain. The scale of the street walls range between 18m along Prince Alfred Park, up to 37m within the OSD, and will be aimed at ensuring a comfortable scale for pedestrians.
• ***To recognise the variety and patterns of street wall heights throughout Central Sydney.***	• The proposal incorporates a variety of street wall heights across the Precinct.
• ***To link street frontage heights to building height.***	• Street frontage heights differ across the Precinct and are closely related to building height.
• ***To ensure that buildings address and define laneways consistent with their special character.***	• The north-south lane is to be defined using the low-rise built form as well as the podiums of the tower blocks. Together, this built form will help create a more intimate character to this pedestrian space when compared with other public spaces within the Precinct.
• ***To provide setbacks above the street frontage to promote good primary separation between towers across streets, and maintain daylight, views to the sky and a sense of openness in the street.***	• The proposal incorporates upper-level tower setbacks that appropriately respond to their setting along Central Avenue or along laneways. • The proposal delivers tower separation distances of 43m from the Western Gateway buildings, 30m along Devonshire Link, 22m along Prince Alfred Park Link and a compliant minimum of 8m separation distance between towers within the Precinct. In most instances tower separation for the proposal exceeds the minimum separation distance required under the CSPS.
• ***To promote visually interesting street wall facades.***	• The proposal incorporates a podium and tower response to built form, as well as a low rise fine grain response to Central Avenue. The Design Guide also requires the provision of a varied street wall height along Central Avenue, and in doing so will promote a more fine grain and visually interesting design solution for the street wall façades of future buildings.

• ***To protect long, low views of open sky and landmark features.***	• The proposed site layout of the built form has been specifically designed to retain and enable views to the Central Clocktower, and to provide east-west views across the Precinct.
Side and rear setbacks, separation and outlook	
• ***To ensure tower forms are appropriately set back from side and rear boundaries to:*** – ***allow sufficient light and air into the stree*** – ***provide outlook to building occupants*** – ***provide definition to building podiums*** – ***ensures that tower forms appear "in the round".***	• The proposed towers within the Precinct are bounded by new streets, laneways and lower rise building that enable tower separation distances of: – 43m from the Western Gateway buildings – 30m along Devonshire Link – 22m along Prince Alfred Park Link – 18m between tower A1 and tower A2 – a minimum 8m between towers within the rest of the Precinct. In all instances tower separation within the same block (or site) exceed the minimum 8m separation distance required under the CSPS.
• ***To ensure self-sufficiency of towers so that they have enough space around them to provide for light, air and outlook entirely within the site area.***	The result of the proposed tower separation distances is a massing and built form solution that: – allows sufficient light and air into the ground level public domain – enables individual towers to appear as individual built form elements that create layered and tiered visual appearance when viewed from a distance – avoids the appearance of a contiguous wall of towers, particularly once each building is designed to have its own individual materiality, appearance and character.
• ***To avoid the appearance of a contiguous "wall of towers", where groups of tall buildings appear as one solid mass.***	
• ***To promote separate building forms that create a layered visual effect when viewed from a distance.***	



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