



**CITY OF
PARRAMATTA**

Overshadowing in the Parramatta CBD

Technical Paper Supplement

7 April 2021



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Version	Date	Remarks	Doc Ref
1	06 June 2019	Original Paper	D06845248
2	11 November 2019	Revised for additional testing of detailed block forms and height revisions	D07109087
3	12 August 2020	Revised for additional testing of solar access to Parramatta Square (Exhibited Version)	D07582610
3A	7 April 2021 (this supplement)	Supplementary Paper to Version 3, above, documenting additional testing undertaken in response to submissions lodged to the public exhibition	D07991569

1. Executive Summary

This Supplement to the Overshadowing in the Parramatta CBD Technical Paper sets out the findings of additional analysis undertaken in response to submissions lodged to the public exhibition of the Parramatta CBD Planning Proposal. This Supplement focuses solely on an assessment of overshadowing impacts from major landholder and consultant submissions; and does not consider other matters pertinent to the submissions – such as urban design or built form, heritage, flooding, etc.

Readers are to refer to the original Technical Paper at Appendix 10A of the publicly exhibited Parramatta CBD Planning Proposal, which, at the time of writing, is available on Council's website. The original Technical Paper details the assumptions on the overshadowing model; as well as the evolution of the modelling that informed the exhibited controls.

The public exhibition for the Parramatta CBD Planning Proposal ran from 21 September to 2 November 2020.

- Twenty (20) submissions are considered in this Supplement where changes to the height controls were requested.
- Five (5) of these submissions related to properties that were entirely outside the Parramatta CBD Planning Proposal boundary as exhibited. As there was no height control exhibited for these properties there was no benchmark for comparison. Despite this, the heights requested were tested and considered for impacts to nominated open space areas and heritage conservation areas consistent with the original body of work. This was to ensure that the outcomes being sought by the submitters were considered fully and consistently with sites located within the CBD Planning Proposal boundary. Notwithstanding the results of the testing undertaken for overshadowing impacts, any submission from a site located outside the CBD Planning Proposal boundary as exhibited could not be supported as the CBD Planning Proposal does not apply to the land.
- Height testing applied limitations imposed by prescribed airspace – mainly the Radar Terrain Clearance Chart (RTCC) for Sydney Airport. Where a submitter sought a height greater than the prescribed RTCC height, the RTCC height was tested for the site as development cannot exceed or penetrate the RTCC surfaces.
- Benchmarks for impacts to open space areas and heritage conservation areas were adopted as per the original body of work, namely:
 - Nominated open space areas must achieve sunlight access to no less than 50% of the open space's area for 4 hours or more (non-contiguous) between 9am and 3pm on 21 June; and
 - A land parcel within a heritage conservation area must achieve sunlight access to the entire parcel for 2 hours or more (non-contiguous) between 9am and 3pm on 21 June.
- Testing was based on extruded 3D volumes applying to the entire site to which the submissions related. This is considered the most appropriate form of testing as any height controls apply to the entire site, unless mapped otherwise, to assess fully the potential impacts of overshadowing. Provision of concept designs may assist for more detailed testing and refinement of the initial results; but a concept design is exactly that, a *conceptual visualisation* of a *potential* built form which may be subject to change at or beyond the final DA stage.

Submissions were also considered in relation to the magnitude of the change requested compared to the exhibited controls. For the purposes of this supplement, where the height requested exceeded the

exhibited controls by more than 10%, the magnitude of the change was deemed to be substantial. Endorsing substantive changes to the CBD Planning Proposal would, consequently, necessitate re-exhibition of the planning proposal to enable the community to review and lodge further submissions on the changes. This, in turn, would delay the finalisation of the planning proposal.

Of the submissions received and considered solely in respect of cumulative overshadowing impacts in this supplement:

- One (1) was recommended for support.
- Eleven (11) were recommended for conditional support.
- Three (3) were recommended for not supporting because of significant cumulative overshadowing impacts.
- Five (5) were recommended for not supporting because the submission related to land outside the CBD Planning Proposal Boundary as exhibited.

It is to be understood that a recommendation for support or conditional support **because of overshadowing impacts** considered in this Supplement **does not indicate endorsement or support of the submission in its entirety** as other issues, such as urban design, heritage impacts, flooding, etc. are not considered as part of the analysis in this Supplement.

2. Height Controls as Exhibited

The Parramatta CBD Planning Proposal exhibited two height maps – the “base” Height of Buildings Map and the Incentive Height of Buildings Map.

The “base” Height of Buildings Map (Figure 1) generally reflects current planning controls contained in *Parramatta Local Environmental Plan 2011*. The exception to this applied for land zoned B3 Commercial Core being assigned by default a maximum building height of 211m(RL), or 243m(RL) including incentives for Design Excellence unless the land was located under a Sun Access Protection Surface. Land affected by a Sun Access Protection Surface is shown on this map uncoloured and edged in orange with the annotation “Area 2”, which calls up Clause 7.4 of the LEP.

The Incentive Height of Buildings Map (Figure 2) provides additional height, subject to providing community infrastructure. Draft Clause 7.6H is the primary enabling clause that applies height controls from the Incentive Height of Buildings Map. Other clauses, such as Clause 7.6C, also reference the Incentive Height of Buildings Map for certain development types. Land subject to the Sun Access Protection Surfaces is shown on this map uncoloured and edged in orange with the annotation “Area 1”.

Where land is shown uncoloured on the Incentive Height of Buildings Map *and* is not subject to the Sun Access Protection surfaces, the land is not subject to an Incentive Height of Buildings control; and the controls on the “base” Height of Buildings Map apply.

Additionally, the “base” Height of Buildings Map reflected current controls as of August 2020. Changes to this map have occurred with the notification of finalised site-specific planning proposals in the CBD since that date. The maps will be reconciled against these changes before finalisation of the CBD Planning Proposal to ensure the amendments from finalised site-specific planning proposals are not undone.

Parramatta CBD Planning Proposal — Height of Buildings Map (HOB)

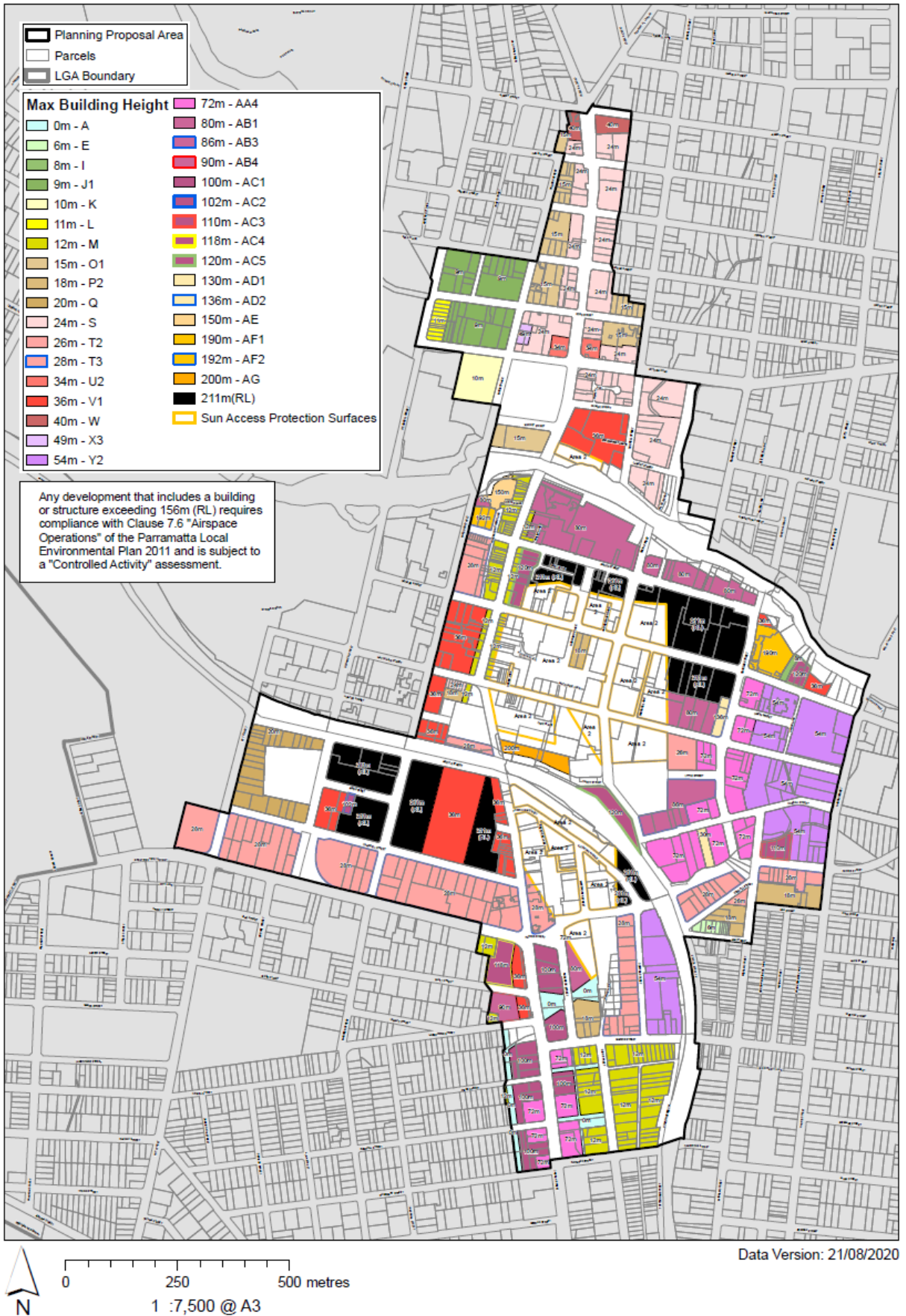


Figure 1 - "Base" Height of Buildings Map (as exhibited)

Parramatta CBD Planning Proposal — Incentive Height of Buildings Map (IHB)

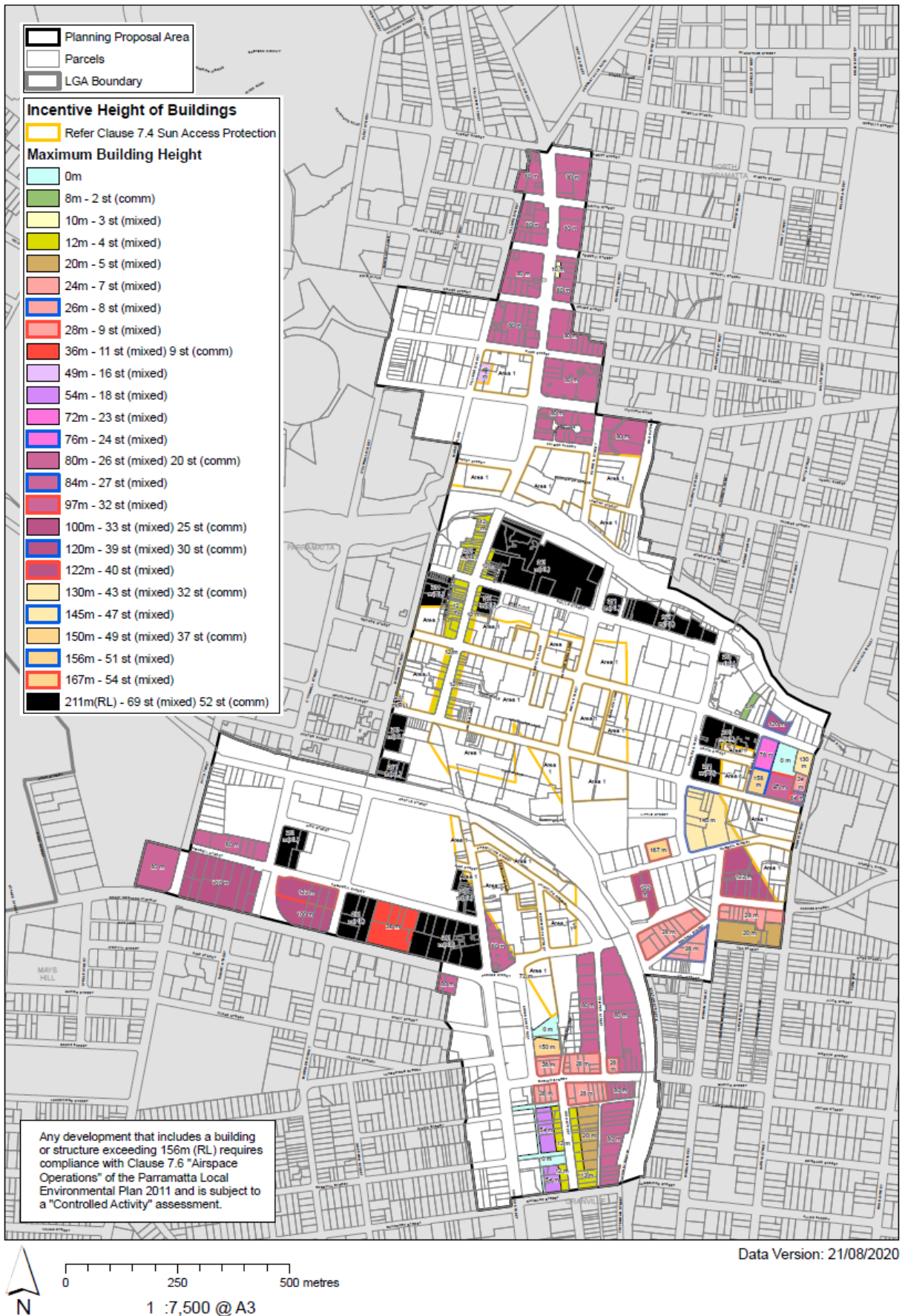


Figure 2 - Incentive Height of Buildings Map (as exhibited)

3. Submissions Received

3.1. Submissions received and tested in the 3D model

Fourteen (14) submissions, covering 17 sites, were identified for overshadowing testing based on likely impacts to the four heritage conservation areas and ten open space areas that were subject to testing in the original technical paper. The location of the tested sites in relation to the heritage conservation areas and open space areas as well as the heights tested is shown in Figure 3 and set out in Table 1, below. Where relevant the heights tested applied an additional 15% to the height requested by the submitter to take account of incentives that could be awarded under the Design Excellence controls. This, in turn, reflects the maximum possible height for a development site.

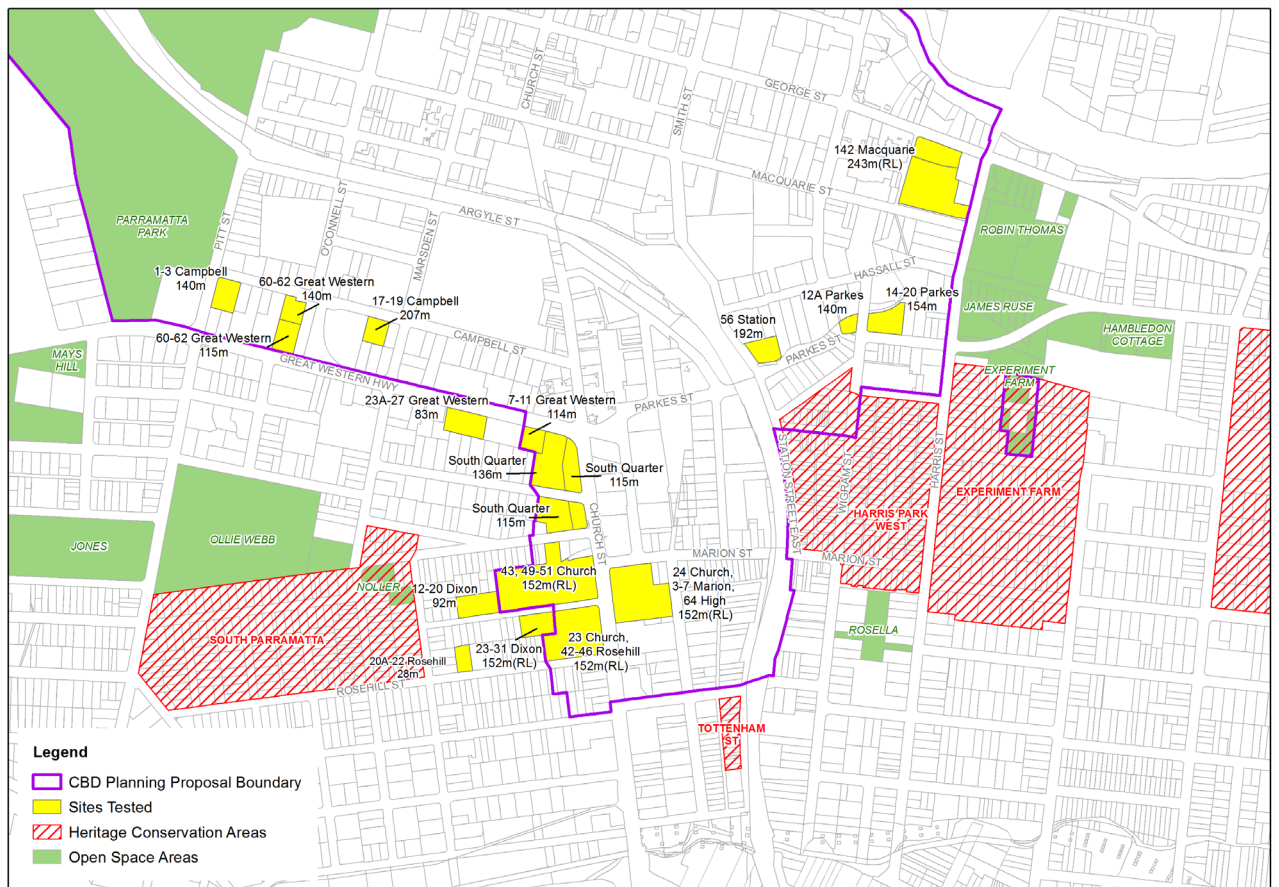


Figure 3 - Sites tested for overshadowing

Table 1 - Sites tested for overshadowing

Site Tested	Heights as Exhibited (Note 1)	Height Requested (exc. Design Excellence)	Height Tested (inc. Design Excellence)
1-3 Campbell St	100m (IHB)	122m	140m
60-62 Great Western Hwy	100m (IHB)	100/122m	115/140m
17-19 Campbell St	122m (IHB)	180m	207m
23A-27 Great Western Hwy (Note 2)	NIL	72m	83m
7-11 Great Western Hwy	80m (IHB)	114m (inc DEx)	114m
63 and 83 Church St (South Quarter)	36/90/118m	100/118m	115/136m
12-20 Dixon St (Note 2)	NIL	80m	92m
23-31 Dixon St (Note 2)	NIL	No Limit	152m(RL) (Note 3)
43, 49-51 Church St (Note 2) 23 Church St, 42-46 Rosehill St 24 Church St, 3-7 Marion St, 64 High St	0/100m/NIL 0/72/100m 0/12/72/100m	180m	152m(RL) (Note 3)
20A-22 Rosehill St (Note 2)	NIL	24m	28m
56 Station St East	72m	122m (exc DEx) /192m (inc DEx)	192m
12A Parkes St	72m	122m	140m
14-20 Parkes St	122m (IHB)	134m	154m
142 Macquarie St	0/76/97/156m	211m(RL)	243m(RL)

Note 1: The exhibited heights in this column are based on:

- The “base” Height of Buildings Map; or
- The Incentive Height of Buildings Map where the incentive height is greater than the base. This is annotated with (IHB) in the column; or
- “NIL” where no “base” Height of Buildings control applies to the land as it is outside the CBD Planning Proposal boundary at the time of exhibition.

Note 2: These sites, or parts thereof in the case of 43 Church St, are outside the CBD Planning Proposal Boundary as exhibited. Despite this, the heights requested in the submissions for these sites were tested for impacts to conservation areas and open space areas to ensure the matters raised in the submission were considered fully.

Note 3: Where a submission requested a height greater than prescribed airspace limits for airports, testing used the maximum heights for the prescribed airspace in lieu of the requested height. For example, the Rhaeto submission for the sites at 43, 49-51 Church St; 23 Church St, 42-46 Rosehill St; and 24 Church St, 3-7 Marion St, and 64 High St requested a height of 180m. The Radar Terrain Clearance Chart for Sydney Airport limits heights for development for land in that area to 152m(RL), as shown in the excerpt from the map in Figure 4. A full version of the map can be viewed and downloaded at the Sydney Airport website.

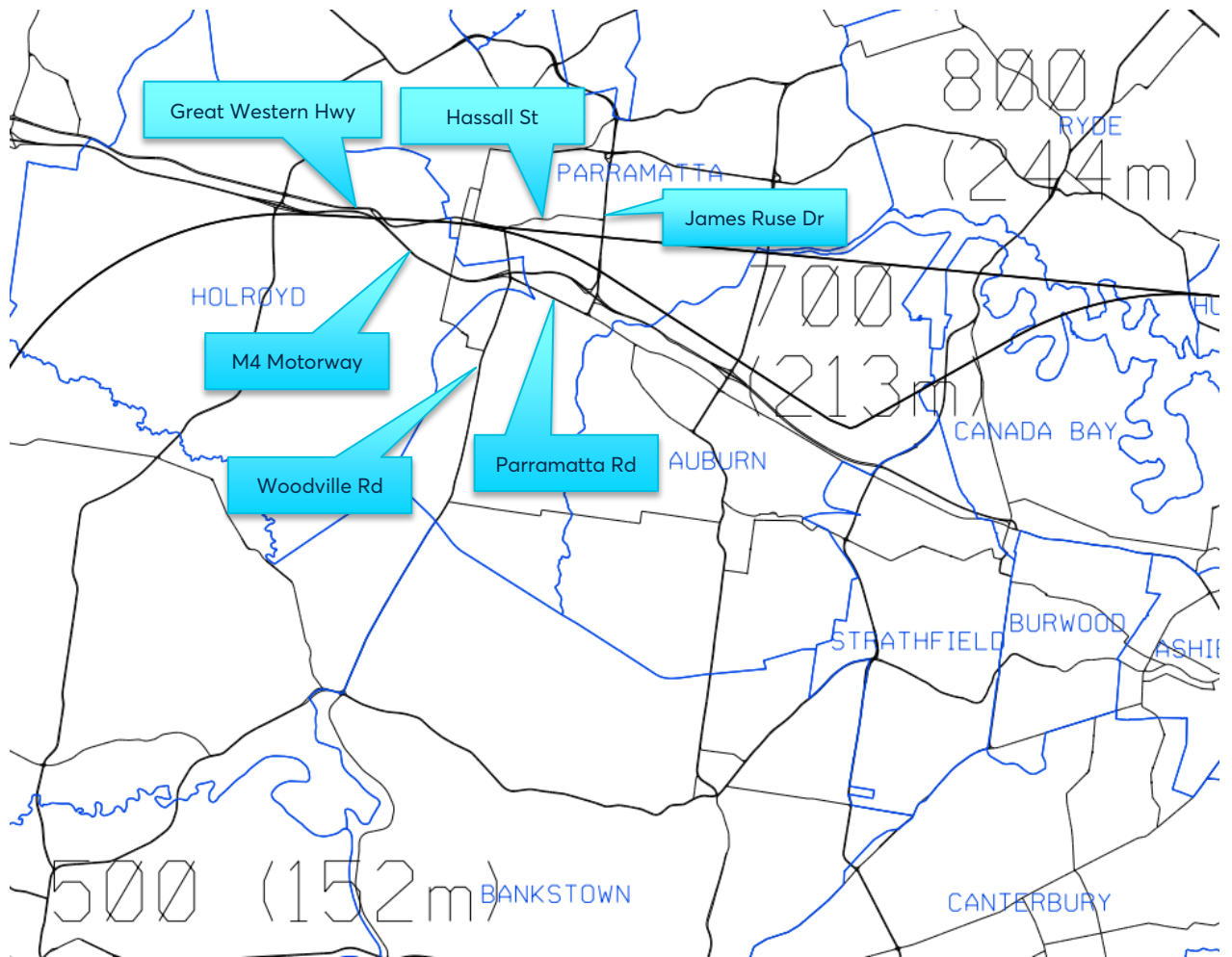


Figure 4 - Extract from the Radar Terrain Clearance Chart (RTCC) for Sydney Airport - Prescribed Airspace declared on 20 March 2015.

3.2. Submissions received and not tested in the 3D model

A further six (6) submissions also sought changes to height controls. These were not subject to detailed testing in the 3D model as their location did not impact the four heritage conservation areas and ten open space areas. The details of those requests are set out in Table 2, below. Consideration of these submissions is provided at Section 6.5.

Table 2 - Sites not modelled for overshadowing

Site Tested	Heights as Exhibited (Note 1)	Height Requested (exc. Design Excellence)
179-181 Church St	28m	36m/120m
27-31 Marion St	28m (IHB)	80m
1-25 Argyle St, 6-12 Pitt St	20m (IHB)	80m
27 Elizabeth St (Note 2)	NIL	157m
14-18 Pitt St	20m	26m
83 Macquarie St	12m	24m

Note 1: The exhibited heights in this column are based on:

- The “base” Height of Buildings Map; or
- The Incentive Height of Buildings Map where the incentive height is greater than the base. This is annotated with (IHB) in the column; or
- “NIL” where no “base” Height of Buildings control applies to the land as it is outside the CBD Planning Proposal boundary at the time of exhibition.

Note 2: This site is outside the CBD Planning Proposal Boundary as exhibited.

3.3. Results of cumulative additional overshadowing testing

Using the tested heights from Table 1, a further iteration of overshadowing testing was undertaken. For the purposes of this additional analysis, extruded 3D volumes were used based on the full extent of the site to which the submission related. The main reason for this approach was to ensure consistency with the original work, which adopted extrusion-based analysis before detailed testing based on actual or conceptual built forms was undertaken for certain areas in the CBD.

The inherent advantage of extrusion-based testing is that the results are not predicated on an assumed concept design – which may or may not be the final design when development consent is issued. The extrusion method applies the modelled height to the entire site, consistent with the planning controls on the Height of Buildings or Incentive Height of Buildings maps as well as the first three iterations of the overshadowing work – see Section 8.1, Table 20 of the exhibited Technical Paper. It is noted that some submitters indicated a concept design for their site, while others did not. Consequently, the extrusion-based approach of the additional height requested by submitters was therefore applied to all sites in the testing to ensure consistent consideration of the submissions and the cumulative impacts to the heritage conservation areas and open space areas.

The amount of additional overshadowing from the tested sites, expressed as a proportion of the total overshadowing extent for the entire CBD, is comparatively minor — ranging between a low of 0.43% at 9am and a high of 3.36% at 2pm. This is shown for each tested period between 9am and 3pm in Table 3, below. Maps showing the extent of additional overshadowing are provided at Appendix 2.

Table 3 – Amount of additional overshadowing compared to the total area of shadow across the CBD

Time of day 21 June	Area of overshadowing as exhibited (sqm)	Amount of additional overshadowing (sqm)	Percentage change
9am	2,173,175	9,330	+0.43%
9:30am	2,006,147	9,909	+0.49%
10am	1,870,848	10,345	+0.55%
10:30am	1,750,989	10,700	+0.61%
11am	1,628,628	9,416	+0.58%
11:30am	1,611,077	11,099	+0.69%
12 noon	1,597,173	27,911	+1.75%
12:30pm	1,609,482	38,994	+2.42%
1pm	1,651,328	45,571	+2.76%
1:30pm	1,703,825	55,671	+3.27%
2pm	1,790,327	60,169	+3.36%
2:30pm	1,913,780	60,677	+3.17%
3pm	2,099,915	70,305	+3.35%

Based on these results, the larger amounts of additional overshadowing occur in the afternoon, impacting parts of the Tottenham Street, Harris Park West and Experiment Farm Heritage Conservation Areas; as well as open space at Robin Thomas, James Ruse, Experiment Farm and Hambledon Cottage reserves. The implications of these results are discussed as they apply to the Heritage Conservation Areas and open space areas in Sections 4 and 5 of this Supplement.

4. Impacts to Heritage Conservation Areas

Based on the extrusion modelling of additional heights requested in Table 1, the impacts to the four heritage conservation areas were tested again. The benchmark of a land parcel not being overshadowed for at least two hours (non-contiguous) between 9am and 3pm on 21 June was adopted for consistency with the previous testing.

All the conservation areas experienced additional overshadowing compared to the exhibited controls. Consistent with the aggregate results from Table 3, the additional impacts of overshadowing to the conservation areas predominantly occurred in the afternoon. This is set out in Table 4, below.

Table 4 – Heritage Conservation Areas experiencing additional overshadowing from heights requested in submissions compared to the exhibited controls

Time of day 21 June	South Parramatta	Tottenham St	Harris Park West	Experiment Farm
9am	Yes		Yes	
9:30am			Yes	
10am			Yes	
10:30am			Yes	
11am			Yes	
11:30am			Yes	
12 noon	Yes		Yes	Yes
12:30pm			Yes	Yes
1pm			Yes	Yes
1:30pm		Yes	Yes	Yes
2pm		Yes	Yes	Yes
2:30pm		Yes	Yes	Yes
3pm			Yes	Yes

Despite the additional overshadowing to the conservation areas from the additional heights requested by submitters, the South Parramatta and Experiment Farm Heritage Conservation Areas did not increase the number of land parcels failing the two-hour benchmark as the additional overshadowing still enabled the same number of land parcels in these areas to achieve at least two hours of sunlight access between 9am and 3pm when compared with the proposed exhibited controls. Tottenham St had one additional land parcel that failed the benchmark; while Harris Park West had four additional land parcels that failed the benchmark. This is summarised in Table 5, below, and is illustrated by maps in Appendix 3.

Table 5 - Changes in overshadowing in Heritage Conservation Areas - number of land parcels failing or achieving the minimum two hour benchmark

Heritage Conservation Area	Total No of Parcels	No of parcels below 2 hours sunlight access (as exhibited)	No of parcels getting more than 2 hours sunlight access (as exhibited)	No of parcels below 2 hours sunlight access (revised March 2021)	No of parcels getting more than 2 hours sunlight access (revised March 2021)	Change
South Parramatta	166	4 (2.4%)	162 (97.6%)	4 (2.4%)	162 (97.6%)	NIL
Tottenham St	14	2 (14.3%)	12 (85.7%)	3 (21.4%)	11 (78.6%)	+1
Harris Park West	184	47 (25.5%)	137 (74.5%)	51 (27.7%)	133 (72.3%)	+4
Experiment Farm	121	0	121 (100%)	0	121 (100%)	NIL

When considering whether the additional overshadowing from the additional heights requested constitutes a significant cumulative impact to the conservation area in its entirety, the total number of land parcels within a conservation area failing the established benchmark of two-hours of sunlight access between 9am and 3pm on 21 June must not be increased by more than 10%. This means, for example, that of the 166 parcels in the South Parramatta Conservation Area no more than 16.6 additional land parcels can fail the two-hour benchmark for this test to fail. The threshold is truncated to the whole parcel, i.e. 16.6 additional parcels to strictly meet the 10% threshold of 166 parcels for the South Parramatta Conservation Area is truncated to 16. It is to be noted that the size, geometry and number of parcels within the conservation area has a substantial role in determining the number of additional parcels needed for the test to fail. A small conservation area – such as Tottenham Street with 14 parcels – can fail the test more readily than the other larger conservation areas. The results of the impact benchmarking are set out in Table 6, below.

Table 6 – Impact test benchmarking – number of additional land parcels within a conservation area to be overshadowed to constitute a significant impact

Heritage Conservation Area	Total No of Parcels	No of additional parcels to be overshadowed to meet the 10% threshold	No of parcels below 2 hours sunlight access (as exhibited)	No of parcels below 2 hours sunlight access (revised March 2021)	No of additional parcels failing the 2-hour benchmark	Test Pass or Fail
South Parramatta	166	16	4 (2.4%)	4 (2.4%)	NIL	Pass
Tottenham St	14	1	2 (14.3%)	3 (21.4%)	+1	Fail
Harris Park West	184	18	47 (25.5%)	51 (27.7%)	+4	Pass
Experiment Farm	121	12	0	0	NIL	Pass

Additional overshadowing to the South Parramatta HCA is attributable to the additional height requested at 19 Campbell Street. This partly affects two parcels at 9am and four at 12 noon. Otherwise, there is no additional impact to the South Parramatta HCA across the remainder of the day.

The additional overshadowing to the Tottenham St HCA is predominantly attributable to the additional height requested for the site at 24 Church Street, 3-7 Marion Street, and 64 High Street. As this site is located north-northwest of the Tottenham Street HCA, the additional overshadowing for the tested periods of 1:30pm, 2pm and 2:30pm from this site result in additional overshadowing to the conservation area.

The additional overshadowing to the Harris Park West conservation area is predominantly attributable to the additional heights requested at 56 Station Street East, 12A Parkes Street and 14-20 Parkes Street. With both 12A Parkes Street and 14-20 Parkes Street located directly to the north of the conservation area, the impacts from the additional heights requested for both of these sites results in successive overshadowing to the conservation area across the entire day – where a parcel that may be overshadowed by 14-20 Parkes Street is subsequently overshadowed by 12A Parkes Street in quick succession. The impact of the successive overshadowing from 14-20 Parkes Street followed quickly by 12A Parkes Street resulted in the four additional parcels in the Harris Park West conservation area falling below the two-hour benchmark. Overshadowing from 56 Station Street East begins to have an impact from 12:30pm and continues for the remainder of the afternoon.

Additional overshadowing to the Experiment Farm conservation area begins at 12 noon from the 142 Macquarie Street site. Additional overshadowing from 14-20 Parkes Street begins to have an impact from 1:30pm; and 12A Parkes Street has an impact from 2:30pm. 56 Station Street East only begins to have an impact at 3pm.

The extent and impact of the overshadowing to the conservation areas in relation to the remarks above is illustrated by the maps in Appendices 2 and 3. The consideration of these impacts in respect of the submissions received will be discussed further in Section 6 of this Supplement.

5. Impacts to open space areas

Using the tested heights from Table 1, a further iteration of overshadowing testing was undertaken. For the purposes of this analysis, extruded 3D volumes were used based on the full extent of the site to which the submission related. The main reason for this approach was to ensure consistency with the original work, which adopted extrusion-based analysis before detailed built form testing was undertaken for certain areas in the CBD. The benchmark of an open space area achieving at least four hours of sunlight access to at least 50% of the open space area in the overall testing period between 9am and 3pm on 21 June was also applied, consistent with previous testing.

Not all the nominated open space areas received additional overshadowing arising from the additional heights requested. The impact of additional overshadowing to the open space areas is summarised in Table 7, where the highest percentage change in any testing period set out in Table 8 resulted in the open space's allocation to each category below. The total proportion of overshadowing for the open space area is then set out in Table 9. Maps illustrating the impact of additional overshadowing to open space areas can be seen in Appendix 2.

Table 7 – Summary of additional overshadowing to open space areas from additional heights requested by submissions

Type of additional impact	Open Space Areas affected
None	Parramatta Park Noller Park Mays Hill Reserve Rosella Park Jones Park
Negligible – no more than 5% additional overshadowing in any tested period between 9am and 3pm	Ollie Webb Reserve
Minor – no more than 10% additional overshadowing in any tested period between 9am and 3pm	Robin Thomas Reserve
Moderate – no more than 20% additional overshadowing in any tested period between 9am and 3pm	Hambledon Cottage Reserve
Significant – no more than 30% additional overshadowing in any tested period between 9am and 3pm	None
Major – more than 30% additional overshadowing in any tested period between 9am and 3pm	James Ruse Reserve Experiment Farm Reserve

Table 8 - Change in the proportion of open space area overshadowed at each testing period as a percentage (percentages have been rounded to the nearest whole percentage value)

Extent of Change (delta) (v8-v7)	9am	9:30am	10am	10:30am	11am	11:30am	12 noon	12:30pm	1pm	1:30pm	2pm	2:30pm	3pm
Noller Park													
Ollie Webb Reserve	+3	+5	+4	+4									
Parramatta Park													
Mays Hill Reserve													
Jones Park													
Robin Thomas Reserve								+1	+5	+6	+2		
James Ruse Reserve							+10	+31	+34	+24	+7		
Experiment Farm Reserve							+2	+10	+54	+49	+12	+4	
Hambledon Cottage Reserve									+2	+12	+12	+8	+1
Rosella Park													

Table 9 - Proportion of the open space area overshadowed at each testing period expressed as a percentage (percentages have been rounded to the nearest whole percentage value)

Parks - Revised Controls (v8)	9am	9:30am	10am	10:30am	11am	11:30am	12 noon	12:30pm	1pm	1:30pm	2pm	2:30pm	3pm
Noller Park	100	100	81	21	38	28	0	0	0	0	0	0	0
Ollie Webb Reserve	100	83	45	21	3	0	0	0	0	0	0	0	0
Parramatta Park	1	0	0	0	0	0	0	0	0	0	0	0	0
Mays Hill Reserve	23	2	0	0	0	0	0	0	0	0	0	0	0
Jones Park	18	0	0	0	0	0	0	0	0	0	0	0	0
Robin Thomas Reserve	0	0	0	0	0	0	5	15	27	41	56	72	95
James Ruse Reserve	0	0	0	0	0	1	31	62	91	98	100	100	100
Experiment Farm Reserve	0	0	0	0	0	0	2	10	57	71	67	95	100
Hambledon Cottage Reserve	0	0	0	0	0	0	0	0	2	21	37	60	89
Rosella Park	0	0	0	0	0	0	0	0	0	0	1	33	27

Note 1: Cells filled in light red indicate where more than 50% of the land area of the open space is overshadowed during the testing period. Cells filled in green have less than 50% of the open space area overshadowed. Cells filled in dark red with white text indicate a testing period where more than 50% of the open space area is overshadowed (i.e. fails the benchmark) as a result of increased heights requested.

Note 2: Numbers displayed in **bold italic** type indicate a change to the proportion of the open space area overshadowed resulting from increased heights requested.

Additional overshadowing to Ollie Webb Reserve is attributable to additional height requested by the submission for 17-19 Campbell Street between 9am and 11am. The additional impact is considered negligible with not more than 5% additional overshadowing occurring to Ollie Webb between 9am and 11am. There is no additional impact after 11am.

Additional overshadowing to Robin Thomas Reserve, James Ruse Reserve, Experiment Farm Reserve and Hambledon Cottage Reserve is primarily attributable to additional height requested by the submission for 142 Macquarie Street. The submitter sought the increased height of 211m(RL) (tested at 243m(RL) to include an assumed 15% bonus design excellence) across the entire site which resulted in major additional overshadowing to both James Ruse and Experiment Farm Reserves as well as moderate additional overshadowing to Hambledon Cottage Reserve. Additional overshadowing to Robin Thomas Reserve was minor and filled in an inter-building gap.

The implications for additional overshadowing to James Ruse Reserve and Experiment Farm Reserve from 142 Macquarie Street also resulted in a reduction of 30 minutes of sunlight access to at least 50% of James Ruse Reserve – falling from 3.5 hours to 3 hours (i.e. passing the benchmark between 9am and 12 noon, but failing from 12:30pm onwards). Experiment Farm Reserve had a reduction of 60 minutes of sunlight access to at least 50% of the reserve's land area – decreasing from 5 hours to 4 hours – and just meeting the 4-hour benchmark threshold for sunlight access (i.e. passing the benchmark between 9am and 12:30pm, but failing the benchmark from 1pm onwards).

The test of an impact of significance – i.e. a moderate, significant or major impact, as set out in Table 7 - is met where the *cumulative additional* overshadowing to an open space area exceeds 10% in any single testing period. While the impact of additional height from an individual submission request may, of itself, be less than 10%, the testing is considering the *cumulative impacts* of overshadowing from all requests. This cumulative impact testing is consistent with Gateway Conditions 1(j)(ii) and 1(j)(iii) and previous work from the original overshadowing Technical Paper. Application of this impact test to submissions is set out in Section 6 of this Supplement.

6. Consideration of submissions

This section sets out the consideration of the overshadowing matters raised in submissions identified in Table 1 and Table 2. It must be noted that overshadowing impacts is but one matter of consideration while other matters are considered separately. The comprehensive consideration of the submission, including any overshadowing matters, and Council's recommended response is contained in the Community Engagement Report – Appendix D. This section summarises the results of the testing from Sections 3, 4, and 5 and applies the results to consideration of the tested submissions, as set out in Table 10.

6.1. Consideration of submissions subject to 3D modelling

When interpreting the result in the final column, the following assessment criteria were used **to consider overshadowing matters only**. The result is **not to be taken as an endorsement of the submission in its entirety**, as other matters pertaining to urban design, heritage, flooding, etc. which are not addressed in this Supplement have not been considered; and the results from this analysis will be one of several inputs into the final recommendation for Council's response to a submission. A process flow chart for this consideration is set out in Appendix 4. In summary:

- If the submission had an impact to Heritage Conservation Areas *and* Open Space Areas deemed to be minor *and* requested a variation in height of up to 10% of exhibited controls, the submission was given support on the basis of overshadowing impacts, and the increase was considered to be minor so it could be accommodated as a post-exhibition amendment.
- If the submission had an impact to Heritage Conservation Areas *and* Open Space Areas deemed to be minor *and* requested a variation in height of more than 10% of exhibited controls, the submission was given conditional support on the basis of overshadowing impacts, but the increase was considered substantial enough that it could not be accommodated as a post-exhibition amendment.
- If the submission failed either of the two previous criteria or was located outside the CBD Planning Proposal boundary, it was not supported on overshadowing impact grounds or the CBD Planning Proposal does not apply to the land.

Table 10 - Sites tested for overshadowing – results of testing and recommendation on the basis of overshadowing impacts

Site Tested	Impact to Heritage Conservation Areas	Impact to Open Space Areas	Extent of Variation to exhibited controls	Result
1-3 Campbell St	Nil	Nil	up to 22%	Conditional Support
60-62 Great Western Hwy	Nil	Nil	up to 22%	Conditional Support
17-19 Campbell St	Nil	Negligible	up to 48%	Conditional Support
23A-27 Great Western Hwy ‡	Nil	Nil	N/A	Do not Support

Site Tested	Impact to Heritage Conservation Areas	Impact to Open Space Areas	Extent of Variation to exhibited controls	Result
7-11 Great Western Hwy	Nil	Nil	up to 43%	Conditional Support
63 and 83 Church St (South Quarter)	Nil	Nil	up to 177%	Conditional Support
12-20 Dixon St ‡	Nil	Nil	N/A	Do not Support
23-31 Dixon St ‡	Nil	Nil	N/A	Do not Support
43, 49-51 Church St 23 Church St, 42-46 Rosehill St 24 Church St, 3-7 Marion St, 64 High St	<i>See Note 1</i>	Nil	up to 80% up to 150% up to 1400%	Do not Support
20A-22 Rosehill St ‡	Nil	Nil	N/A	Do not Support
56 Station St East	<i>See Note 2</i>	Nil	up to 166%	Conditional Support
12A Parkes St	<i>See Note 2</i>	Nil	up to 69%	Conditional Support
14-20 Parkes St	<i>See Note 2</i>	Negligible	up to 10%	Support
142 Macquarie St	<i>See Note 3</i>	<i>See Note 3</i>	up to 177%	Do not Support

‡ This site is located outside the CBD Planning Proposal Boundary

Note 1: The additional overshadowing from the 24 Church St, 3-7 Marion St, 64 High St site had significant impacts to the Tottenham St Heritage Conservation Area, with between 50% and 100% of the HCA being in additional overshadowing between 1pm and 2:30pm based on testing with a 152m(RL) height, consistent with the Radar Terrain Clearance Chart (RTCC). The other two sites did not impact the Tottenham St HCA during the testing period. The cumulative impact of the additional overshadowing in the afternoon resulted in one additional land parcel in the HCA failing the two-hour benchmark, which was deemed a significant adverse impact per the discussion in Section 4. In addition, the requested height of 180m exceeds prescribed airspace controls for Sydney Airport, which establishes a maximum height of 152m(RL) under the RTCC as shown in Figure 4.

Note 2: The additional overshadowing from 56 Station St East, 12A Parkes St and 14-20 Parkes St, *when evaluated separately*, did not of themselves result in any additional land parcels in the Harris Park West Heritage Conservation Area failing the two-hour benchmark. However, the cumulative impacts of the overshadowing – particularly the overshadowing cast by 12A Parkes St and 14-20 Parkes St in quick succession, followed by 56 Station Street East in the later afternoon contributed to four additional land parcels in the Harris Park West failing the two-hour benchmark. The additional overshadowing of four land parcels, however, constituted less than a 10% increase to overshadowing in the HCA and is considered a less-than-significant impact. Consequently, on the basis of cumulative overshadowing impacts alone, 56 Station Street East and 12A Parkes St were identified for conditional support because the change in height requested is greater than 10% of the exhibited control; while the height change for 14-20 Parkes Street is a 10% variation and may, in principle, be supported as a post-exhibition change.

Note 3: The additional overshadowing from 142 Macquarie Street has minor additional impacts in terms of overshadowing to the Experiment Farm Heritage Conservation Area with overshadowing to some parcels along both sides of Ruse Street, starting between 11:30am and 12 noon and finishing between 2:30pm and 3pm. This additional overshadowing does not result in any land parcels in the HCA falling below the 2-hour minimum threshold for sunlight access and, therefore, considered minor. However, the additional height has major impacts on open space areas at James Ruse Reserve, causing additional overshadowing to that reserve ranging between 7% and 34% in the afternoon. It also causes additional overshadowing to Experiment Farm Reserve ranging between 3% and 54% in the afternoon. The greatest additional impact to these reserves occurs between 12:30pm and 1:30pm testing periods. In addition, the height requested penetrates the Sun Access Protection surface for Experiment Farm, potentially compromising the heritage significance of the Experiment Farm cottage and curtilage. It also represents up to a 177% variation on exhibited controls. Consequently, this request is not supported on impacts for overshadowing grounds alone.

6.2. Variations requested to height controls

Of the submissions received, only one requested a minor increase to the height (i.e. up to 10% variation). All other submissions requested what were deemed significant variations to the exhibited controls – ranging between 22% and 1400%, as set out in Table 10, above. Four of the sites tested were not in the CBD Planning Proposal boundary as exhibited, so there was no basis for comparison with exhibited controls to begin with. Those submissions, despite not having impacts to heritage conservation areas or open space areas, cannot be supported because they are outside the CBD Planning Proposal boundary.

6.3. Impacts to Heritage Conservation Areas

Except as discussed for specific sites in Notes 1 to 3, above, the heights requested by submitters had no additional adverse impact to the four heritage conservation areas. Consequently, most submissions passed the impact test to the heritage conservation areas except for the site at 24 Church St, 3-7 Marion St and 64 High St.

6.4. Impacts to Open Space Areas

Most sites, except for 142 Macquarie St – as discussed in Note 3 – had no or negligible impact in respect of additional overshadowing to open space areas. The additional overshadowing from 17-19 Campbell St created less than 5% additional overshadowing to Ollie Webb Reserve between 9am and 11am, which did not cause the park to exceed overshadowing to 50% of the land area unless it was already overshadowed above that threshold to begin with. For example, at 10am, 17-19 Campbell created an additional 4% of overshadowing to Ollie Webb Reserve; and increasing the proportion of land overshadowed at that testing period from 41% to 45% (see Table 9). This increase did not tip over the 50% threshold, so the additional overshadowing is deemed minor.

Similarly, 14-20 Parkes St created approximately 4% of additional overshadowing to Experiment Farm Reserve at 2:30pm. This is considered negligible additional overshadowing as the reserve was already 91% overshadowed from other sites at 2:30pm, and the additional overshadowing increased that to 95%.

6.5. Consideration of submissions not subject to 3D modelling

A further six submissions were not subject to 3D overshadowing testing as they were considered to not have an adverse impact on the four heritage conservation areas or ten nominated open space areas. These are summarised in Table 11, below, with additional remarks following. Like the submissions considered in Section 6.1 and Table 10, above, the result in Table 11 **is not to be taken as an endorsement of the submission in its entirety**, as other matters pertaining to urban design, heritage, flooding, etc. which are not addressed in this Supplement have not been considered; and the results from this analysis will be one of several inputs into the final recommendation for Council's response to a submission.

Table 11 - Consideration of Submissions that were not subject to 3D modelling

Site Tested	Impact to Heritage Conservation Areas	Impact to Open Space Areas	Extent of Variation to exhibited controls	Result
179-181 Church St	Nil	Nil	+228%	Conditional Support
27-31 Marion St	Nil	Nil	+185%	Conditional Support
1-25 Argyle St, 6-12 Pitt St	Nil	Nil	+300%	Do Not Support
27 Elizabeth St ‡	Nil	Nil	N/A	Do Not Support
14-18 Pitt St	Nil	Nil	+30%	Conditional Support
83 Macquarie St	Nil	Nil	+100%	Conditional Support

‡ This site is located outside the CBD Planning Proposal Boundary

- 179-181 Church St** requested an increase in height from the exhibited 28m to in part 36m and in part 120m. The location of the subject site is to the southwest of the Parramatta Square Protected Area. Consequently, the height requested had no additional adverse impact to Parramatta Square. However, the additional height requested is a substantial variation to the exhibited controls and fails that test. Additionally, the context of the height requested would need to be considered on urban design grounds in relation to the newly established viewshed or "blue sky" corridor extending along Church St between Macquarie St and the river. Consequently, the request has been identified for conditional support in the overshadowing analysis as it creates no adverse impacts on overshadowing grounds but seeks a significant variation to the height control as exhibited.
- 27-31 Marion St** requested an increase in from the exhibited 28m to 80m (92m including design excellence bonus). The location of the site is to the north of the Tottenham St Heritage Conservation area. Heights of 92m were tested for the property in the original Technical Paper before a reduction to that area was undertaken on urban design and heritage grounds – see the Marion St Precinct Plan (Appendix 8 to the exhibited CBD Planning Proposal content). The original testing indicated no adverse impact to the Tottenham St conservation area with a 92m height limit (i.e. 80m plus 15% Design Excellence incentive). However, the additional height requested is a substantial variation to the exhibited controls and fails that test. Additionally, the context of the height requested would need to be considered on urban design grounds in relation to exhibited Marion St Precinct Plan. Consequently, the request has been identified for conditional support in the overshadowing analysis as it creates no adverse impacts on overshadowing grounds but seeks a significant variation to the height control as exhibited.
- 1-25 Argyle St, 6-12 Pitt St** requested an increase from the exhibited 20m to 80m (92m including design excellence bonus). The location of these sites is immediately to the north of St Johns Cemetery, a listed heritage item of State significance. While the height requested will not impact overshadowing to the heritage conservation areas or nominated open space areas, it will cause overshadowing across the entire day to the majority or entirety of the cemetery. The cemetery itself, like most heritage items in the CBD (except for Experiment Farm), does not have specific solar access protection controls applying to the land. The submitter's contention that the overshadowing from the

concept will have no adverse impacts is disputed. When reviewing the submitter's overshadowing diagrams provided in the Heritage Significance report (page 7) and the submission itself (page 12), it is noted that the overshadowing is not reflective of the mid-winter diagrams provided by the submitter's architect at page 23 of the feasibility study. A 92m building height would cast shadow lengths ranging between 268m at 9am to 142m at 12 noon to 278m at 3pm. These shadow lengths would extend over most of the cemetery throughout the day. Consequently, the additional height requested is not supported because of significant overshadowing impacts to the cemetery.

- **27 Elizabeth St** requested a height of 157m. The land is located outside the CBD Planning Proposal boundary as exhibited. Consequently, there are no exhibited controls applying to the site for comparison, despite the location of the site not having adverse impacts to the nominated heritage conservation areas or open space areas. The request is not supported on the basis of its location outside of the CBD PP boundary.
- **14-18 Pitt St** requested an increase from the exhibited 20m to 26m. The land is located to the west of St Johns Cemetery, a listed heritage item of State significance. While the height requested will not impact overshadowing to the heritage conservation areas or nominated open space areas, it will cause overshadowing across the afternoon to the cemetery. The additional impact is considered minor with the computed shadow length increasing from 31m to 40m at 12 noon (an increase of 9m compared to the exhibited controls); and increasing from 60m to 78m at 3pm (an increase of 18m compared to the exhibited controls); and increasing from 60m to 78m at 3pm (an increase of 18m compared to the exhibited controls) on 21 June. However, the requested variation in height is considered more than minor – being an increase of 30% above the exhibited controls. Consequently, the request has been identified for conditional support in the overshadowing analysis as it creates negligible adverse impacts on overshadowing grounds but seeks a significant variation to the height control as exhibited.
- **83 Macquarie St** requested an increase in height from the exhibited 12m to 24m. The land is located to the northwest of the Parramatta Square Protected Area and is located under the Parramatta Square Sun Access Protection Surface. The height requested is lower than the Sun Access Protection surface, so the additional height would not adversely impact overshadowing to the Parramatta Square Protected Area. The additional height, however, is inconsistent with an established 12m height limit applying to the first 12m setback of buildings along Church St. While the request will not have adverse impacts in terms of overshadowing, further consideration needs to be given in respect of established setbacks and urban design impacts to Church St. Additionally, the requested height represents a significant change from the exhibited controls – an increase of 100%. Consequently, the request has been identified for conditional support in the overshadowing analysis as it creates no adverse impacts on overshadowing grounds but seeks a significant variation to the height control as exhibited.

Appendix 1: Overshadowing comparison – as exhibited and submissions received

This appendix shows the extent of overshadowing cast by the increased heights sought by the submissions tested, as shown in Figure 3. The grey area is the modelled overshadowing extent from the technical paper and the blue areas are the modelled shadow extent cast by the heights requested in the submissions.

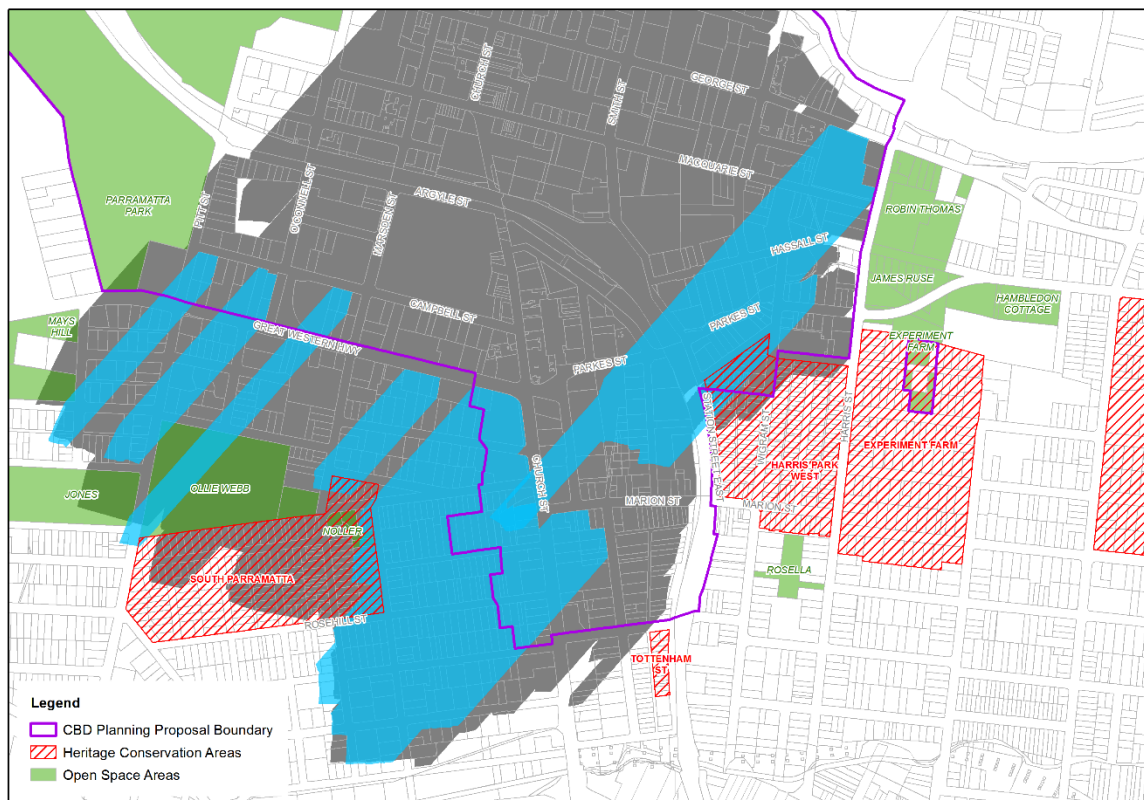


Figure 5 – Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 9am

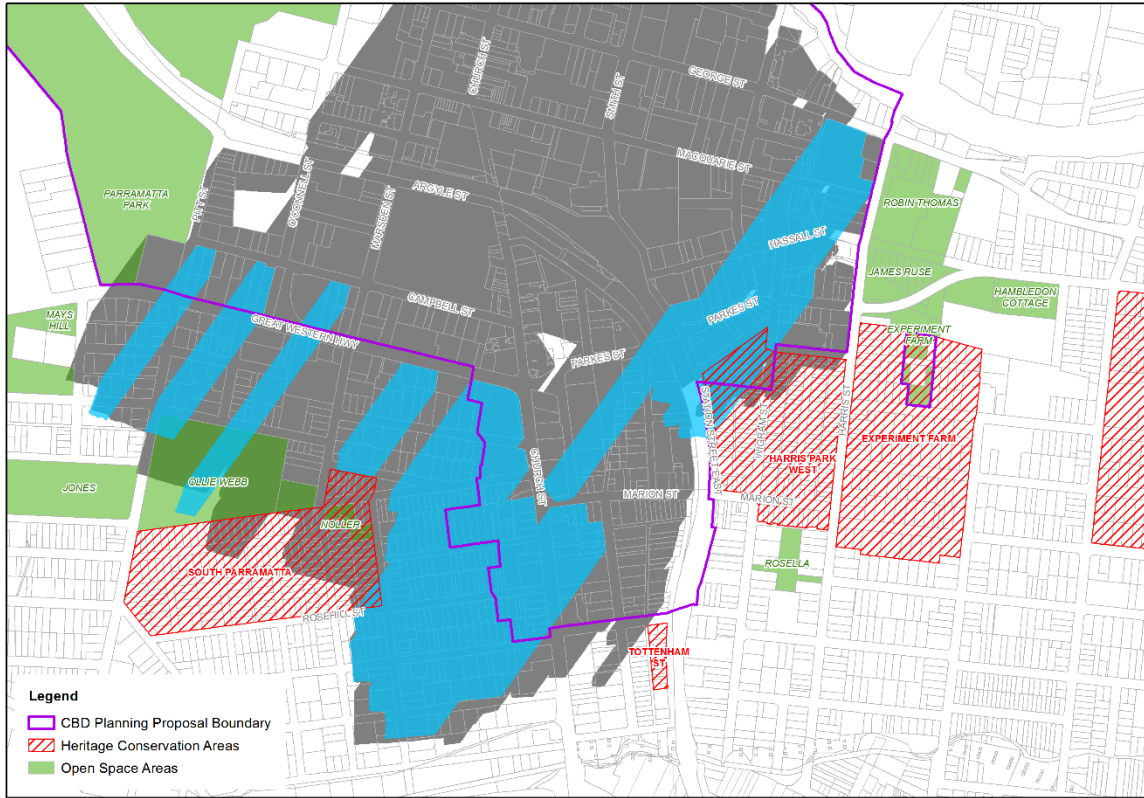


Figure 6 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 9:30am

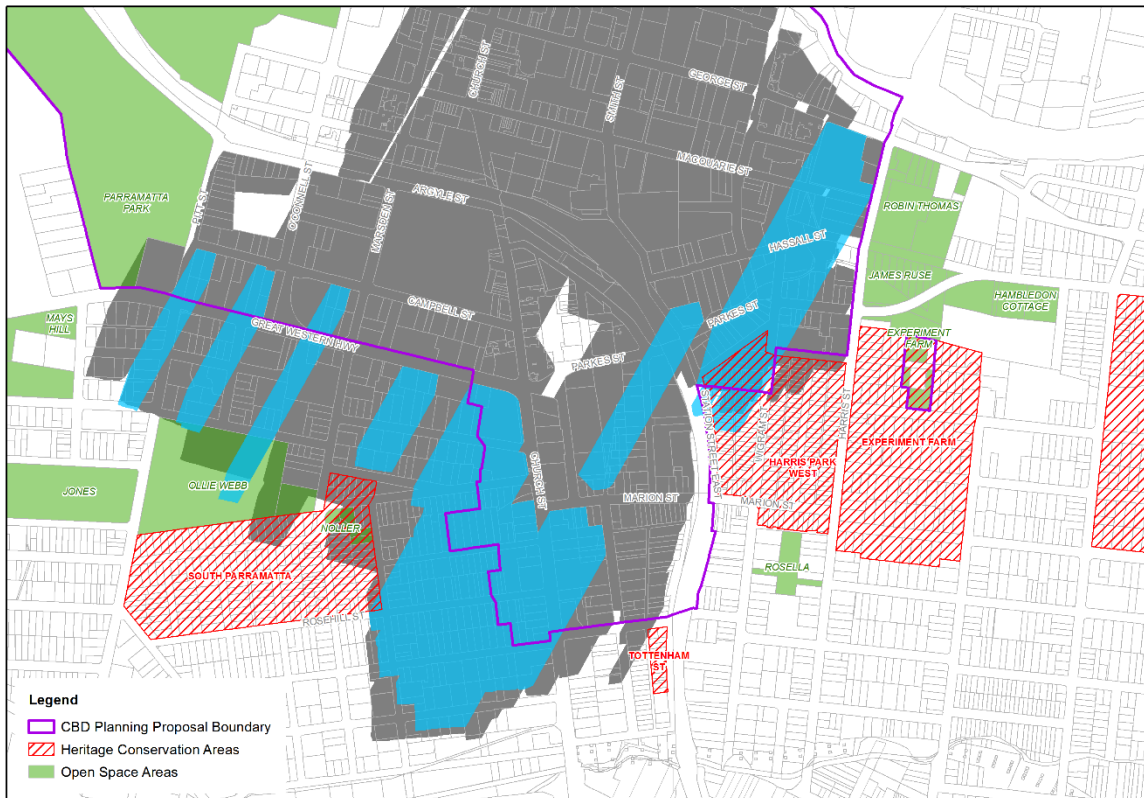


Figure 7 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 10am

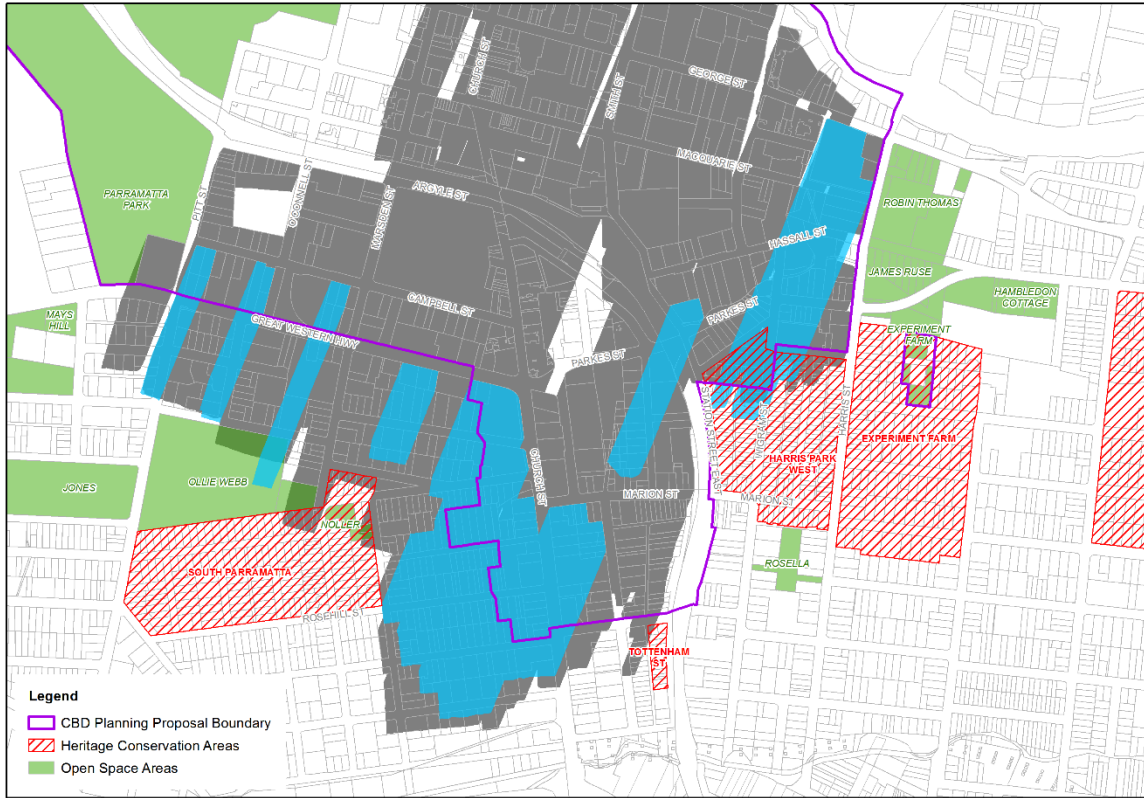


Figure 8 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 10:30am

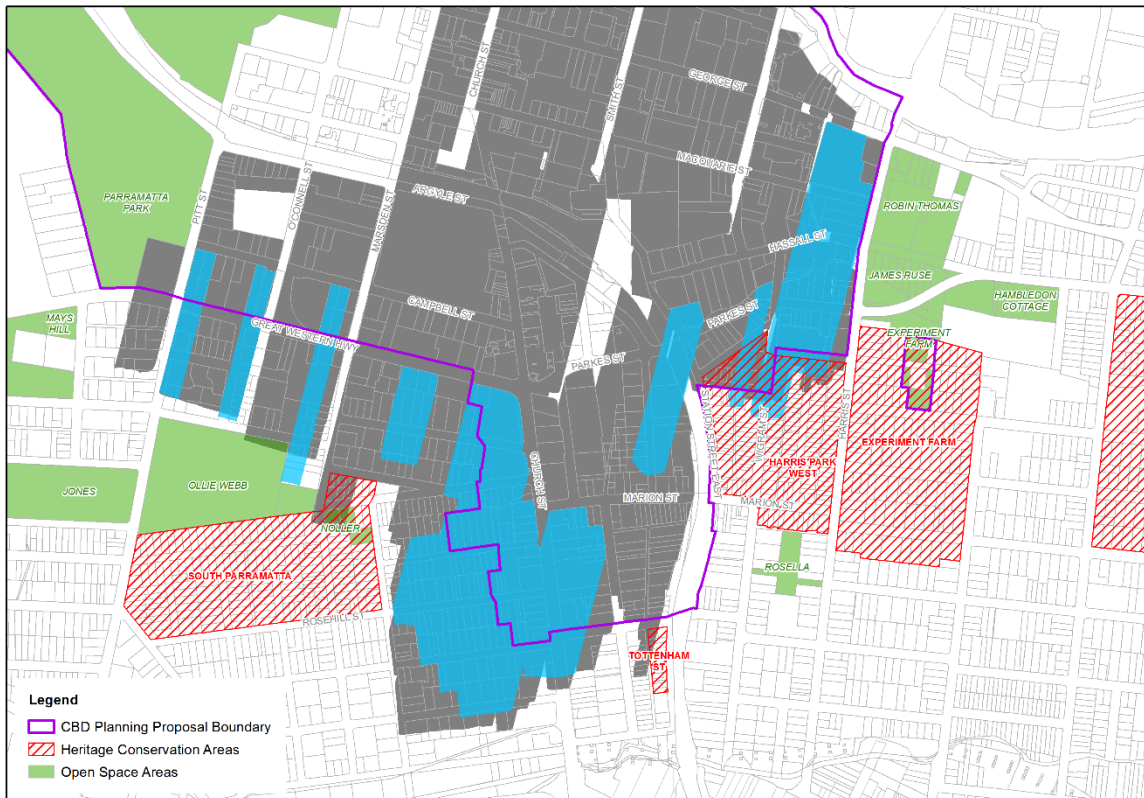


Figure 9 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 11am

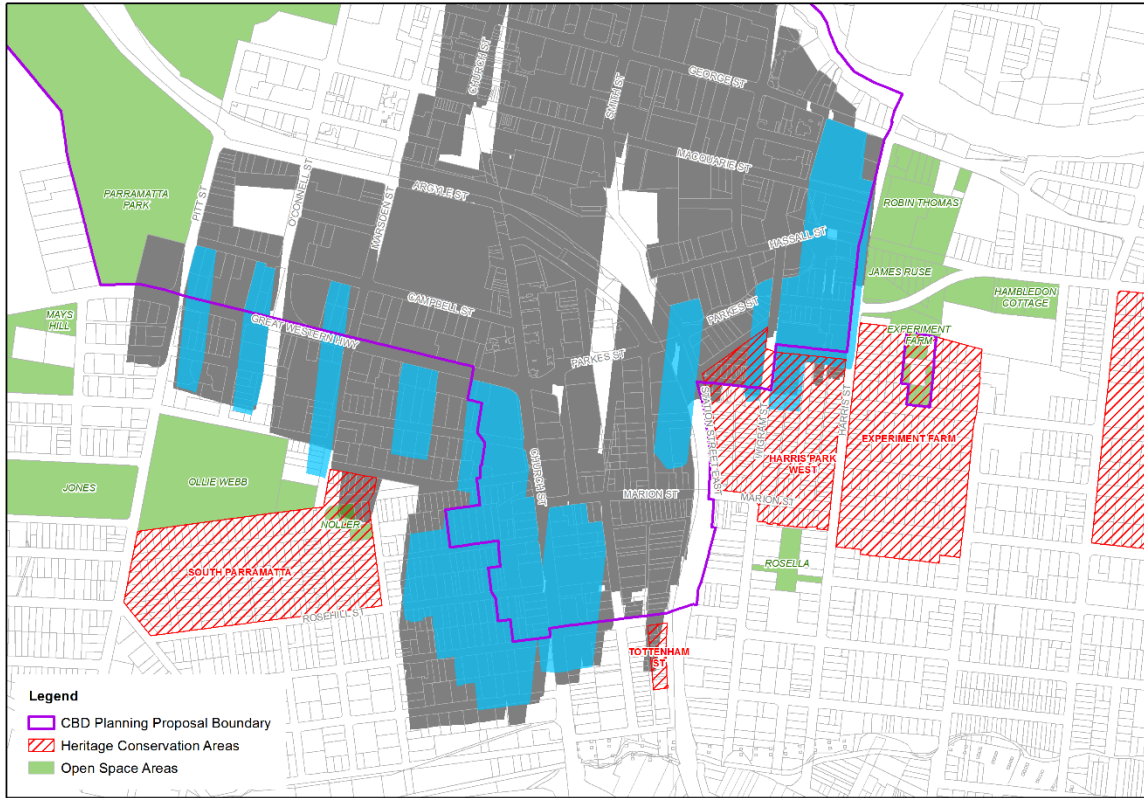


Figure 10 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 11:30am

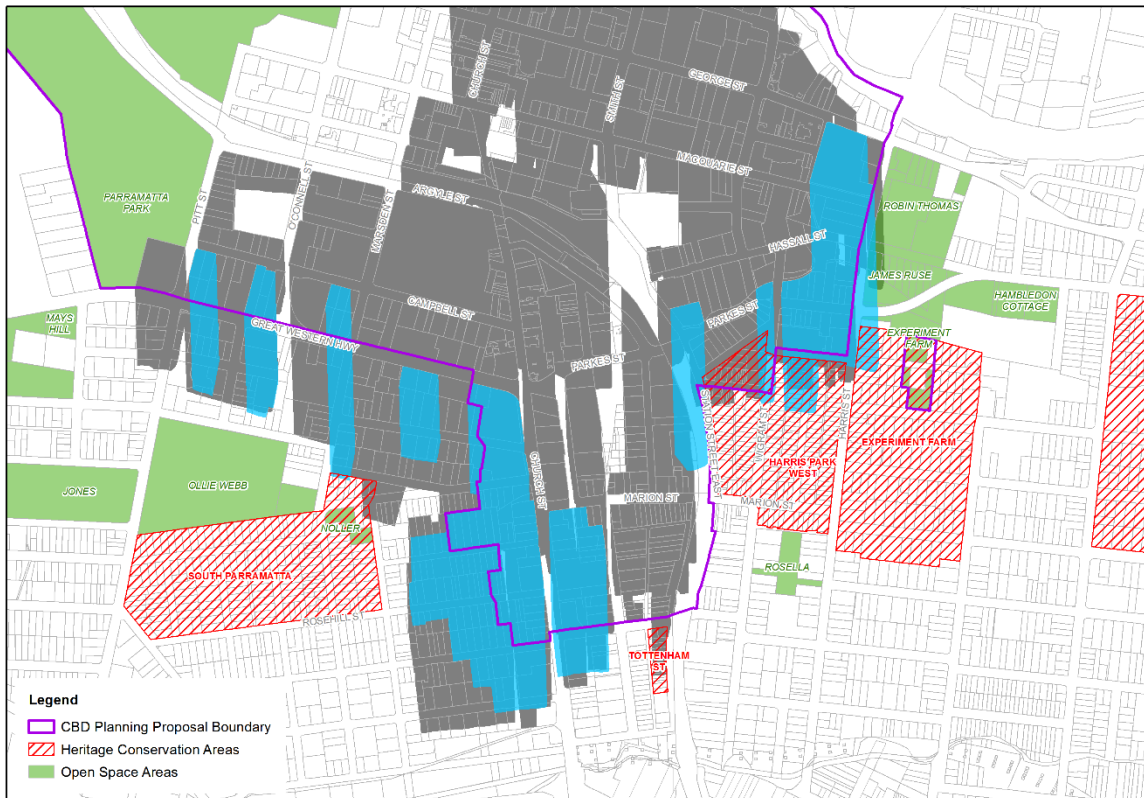


Figure 11 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 12 noon

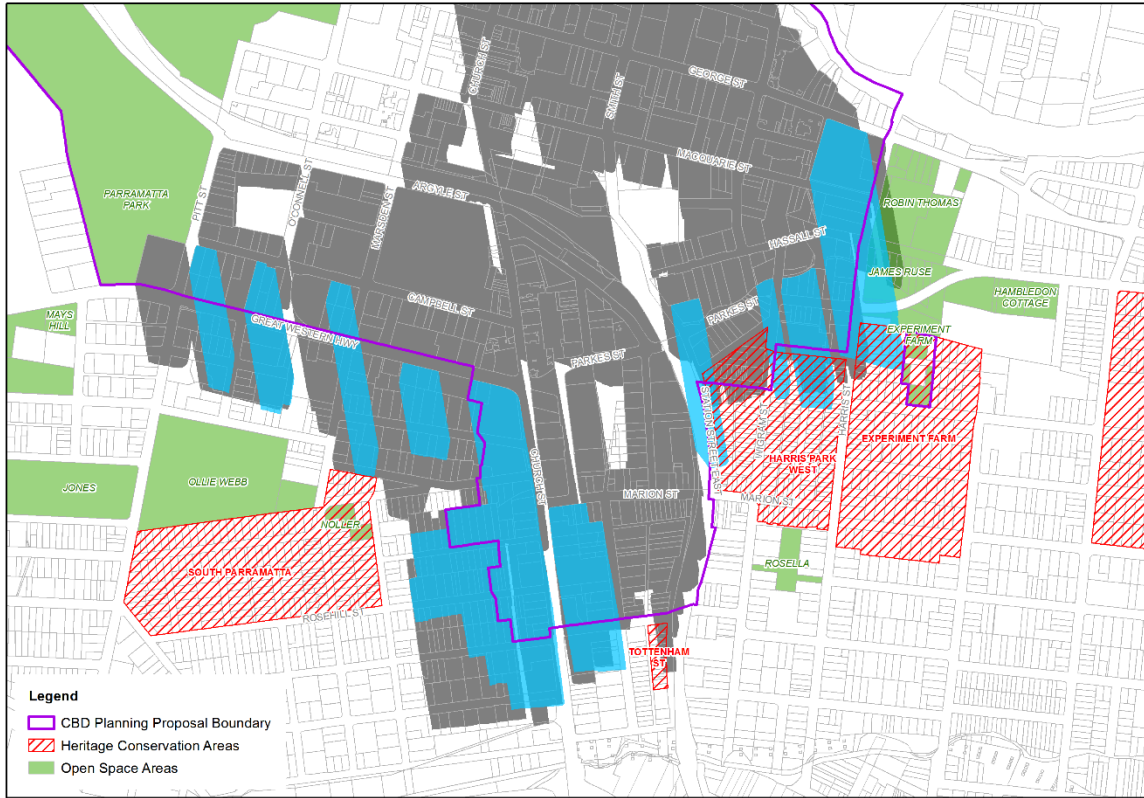


Figure 12 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 12:30pm

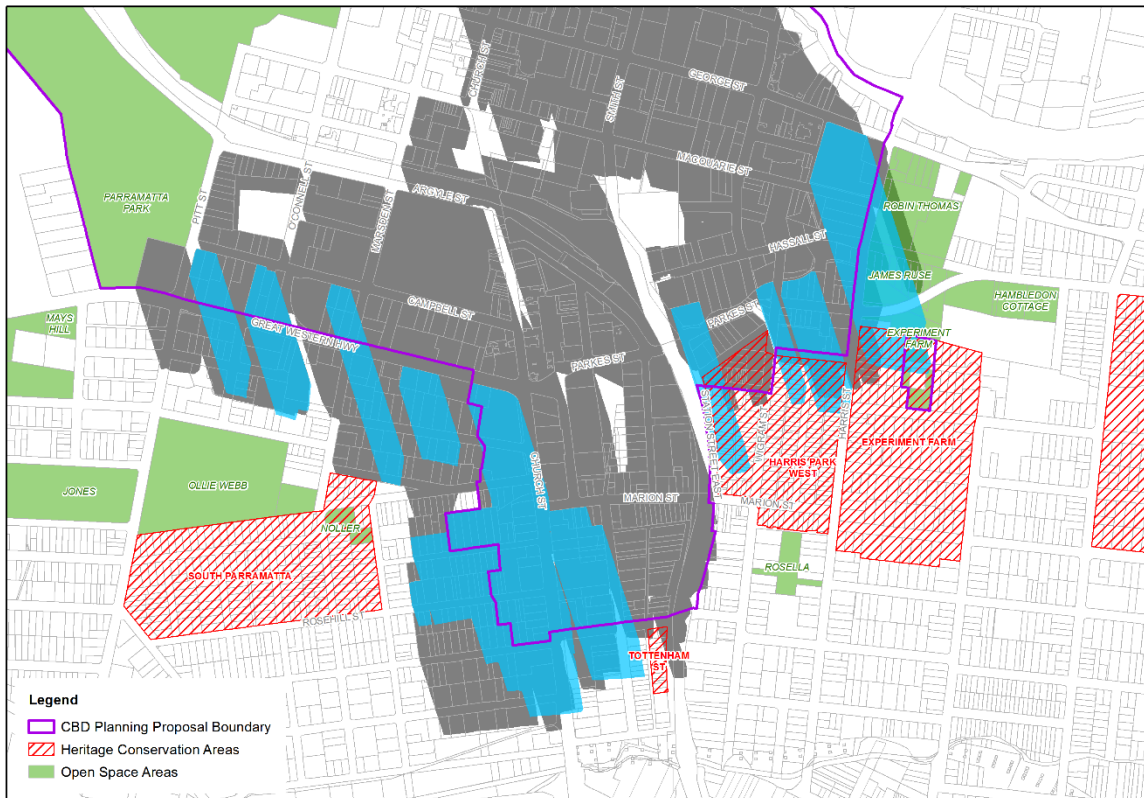


Figure 13 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 1pm

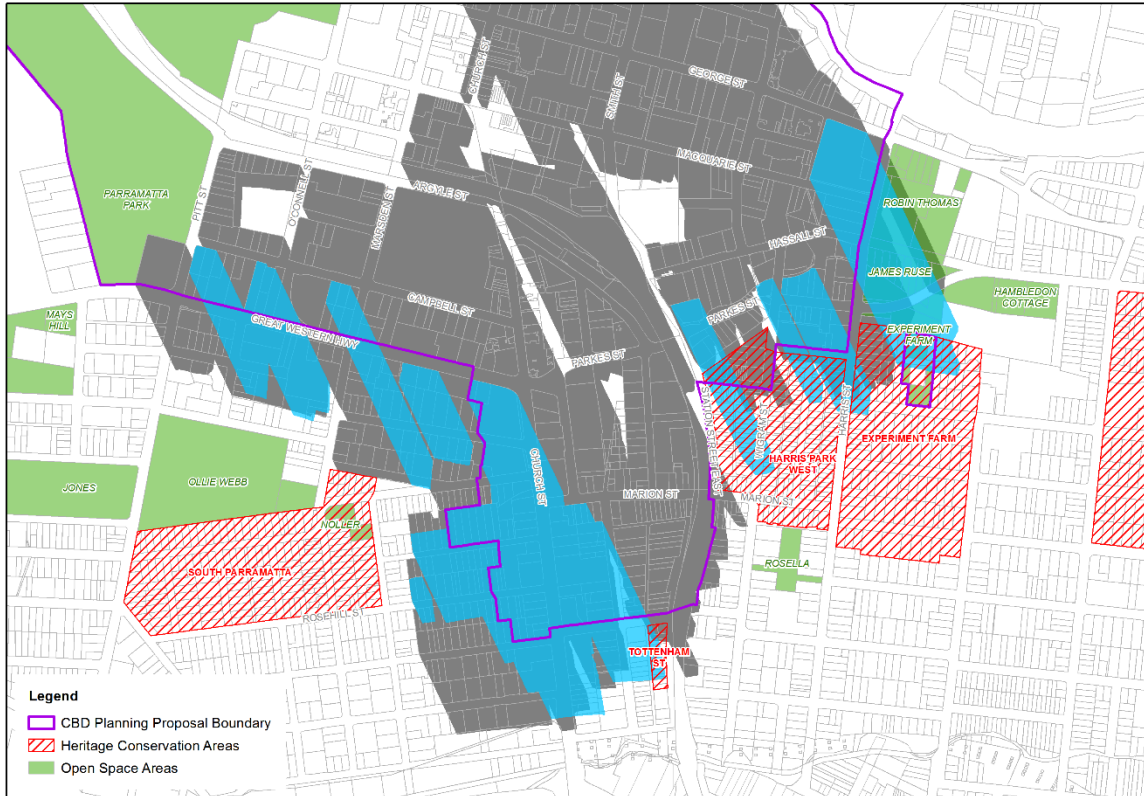


Figure 14 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 1:30pm

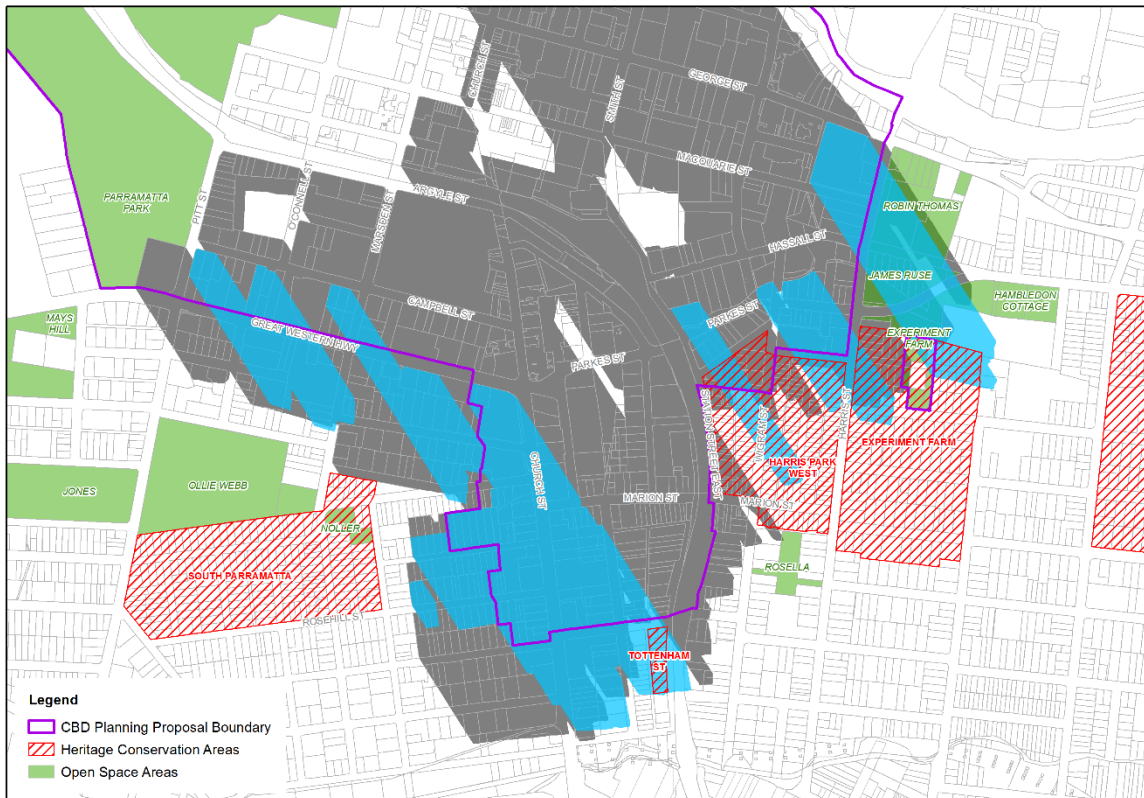


Figure 15 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 2pm

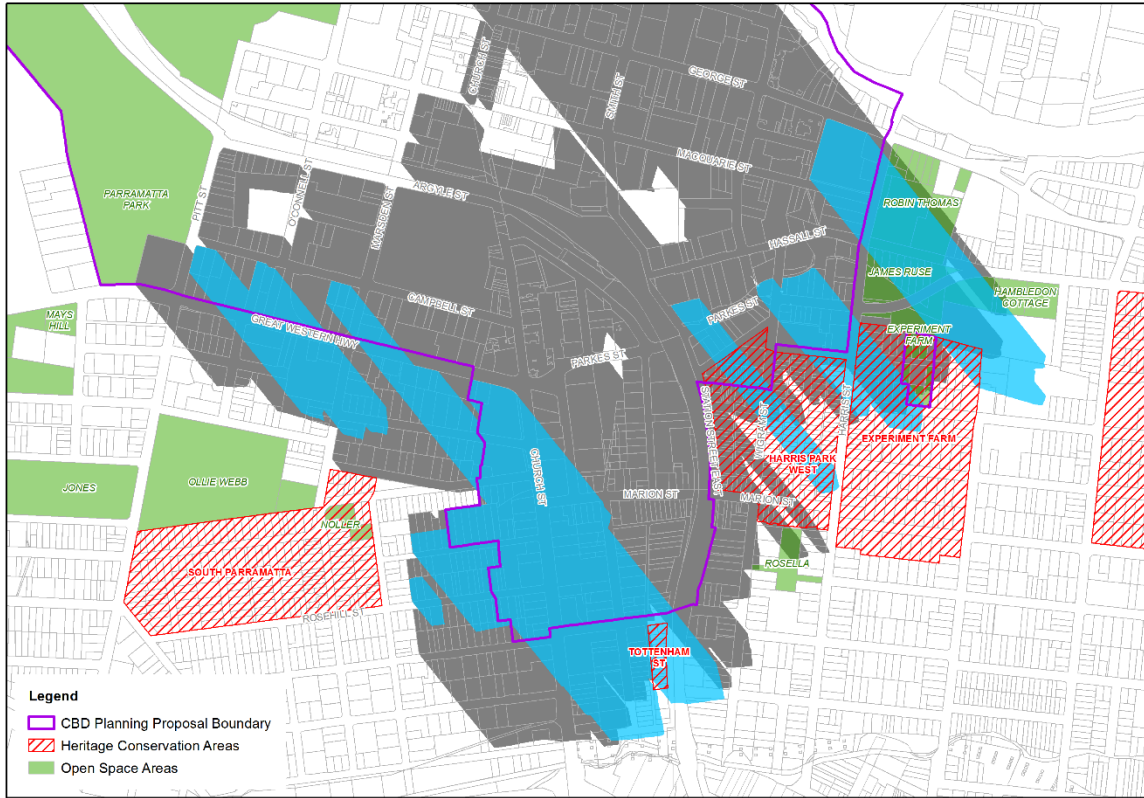


Figure 16 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 2:30pm

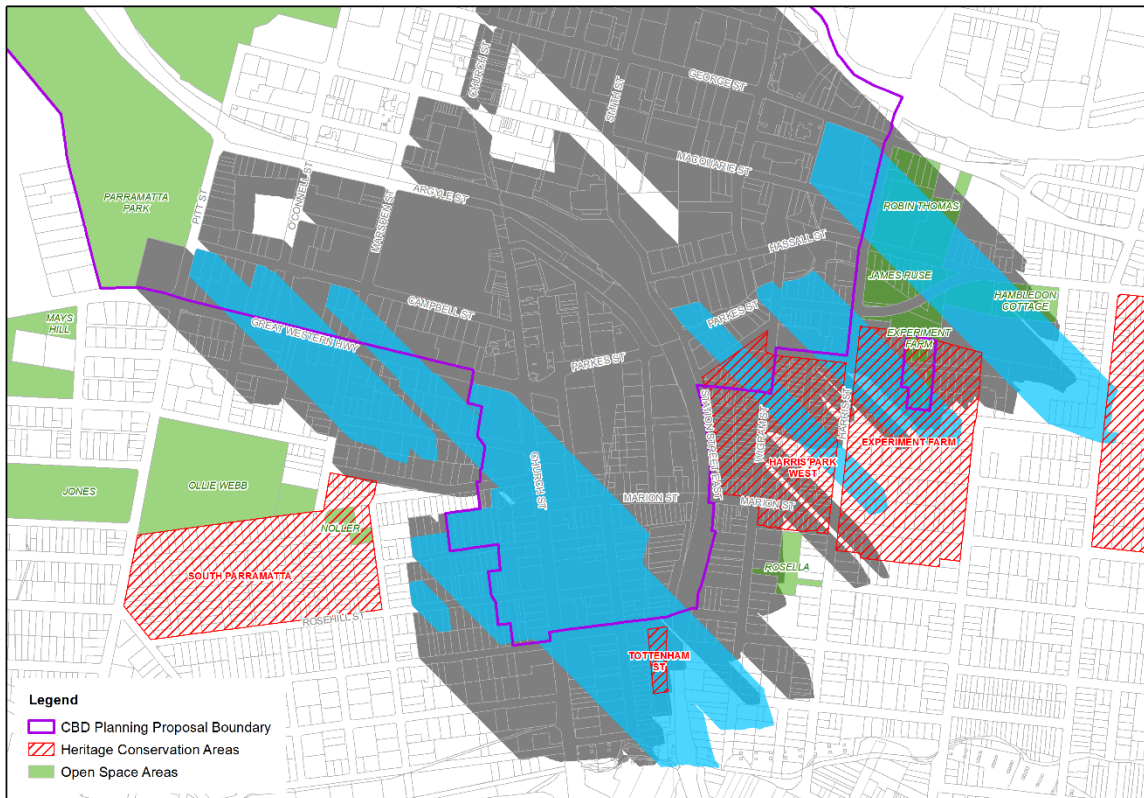


Figure 17 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 3pm

Appendix 2: Overshadowing comparison – extent of additional overshadowing

This appendix shows the extent of *additional* overshadowing cast by the increased heights sought by the submissions tested, as shown in Figure 3. The grey area is the modelled overshadowing extent from the technical paper and the blue areas are the additional shadow extent cast by the heights requested in the submissions.

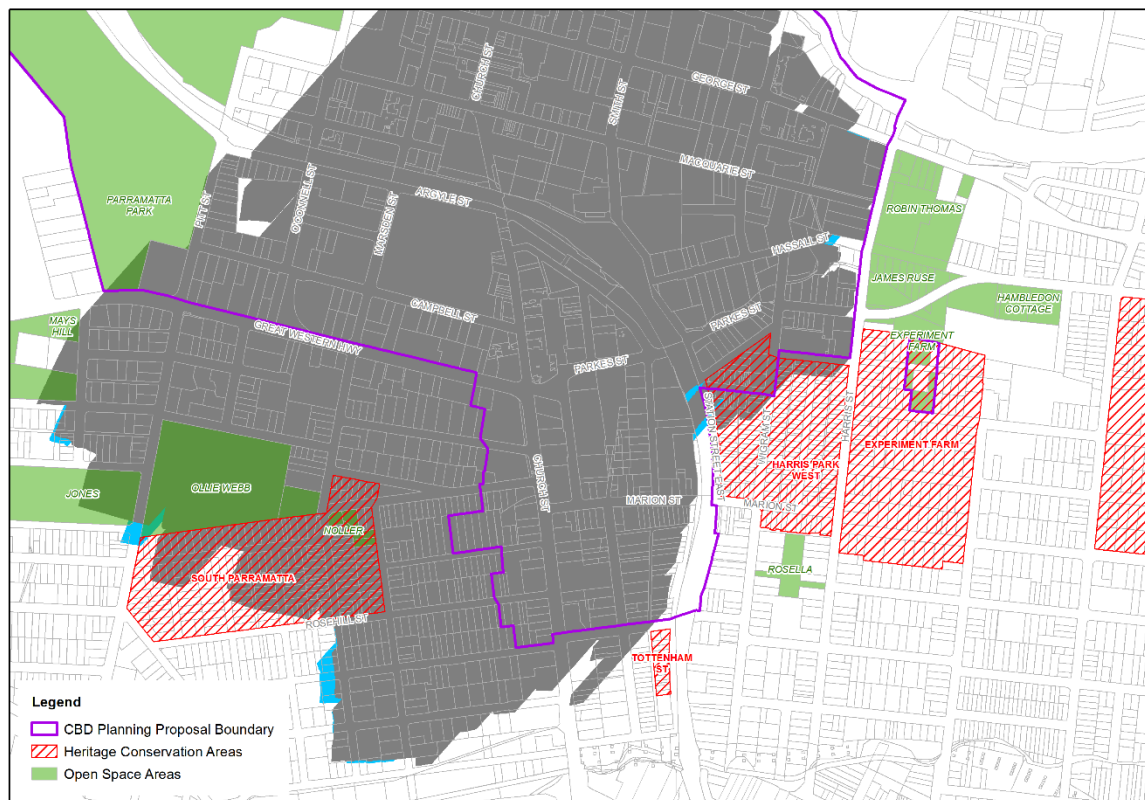


Figure 18 – Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 9am

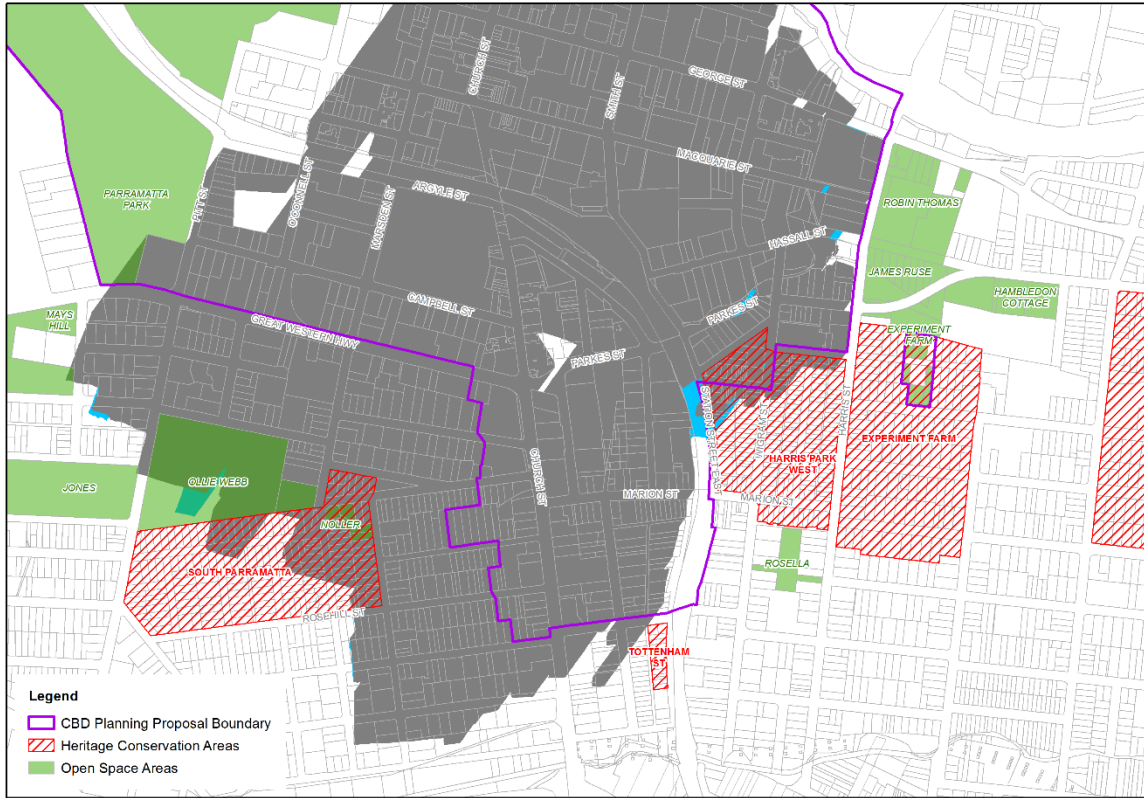


Figure 19 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 9:30am

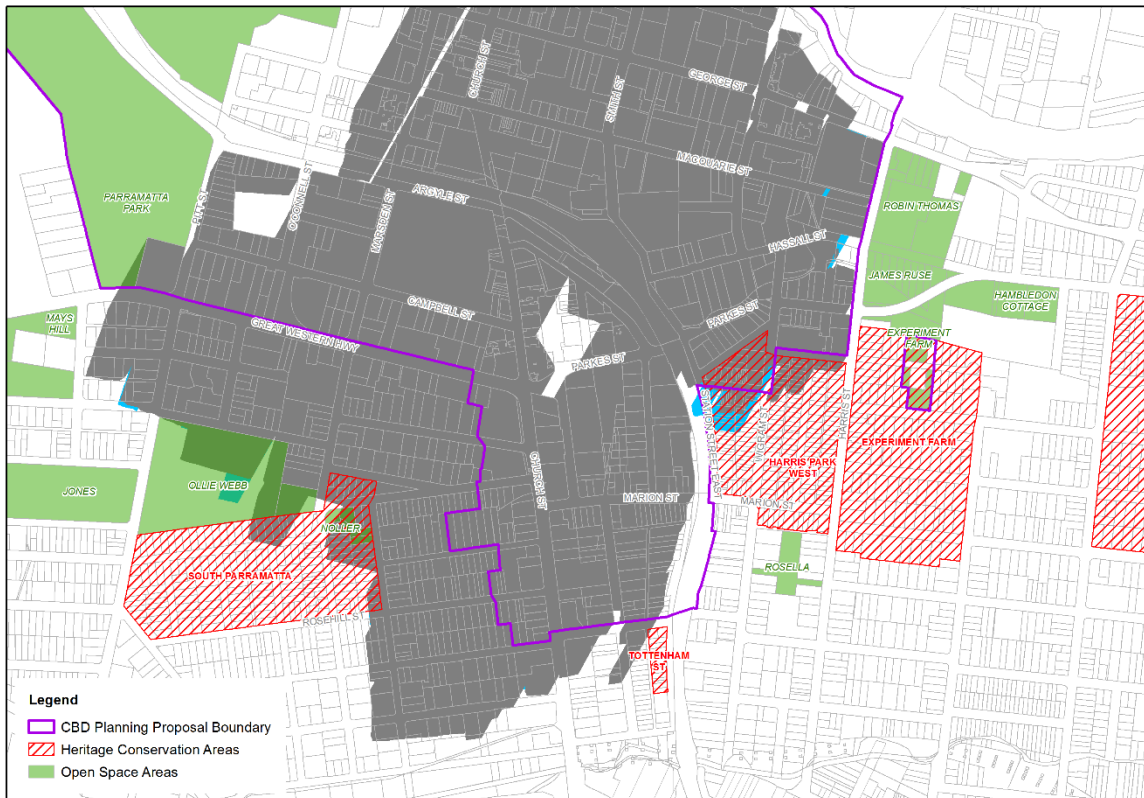


Figure 20 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 10am

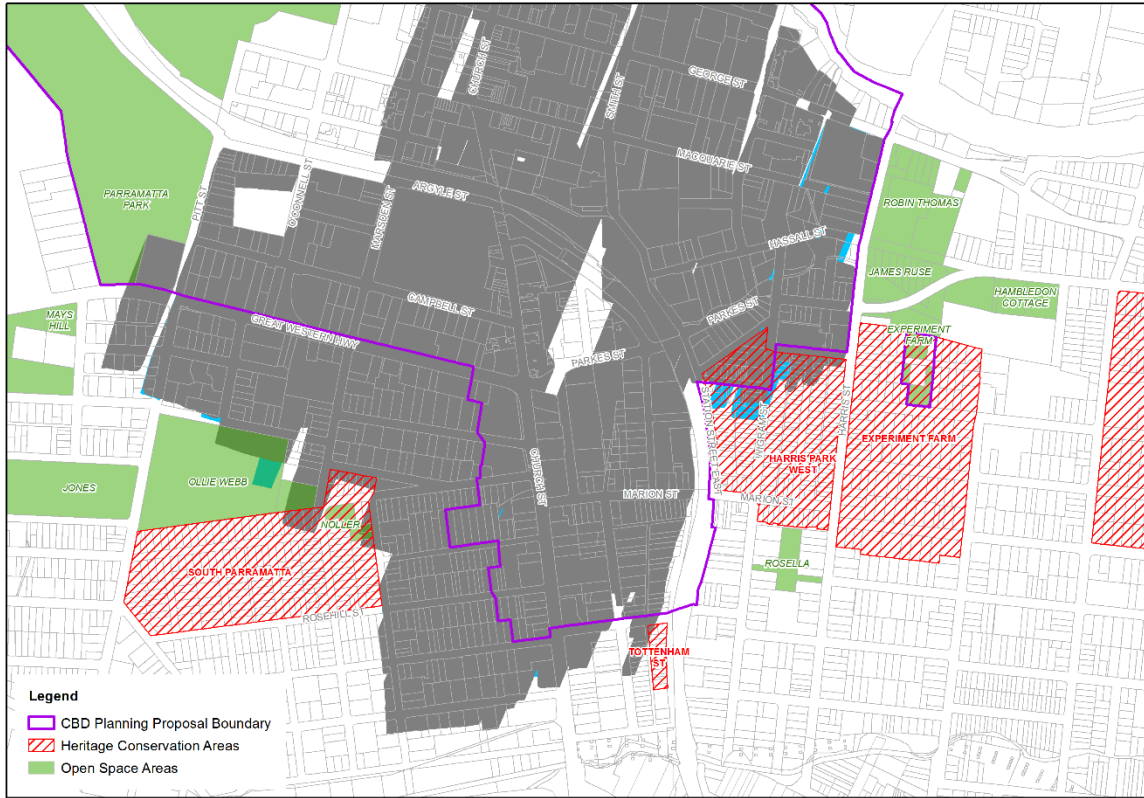


Figure 21 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 10:30am

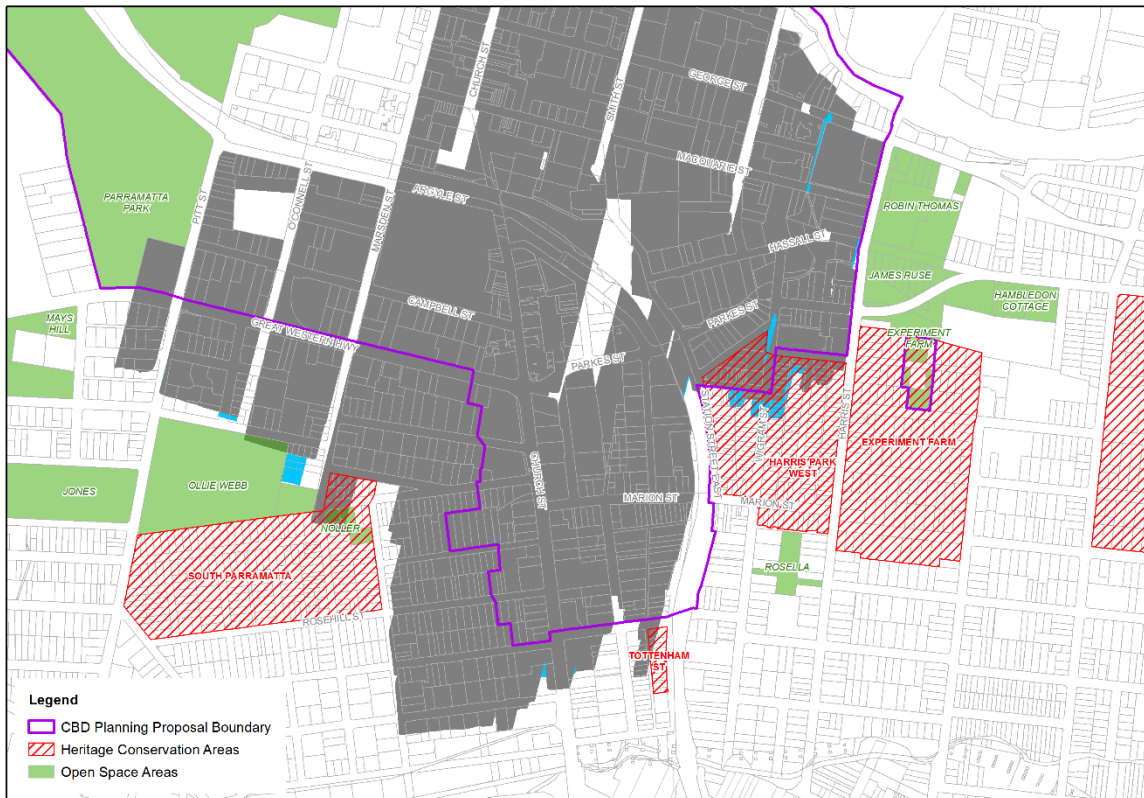


Figure 22 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 11am

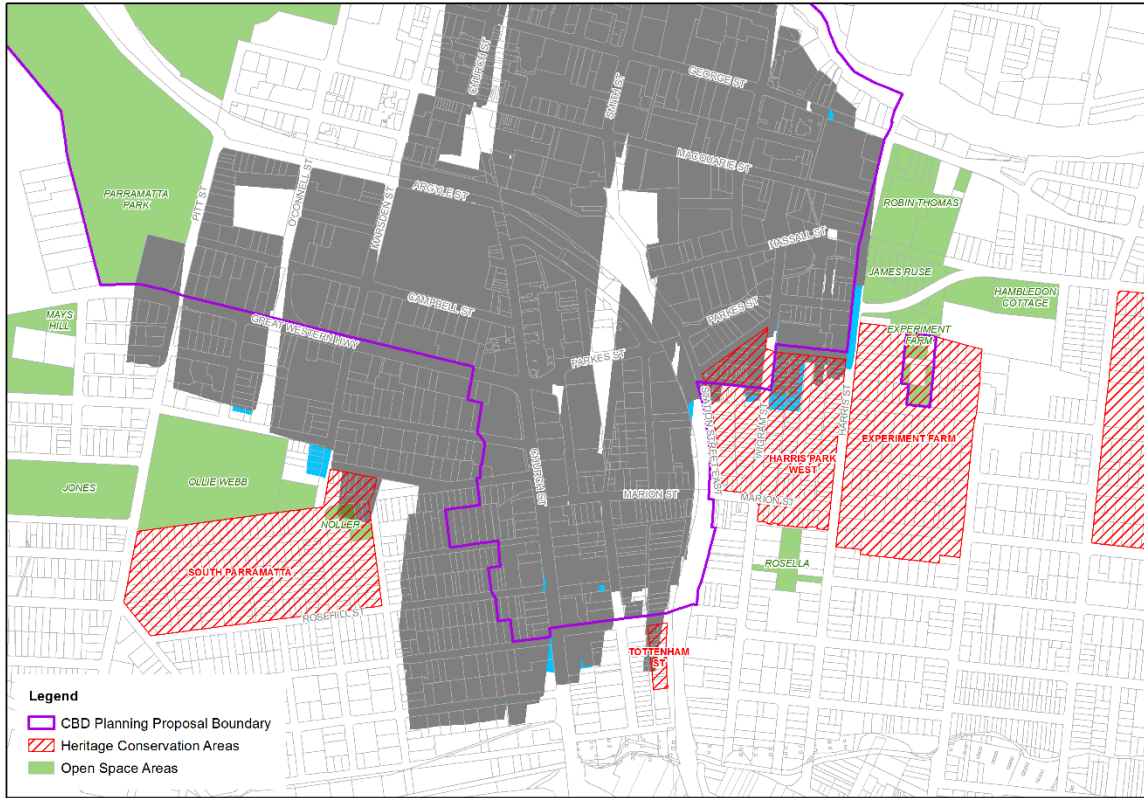


Figure 23 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 11:30am

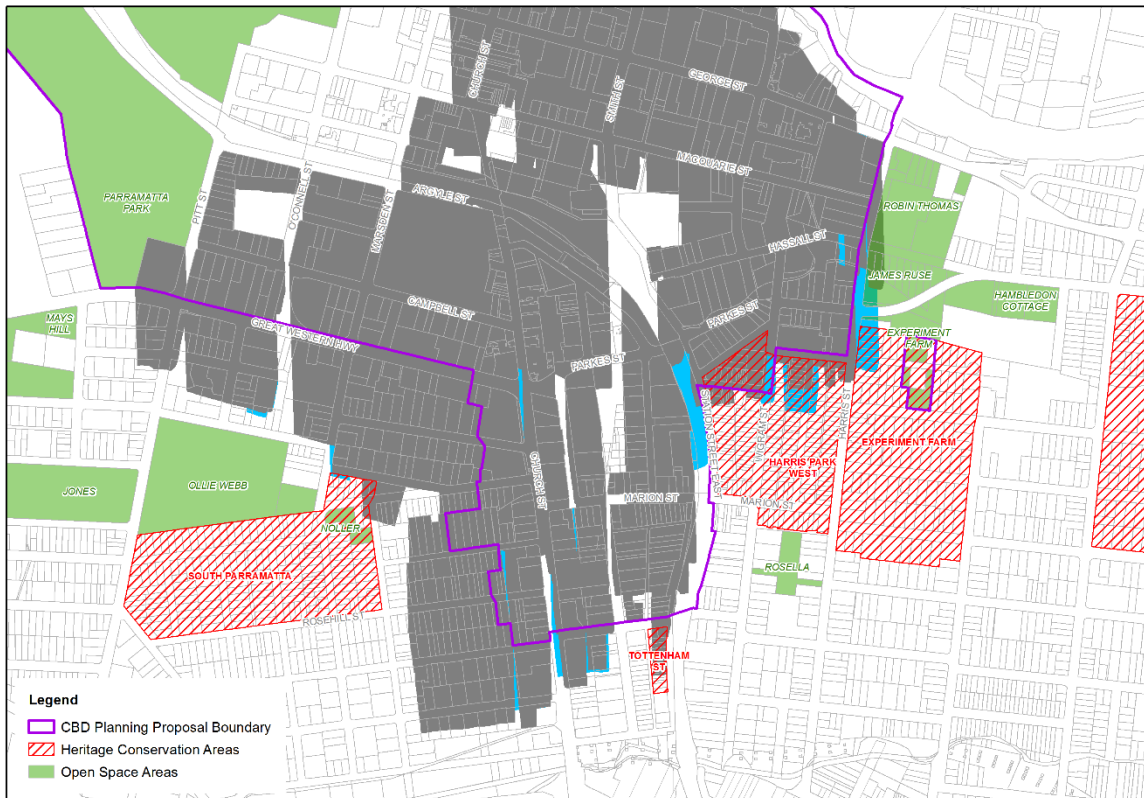


Figure 24 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 12 noon

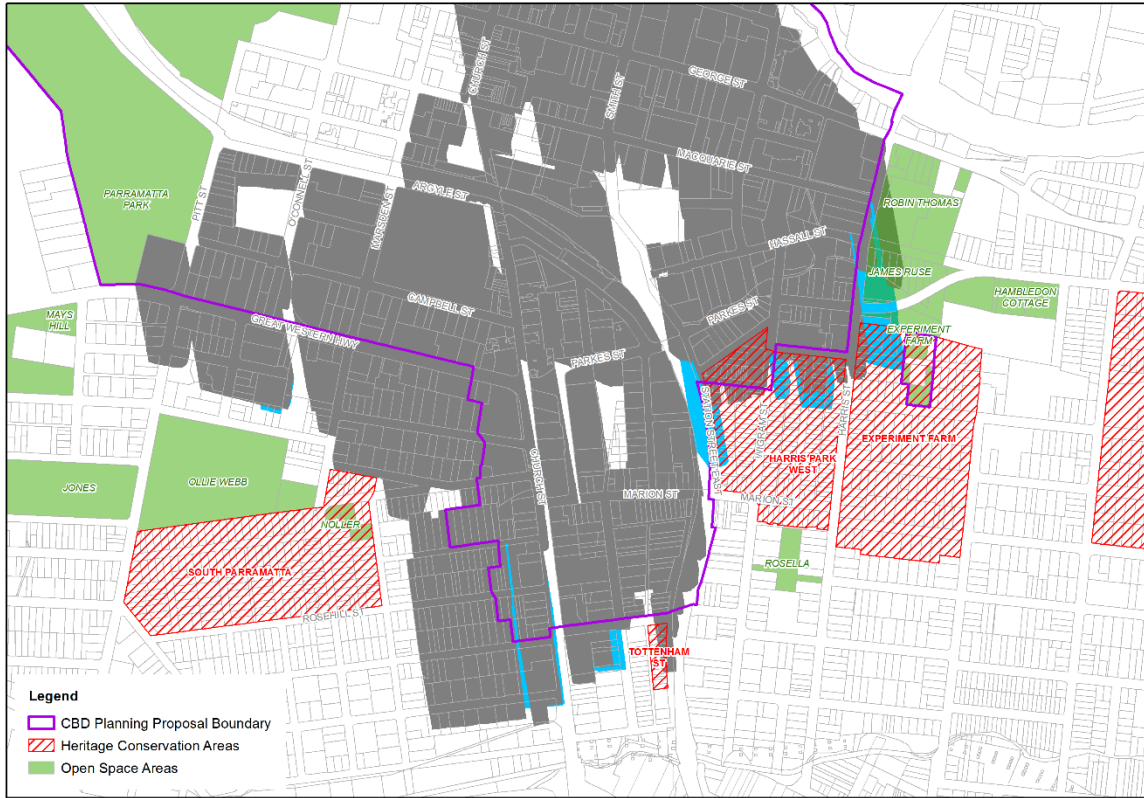


Figure 25 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 12:30pm

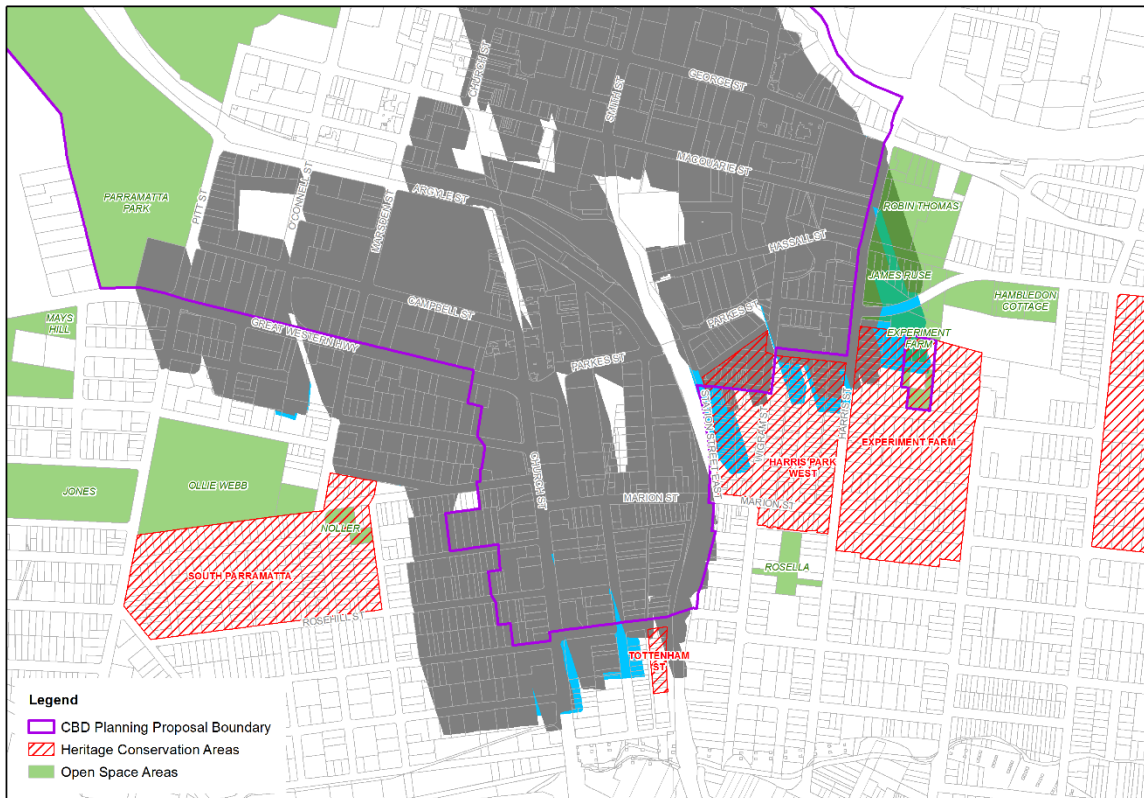


Figure 26 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 1pm

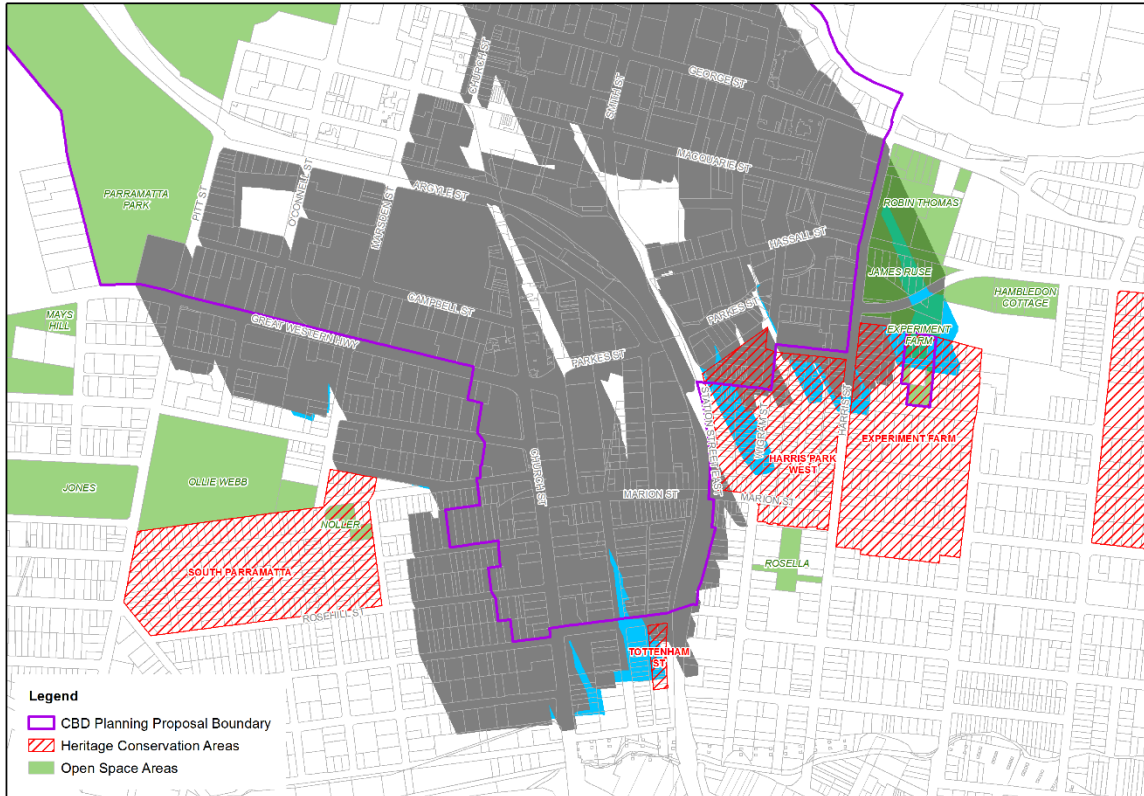


Figure 27 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 1:30pm

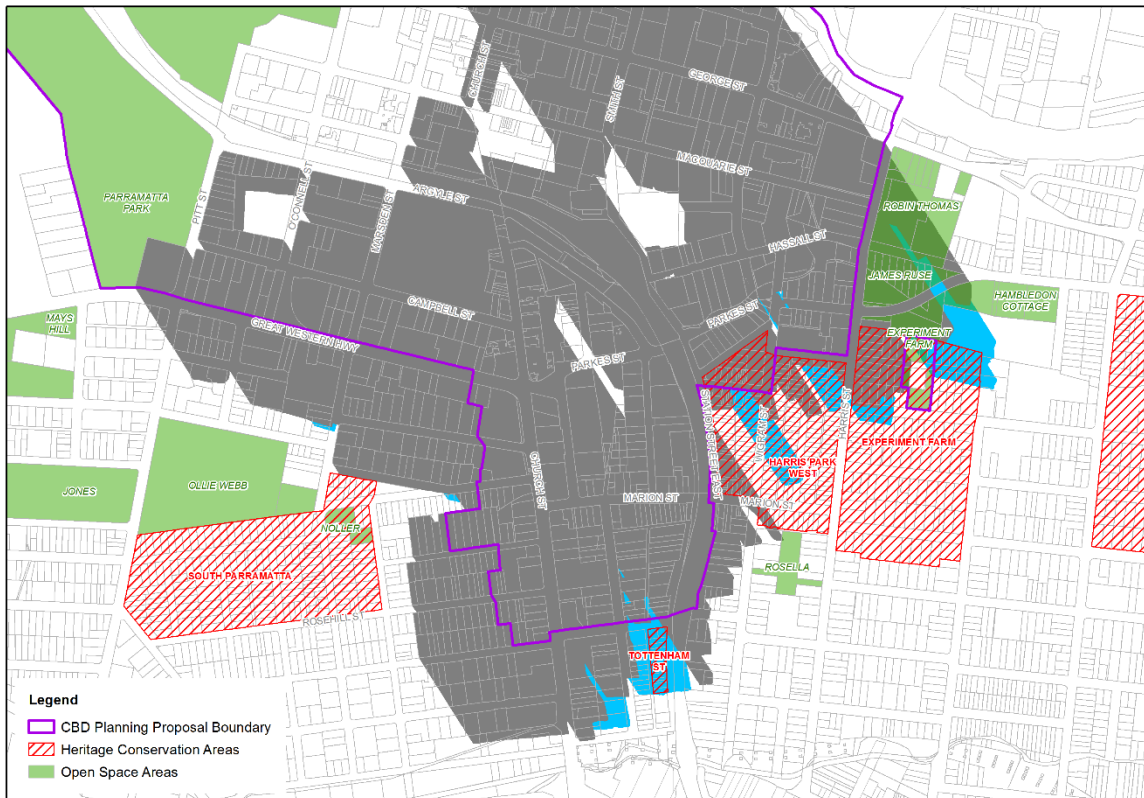


Figure 28 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 2pm

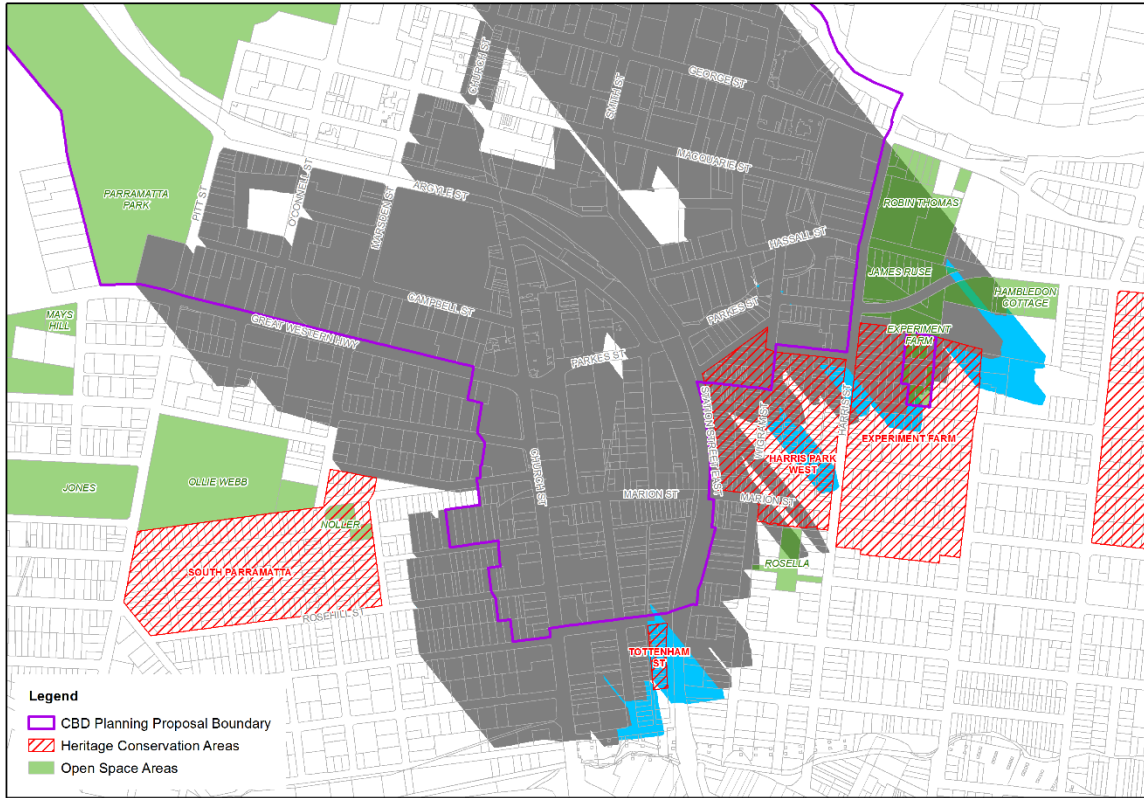


Figure 29 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 2:30pm

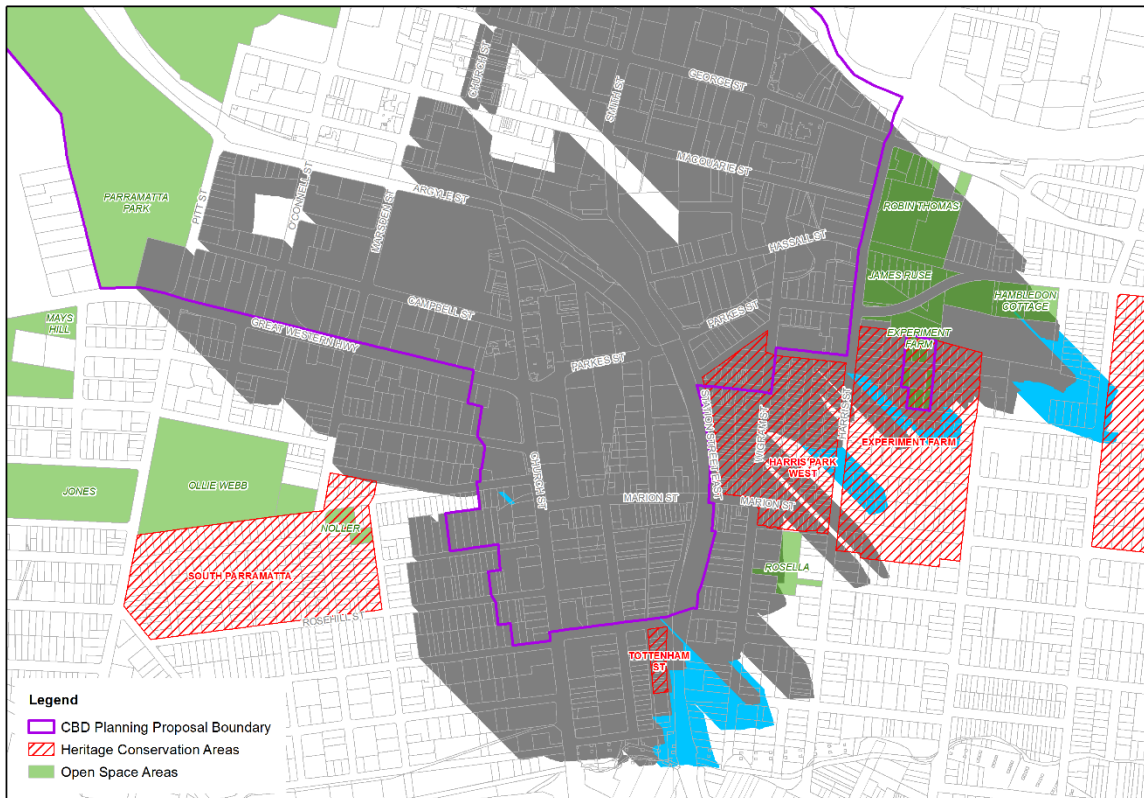


Figure 30 - Overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requested by submitters – 21 June – 3pm

Appendix 3: Parcel-based Assessment of Overshadowing of Heritage Conservation Areas

This appendix shows the shadow analysis for the four Heritage Conservation Areas to the south of Parramatta CBD and the impacts of additional overshadowing requested by submissions to the exhibited planning proposal. The grey area is the modelled overshadowing extent from the technical paper and the blue areas are the additional shadow extent cast by the heights requested in the submissions. Land parcels coloured green are not overshadowed for the tested period, while land parcels coloured red are overshadowed for the tested period.

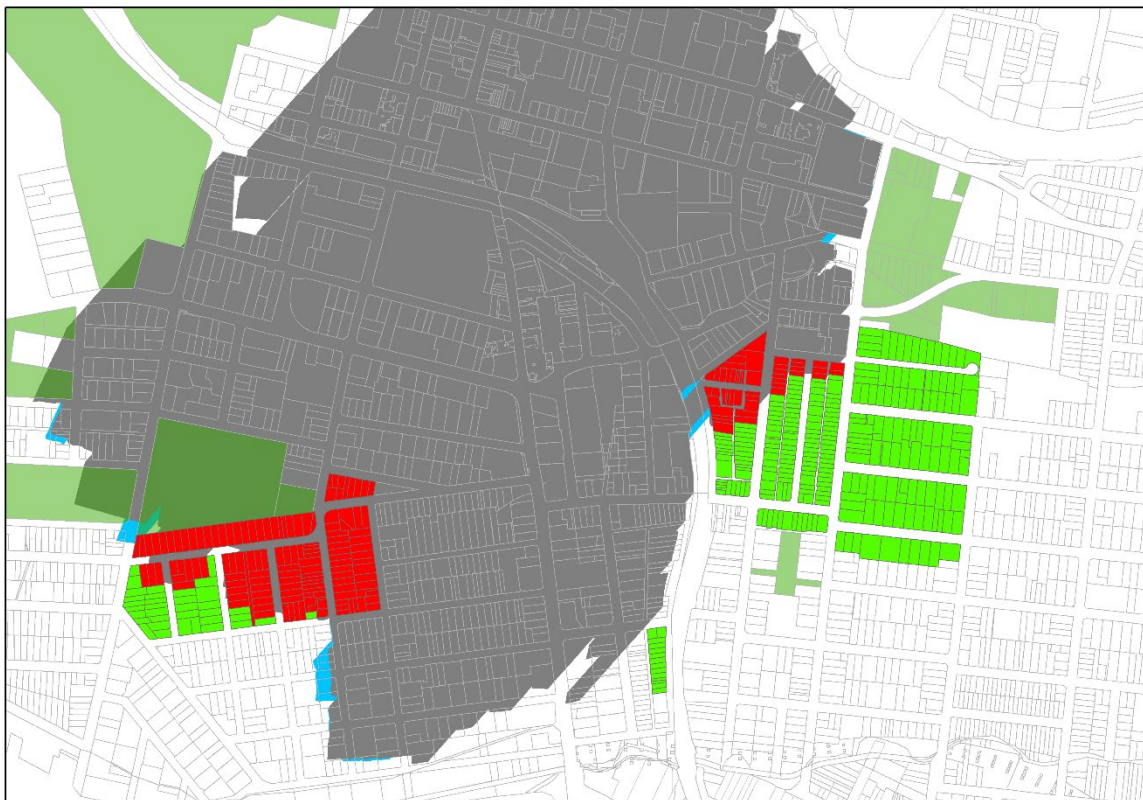


Figure 31 - Impact to land parcels within Heritage Conservation Areas from overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requests by submitters – 21 June – 9am

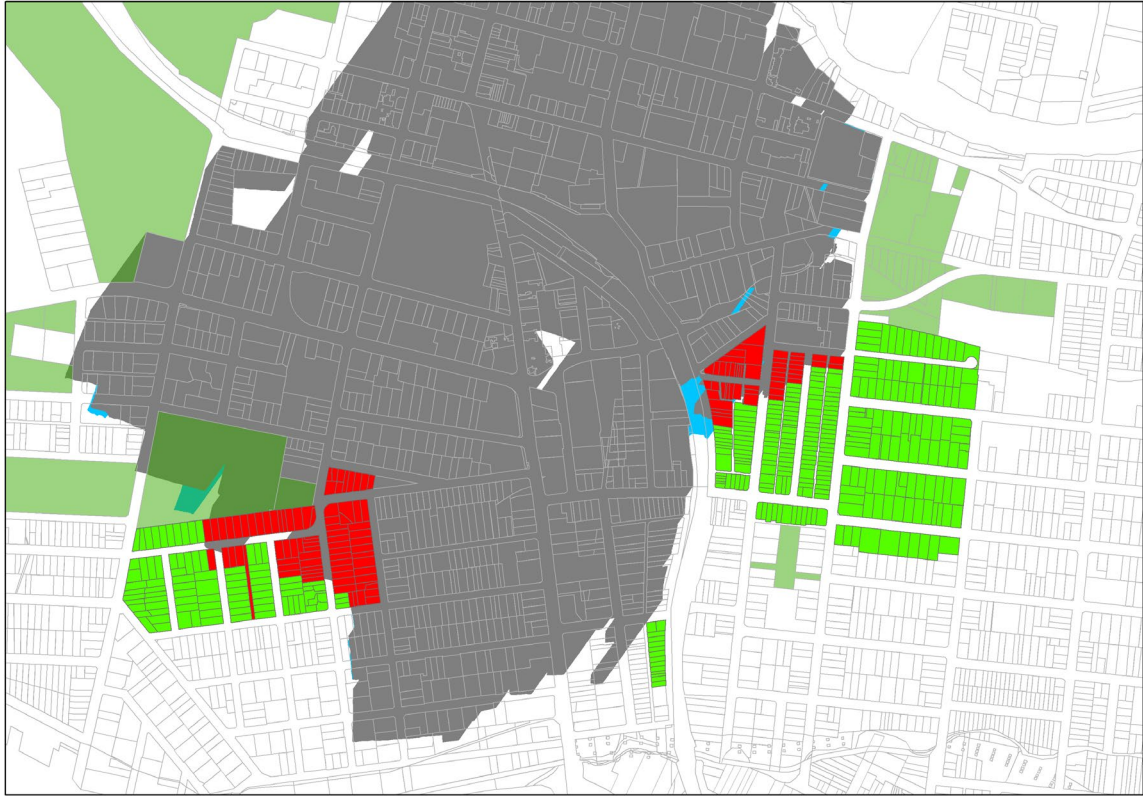


Figure 32 - Impact to land parcels within Heritage Conservation Areas from overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requests by submitters – 21 June – 9:30am

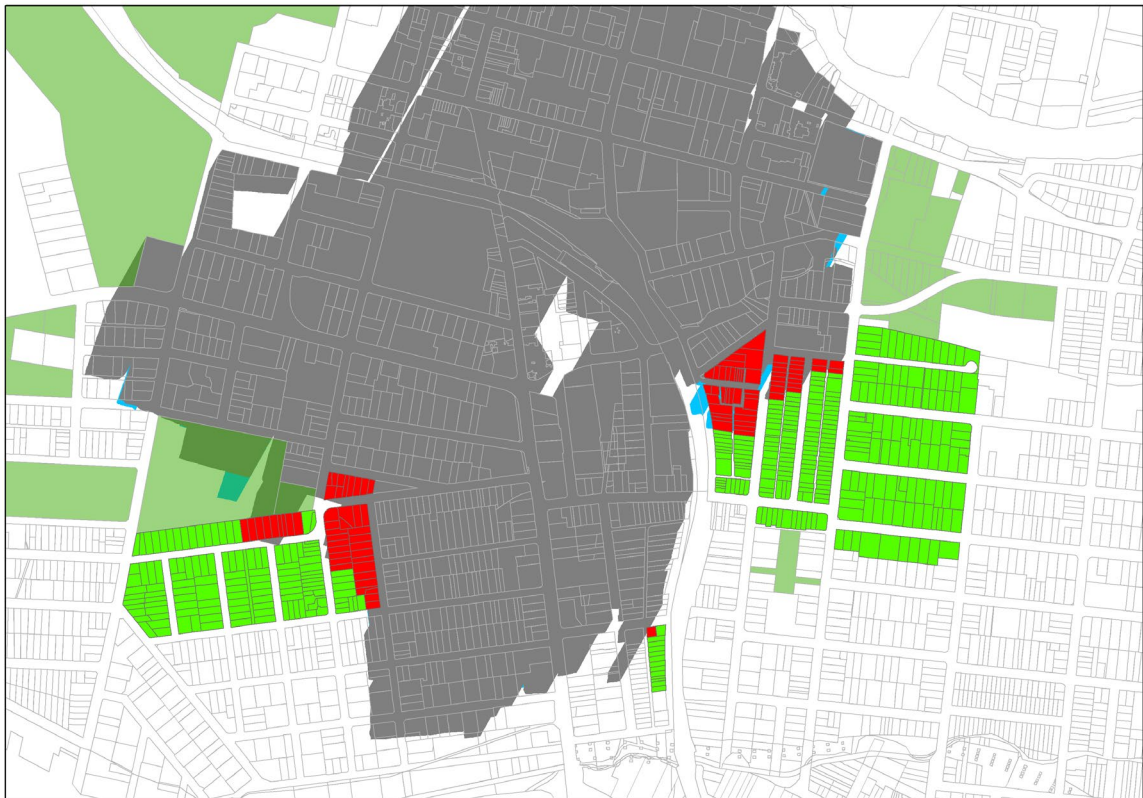


Figure 33 - Impact to land parcels within Heritage Conservation Areas from overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requests by submitters – 21 June – 10am



Figure 34 - Impact to land parcels within Heritage Conservation Areas from overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requests by submitters – 21 June – 10:30am



Figure 35 - Impact to land parcels within Heritage Conservation Areas from overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requests by submitters – 21 June – 11am



Figure 36 - Impact to land parcels within Heritage Conservation Areas from overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requests by submitters – 21 June – 11:30am



Figure 37 - Impact to land parcels within Heritage Conservation Areas from overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requests by submitters – 21 June – 12 noon



Figure 38 - Impact to land parcels within Heritage Conservation Areas from overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requests by submitters – 21 June – 12:30pm



Figure 39 - Impact to land parcels within Heritage Conservation Areas from overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requests by submitters – 21 June – 1pm



Figure 40 - Impact to land parcels within Heritage Conservation Areas from overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requests by submitters – 21 June – 1:30pm



Figure 41 - Impact to land parcels within Heritage Conservation Areas from overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requests by submitters – 21 June – 2pm



Figure 42 - Impact to land parcels within Heritage Conservation Areas from overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requests by submitters – 21 June – 2:30pm



Figure 43 - Impact to land parcels within Heritage Conservation Areas from overshadowing cast by revised Incentive Height of Buildings controls (iteration 7) and the additional height requests by submitters – 21 June – 3pm



Figure 44 – Summary of overshadowing to land parcels within the Heritage Conservation Areas achieving or not achieving two hours of sunlight access on 21 June between 9am and 3pm.

Figure 44, above, shows the location of land parcels within the Heritage Conservation areas that are able to achieve two hours or more of sunlight access between 9am and 3pm on 21 June (coloured green); land parcels that could not achieve two hours of sunlight access (coloured red); and *additional* land parcels that could not achieve two hours of sunlight access as a result of heights requested by submitters (coloured grey).

Appendix 4: Process flowchart for impact assessment

This appendix sets out the process flowchart used to consider submissions in terms of additional overshadowing impacts to the nominated heritage conservation areas and open space areas originally tested in the Technical Paper as exhibited.

