10051

APPENDIX H

Visual Impact Assessment

Virtual Ideas

Visual Impact Photomontage Methodology

BACKGROUND

This document was prepared by Virtual Ideas and includes a methodology of the processes used to create the view impact CGI images and illustrate the accuracy of the results.
Virtual Ideas is an architectural visualisation company that is highly experienced at preparing visual impact assessment media to a level of expertise that is suitable for both council submission and use in court.

Virtual Ideas is familiar with the court requirements to provide 3D visualisation media that will accurately communicate a proposed developments' design and visual impact.
These methodologies and results have been inspected by various court appointed experts in a variety of cases and have always been found to be accurate and acceptable.

OVERVIEW

The process of creating accurate photomontage renderings begins with the creation of an accurate, real world scale digital 3D model. We then take site photographs from known locations and place cameras in the digital 3D model that match the real world position of the site photography.

By matching the lens properties of the cameras in the digital 3D software, to that of the real world photography, and rotating the cameras in the software so that surveyed points in 3D space align with the corresponding points on the photograph, we can create a rendering that is accurate in terms of position, scale, rotation, and perspective.

Time and data information is also recorded during the site photography so that accurate lighting conditions can be reproduced in the 3D rendering.

A digital image is then rendered from the camera in the 3D software application, that is then superimposed into the real world photo to generate an image that represents accurate form and visual impact.

DESCRIPTION OF COLLECTED DATA

To create the 3D model and establish accurate reference points for alignment to the photography, a variety of information was collected. This includes the following:

1) 3D model of Concept Plan (Mod 10)
   - Created by: Lendlease
   - Supplied by: Lendlease
   - Format: DWG and Revit files
   - Content: Model of proposed building envelope plan with RL's indicated

2) Approved Concept plan (Mod 8) drawings and 3D mdoel
   - Created by: RSHP
   - Supplied by: Lendlease
   - Format: DWG file
   - Content: Model of proposed building envelope plan with RL's indicated

3) Ortho-corrected aerial photography of the city of Sydney and surrounds
   - Created by: Department of Lands
   - Supplied by: Department of Lands
   - Format: ecw
   - Content: Ortho-corrected aerial photography

4) Digital terrain model of the city of Sydney and surrounding suburbs
   - Created by: Department of Lands
   - Supplied by: Department of Lands
   - Format: DWG
   - Content: 3D contours of the ground plane only (no buildings)

5) Surveyed 3D model of the city of Sydney buildings and ground plane
   - Created by: AAM Hatch
   - Supplied by: Lendlease
   - Format: DWG
   - Content: 3D model of the city of Sydney buildings and ground plane

6) 3D model of the Proposed Concept Plan Amendment (Mod 8) Indicative Design
   - Created by: RHSP Architects
   - Supplied by: Lend Lease
   - Format: DWG
   - Content: 3D model of the Barangaroo buildings

7) 3D model of the Concept Plan (Mod 10) Indicative Design
   - Created by: RPBW Architects and amended to correct RL heights by Virtual Ideas
   - Supplied by: Lend Lease
   - Format: DWG
   - Content: 3D model of the Barangaroo buildings

8) Site photography
   - Created by: Luke Kolln and Rick Mansfield of Virtual Ideas (VI Photos)
   - Format: JPEG file
   - Content: High resolution photo

CREATION OF THE DIGITAL 3D MODEL

Creating the surrounding terrain model

Using our software application (3D Studio Max), we imported the Lands 3D topographical CAD data and created a three dimensional terrain model at real world scale. This model was referenced back to MGA co-ordinates using a common reference point that all project drawings are being referenced to. The ortho-corrected aerial photography was then mapped to this model giving us a relatively accurate source for referencing camera positions in both position and height.

Creating the Sydney city buildings 3D model

To have sufficient survey data that would allow us to accurately align the 3D model to the photography, a surveyed 3D model was purchased from AAM hatch and positioned into the 3D scene using the common MGA reference point as the origin. In addition, a surveyed ground plane from AAM Hatch was also purchased and positioned under the buildings.

The building survey was created by AAM Hatch using photogrammetric mapping equipment and techniques.

Creating the Barangaroo buildings 3D model

The Barangaroo massing and building models were created with information supplied by RHSP and Lend Lease. At all points in the creation of these models, careful attention was taken to ensure that the footprint and heights of the buildings were correct.

SITE PHOTOGRAPHY

Site photography was taken from the positions agreed with Lend Lease. The positions were selected to fulfil the Director General Requirements provided by the Department of Planning and Environment. Additional locations for photomontages were requested by the city of Sydney, and subsequently photographed.

The DGR requirements for photomontage photography have been defined as follows: “using human eye focal lengths (50mm at 35mm FX format and 46 angle of view) from long range, medium range and short range positions so that they can be assessed with respect to visibility, visual absorption capacity and visual impact rating, as well as a comparison analysis with the approved Concept Plan.”

This request was reviewed during the Mod 4 application and it was determined that due to the scale of the Barangaroo buildings and the specific locations of the DGR photomontages, it was not effective to use 50mm lenses in all circumstances as this would not produce a result where the buildings could be evaluated in respect to the surroundings. In addition, in most cases it was not possible to take medium range and long range options for each view as the topography vegetation, and surrounding built form did not accomodate.

The specific requirment for the lens selection for each shot was based on the following criteria that was agreed to with Lend Lease and the Department of Planning and Environment, and was deemed acceptable by the Department of Planning for all previous Barangaroo concept plan application,.

- All photographs should be taken with a Canon 5D, which is 35mm FX format.
- The on-site location for the photograph should be as close as possible to the instructed location.
- The entirety of the proposed buildings, including the approved concept plan envelope should be in view in each photo where possible.
- Surrounding existing buildings should also be visible in each photomontage to allow for fair and accurate comparison to existing built form.

The lens size selected for each shot ranges from 17-40mm, and in addition, crop marks have been added to the photographs to illustrate the extents of longer lens sizes.

For further explanation of digital photography and the human eye refer to Appendix A.

In most cases, we consider that a 17-24mm lens as a fair representation of the focal length of the human eye. It is difficult to define the exact focal length of the eye as we have to consider the distance to the subject and peripheral vision. There are many studies to support that 17mm is acceptable. Also many scientists consider 20-24mm acceptable when looking at a specific item in the distance - please see appendix A.

METHODOLOGY OF THIS REPORT

This report has been prepared in accordance with the methodology set-out and agreed by Lend Lease and the Department of Planning throughout the Barangaroo Concept Plan Mod 4 Application process.

CREATION OF PHOTOMONTAGES

The positions of the real world photography were located in the 3D scene using the lands and AAM Hatch 3D models, and the ortho-corrected photography.

Cameras were then created in the 3D scene to match the locations and height of where the photographs were taken from. The lens data stored in the metadata of the photograph was also used for accuracy. The cameras were then aligned in rotation so that the points of the 3D model aligned with their corresponding objects that are visible in the photograph.

A realistic sun and skylight light system was then created in the 3D scene and matched to the precise time and date of when each photograph was taken.

3D renderings of the indicative new buildings were then created from the selected cameras at the exact pixel dimensions and aspect ratio of the original digital photograph (4368 x 2912 pixels and 5616 x 3744 pixels).

The 3D renderings were then placed into the digital photography, and masked-out where existing form appeared in front of the buildings.

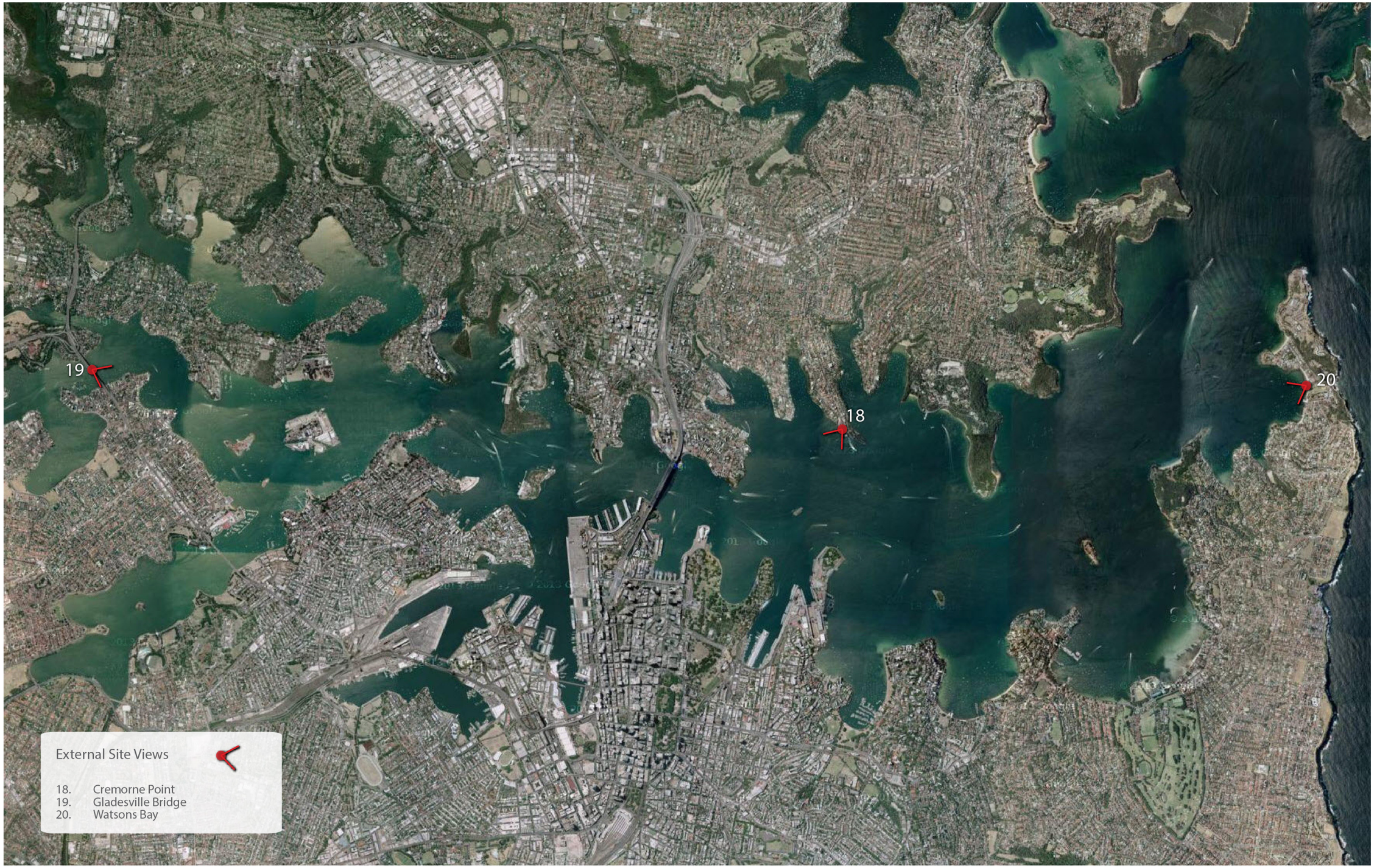
In conclusion, it is my opinion, as an experienced 3D architectural visualisation professional, that the images included in this assessment accurately portray the level of visibility and impact of the indicative built form under the concept plan Mod 10 with respect to the surrounds.

Yours sincerely

Grant Kolln,
Director - Virtual Ideas

MAP SHOWING CAMERA LOCATIONS

MAP SHOWING CAMERA LOCATIONS



Original photo with crop marks to identify the filed of view of longer lens sizes.

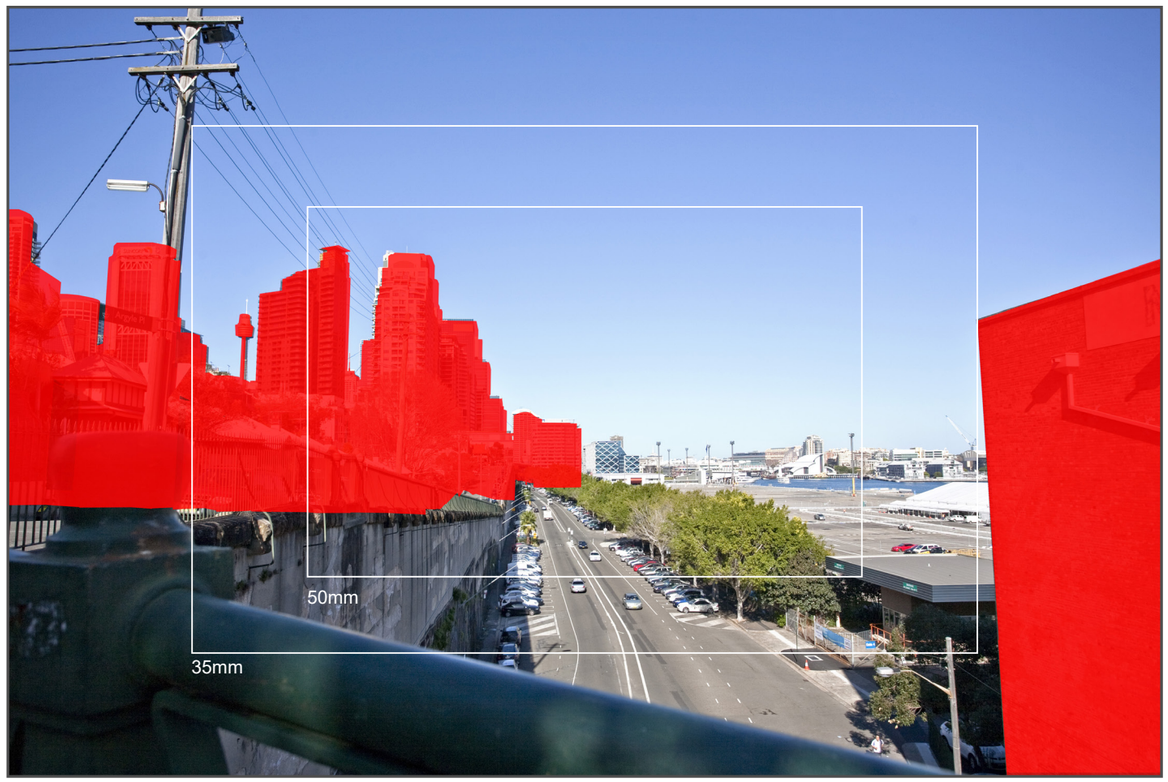


Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	HICKSON ROAD
Camera R.L.	17.5m
MGA coords:	X: 333734.347, Y: 6252097.407
Lens:	24mm
Dimensions:	4368 x 2912
Date:	18/06/2010 12:30 PM
Camera:	Canon EOS 5D

Rationale for lens selection

The rationale for using a 24mm lens was to capture the heights of several existing city buildings to the left of the image, and also show the building immediately to the right of the viewer. Including the handrail in this image also visually desribes that the viewer is standing on the bridge.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Original photo with crop marks to identify the filed of view of longer lens sizes.

Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	KENT ST (CNR MARGARET ST)
Camera R.L.	17.9m
MGA coords:	X: 333899.463, Y: 6251329.789
Lens:	20mm
Dimensions:	4368 x 2912
Date:	2/06/2010 2:19 PM
Camera:	Canon EOS 5D

Rationale for lens selection

The rationale for using a 20mm lens was to capture the heights of the Westpac building, while also providing enough room to see the extent of the future Barangaroo buildings and the approved concept plan.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

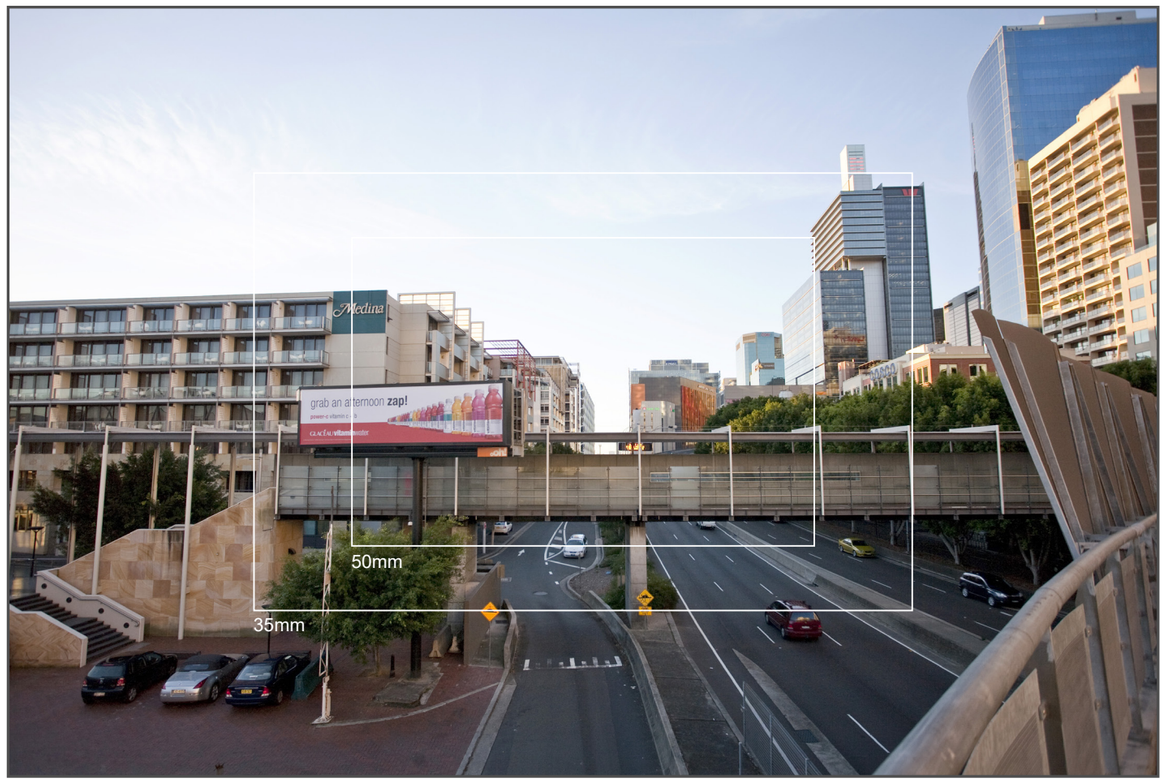
Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.



Original photo with crop marks to identify the filed of view of longer lens sizes.

Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	SHELLEY ST FROM KING ST BRIDGE
Camera R.L.	11.8m
MGA coords:	X: 333775.939, Y: 6250899.372
Lens:	20mm
Dimensions:	4368 x 2912
Date:	8/06/2010 5:41 PM
Camera:	Canon EOS 5D

Rationale for lens selection

The rationale for using a 20mm lens was to capture the heights of several existing city buildings to the right of the image, and also show some of the built form to the left of the viewer. Including the handrail in this image also visually desribes that the viewer is standing on the bridge.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

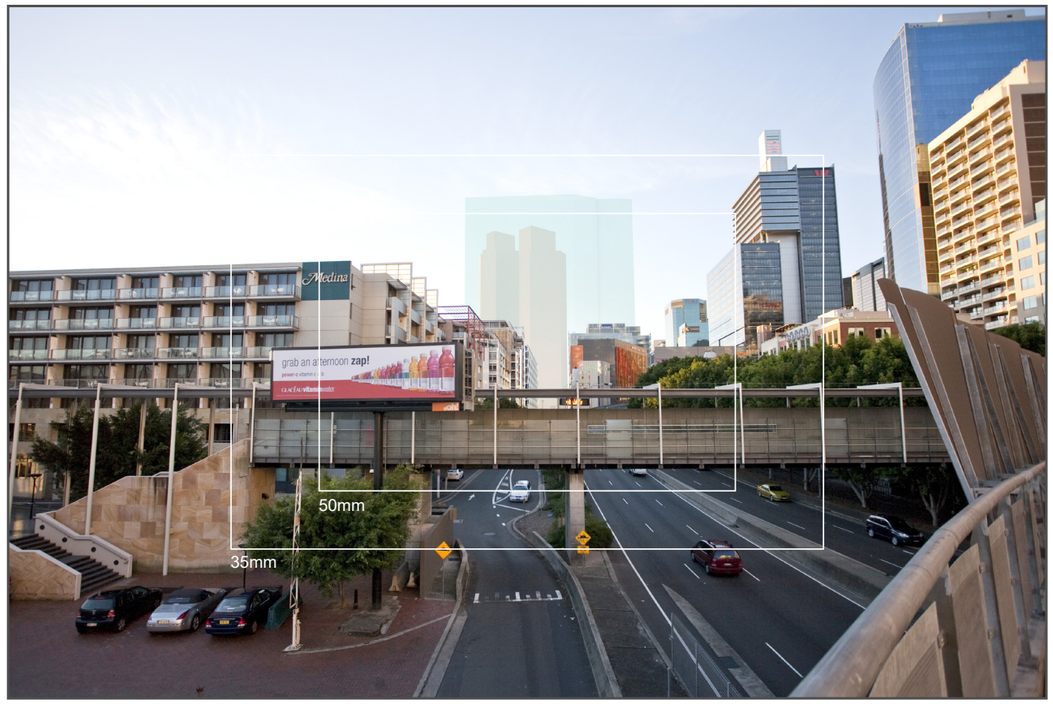


Image showing massing of the Approved Concept Plan Amendment (Mod 8)

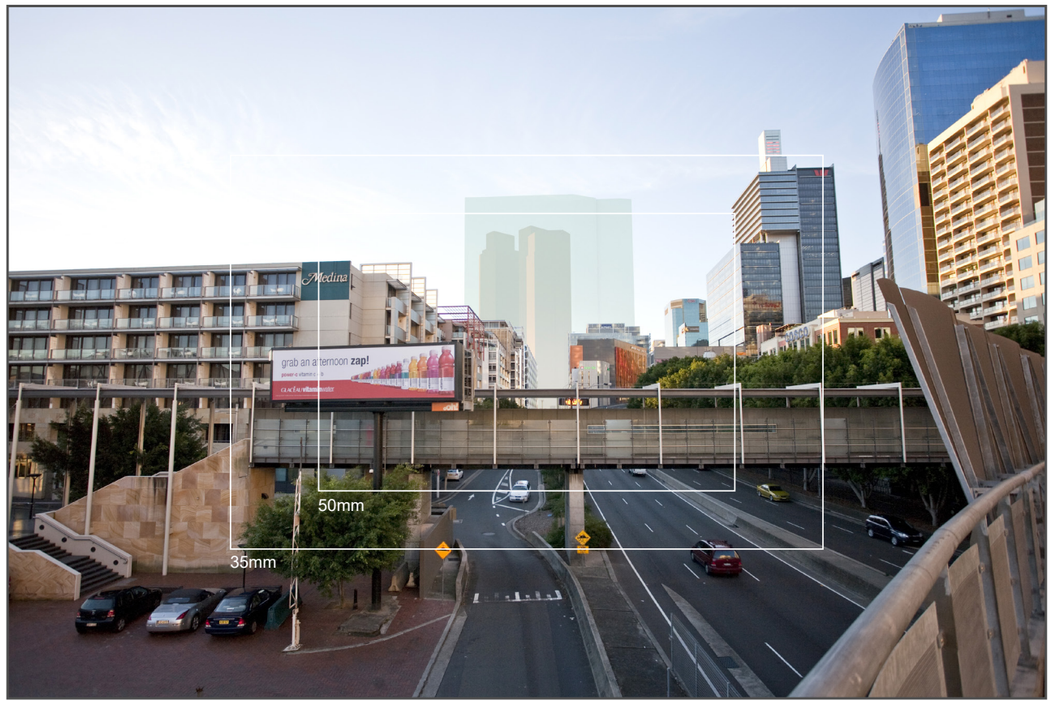


Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

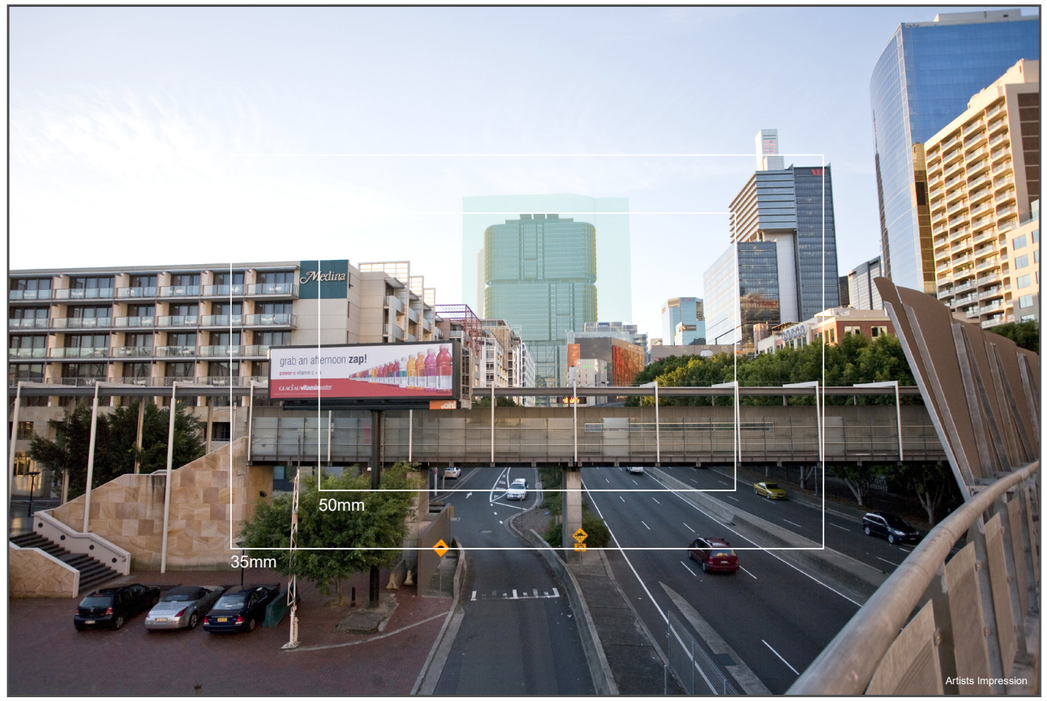


Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

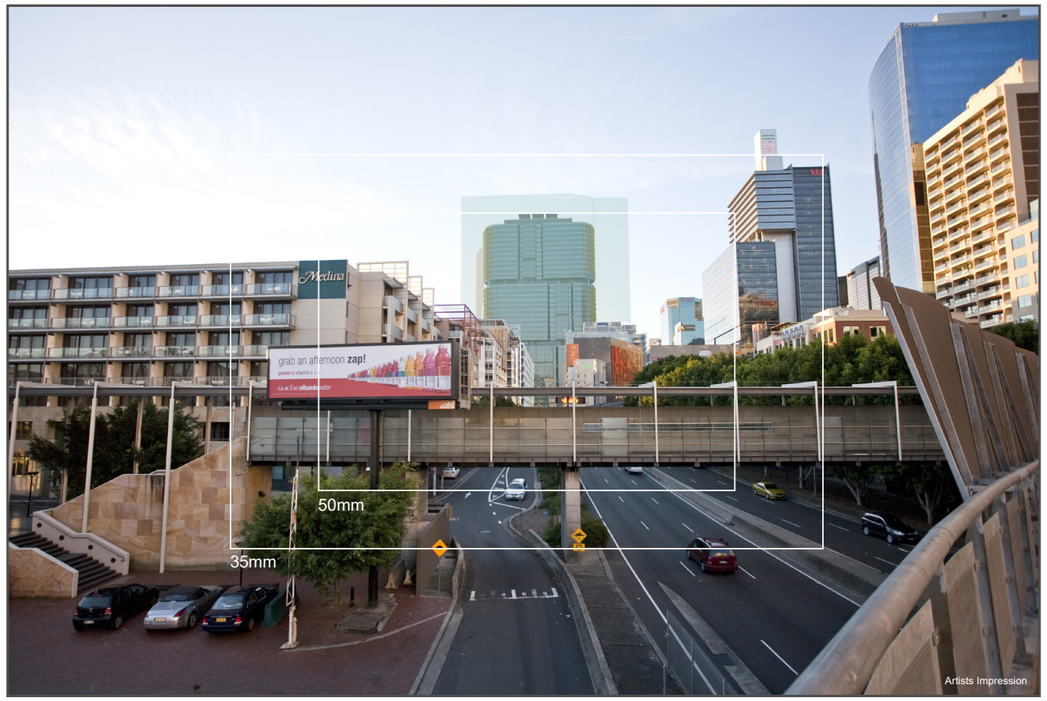


Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

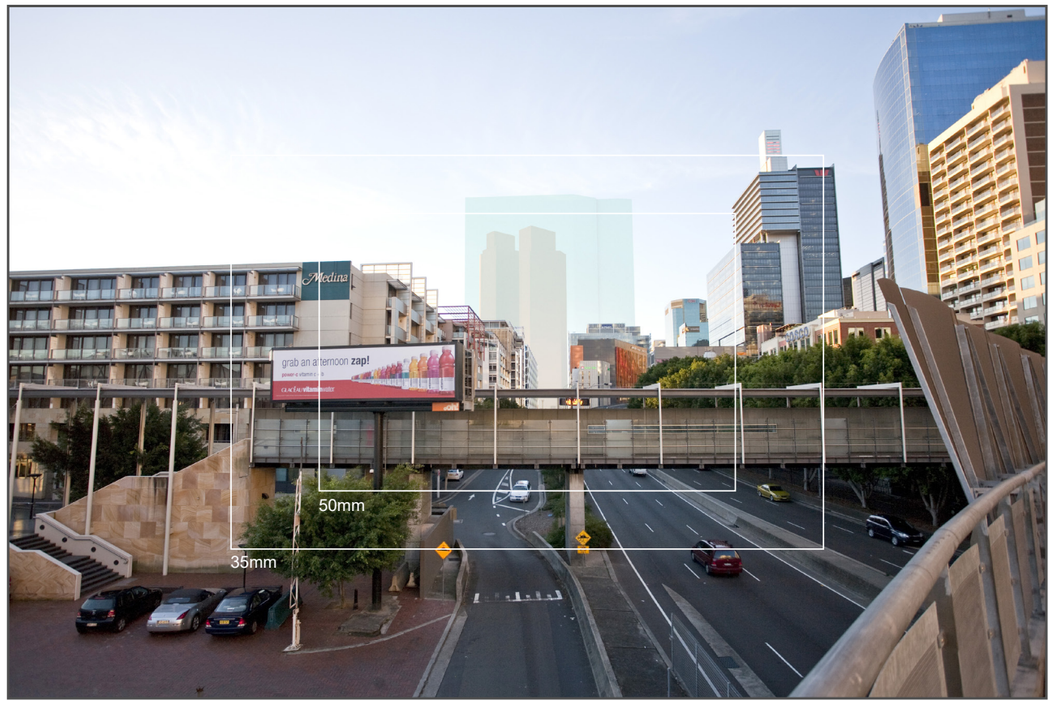


Image showing massing of the Approved Concept Plan Amendment (Mod 8)

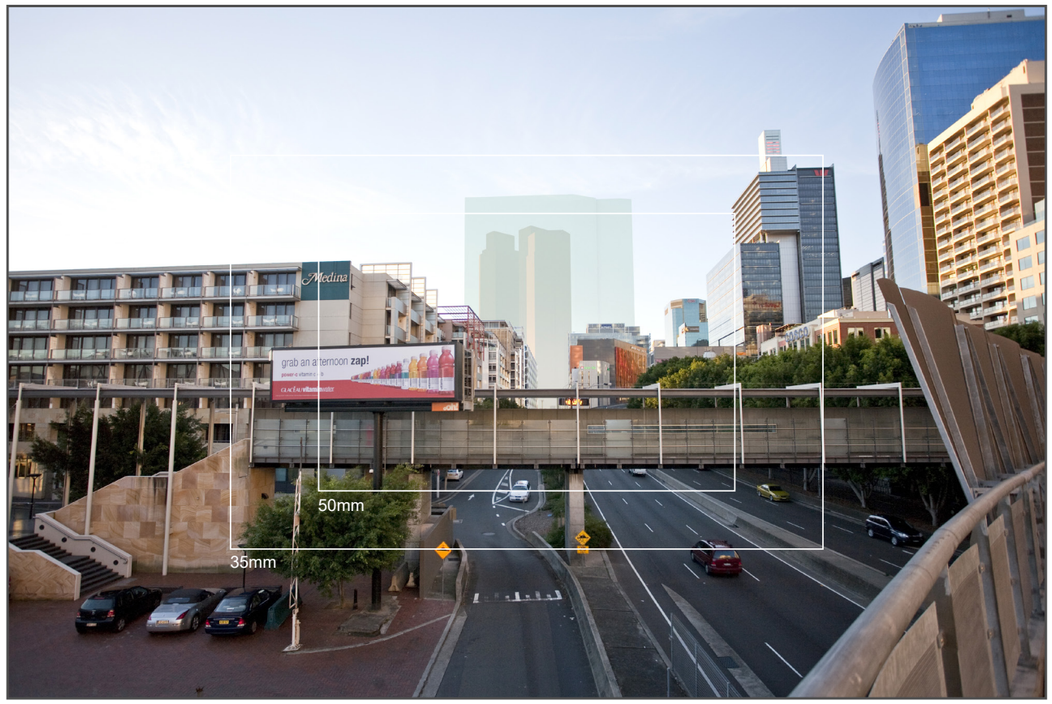


Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

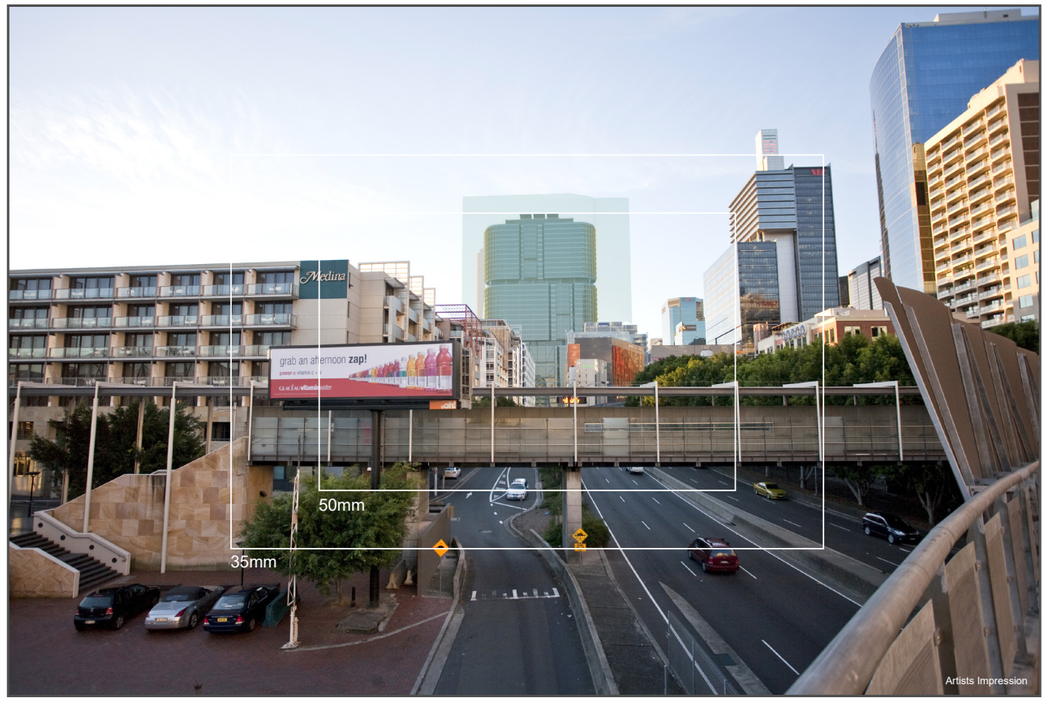


Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

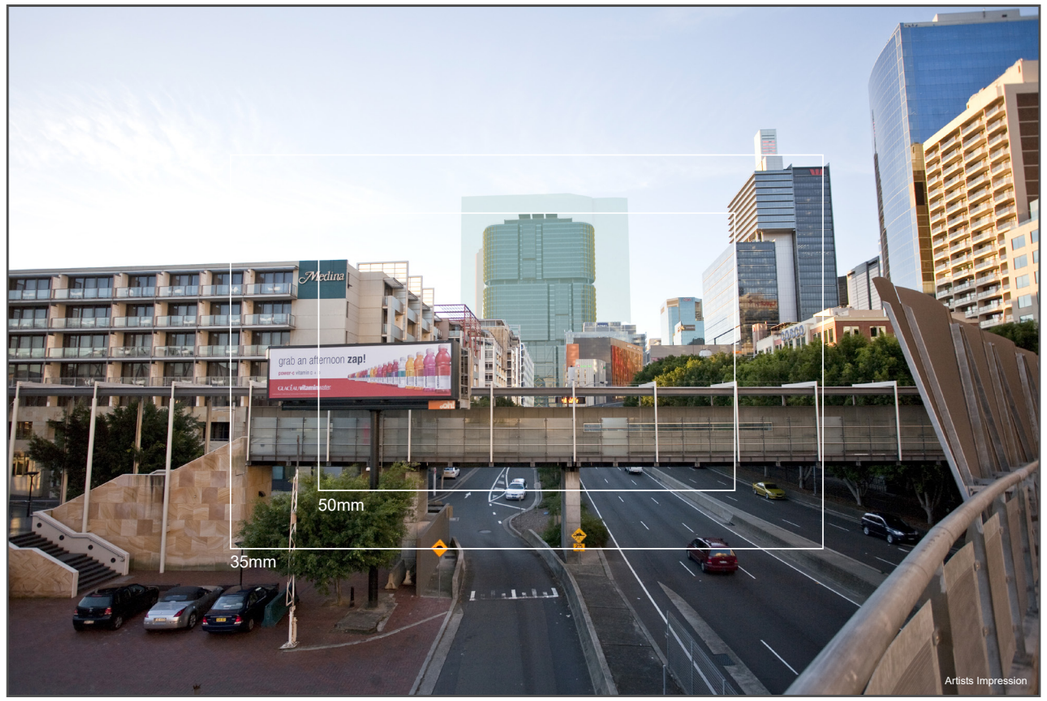


Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Original photo with crop marks to identify the field of view of longer lens sizes.

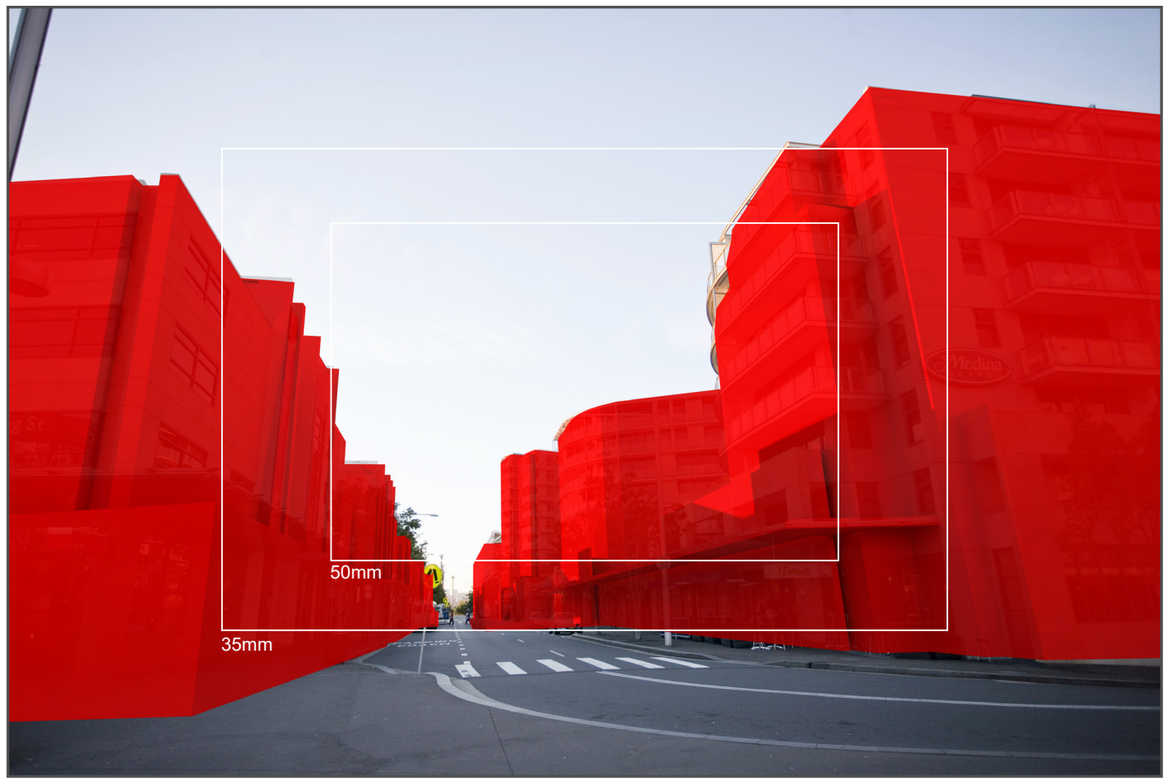


Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	LIME STREET
Camera R.L.	6.7m
MGA coords:	X: 333693.502, Y: 6250920.272
Lens:	22mm
Dimensions:	4368 x 2912
Date:	8/06/2010 5:47 PM
Camera:	Canon EOS 5D

Rationale for lens selection

The rationale for using a 22mm lens was that to show the width of the street in front of the viewer, as well as to capture the height of the lime st buildings.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Original photo with crop marks to identify the field of view of longer lens sizes.

Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	HIGH STREET
Camera R.L.	16.0m
MGA coords:	X: 333744.51, Y: 6252031.60
Lens:	25mm
Dimensions:	5616 x 3744
Date:	14/11/2013, 12:35:12 PM
Camera:	Canon EOS 5D Mark II

Rationale for lens selection

The rationale for using a 25mm lens was that to show the width of the street in front of the viewer, as well as to capture the height of the High st buildings.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

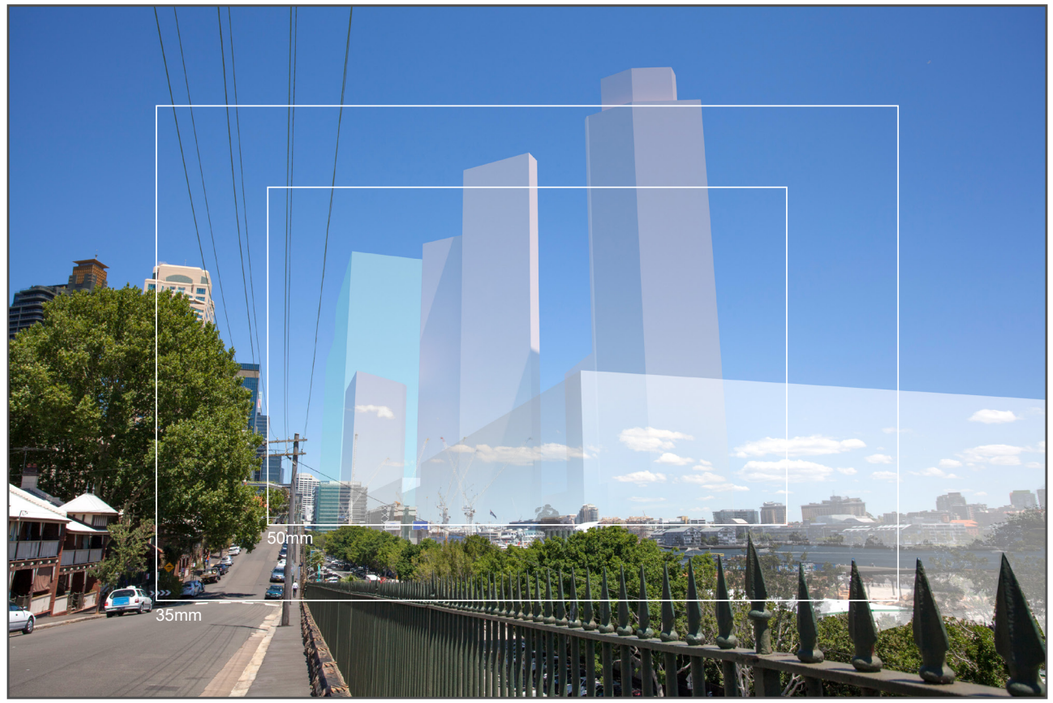


Image showing massing of the Approved Concept Plan Amendment (Mod 8)

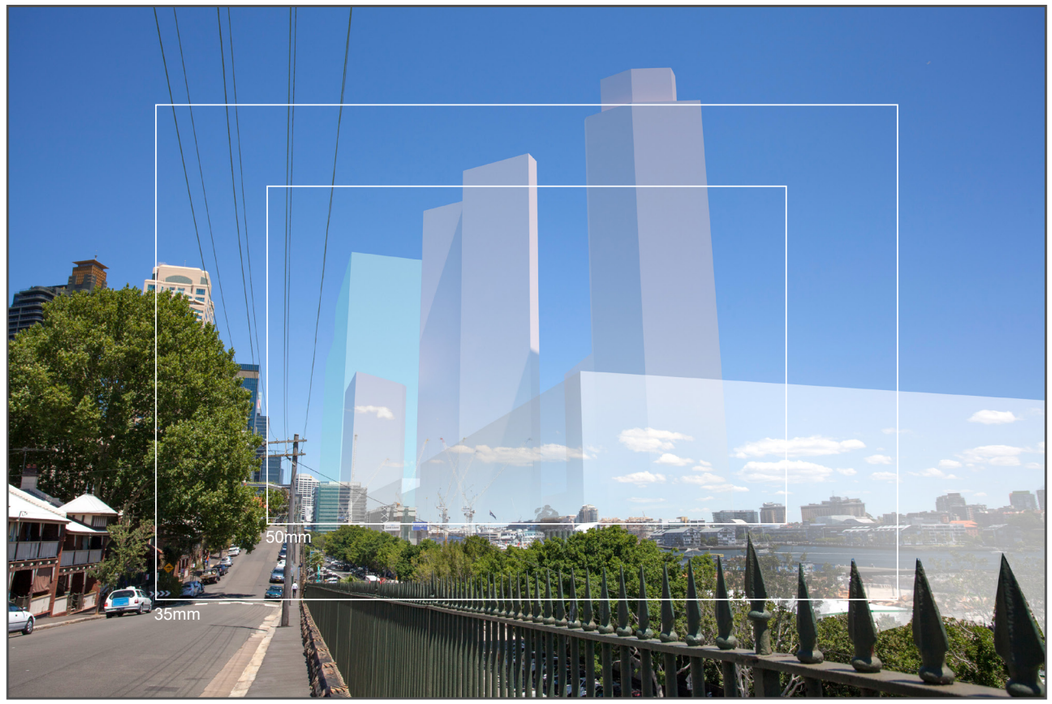


Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

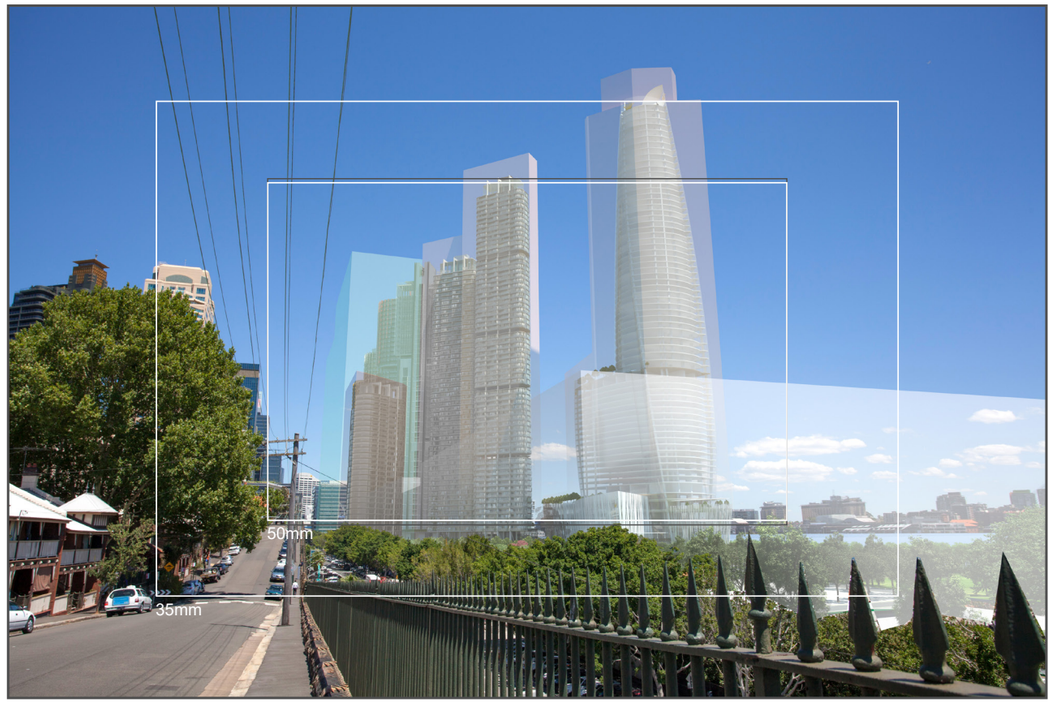


Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

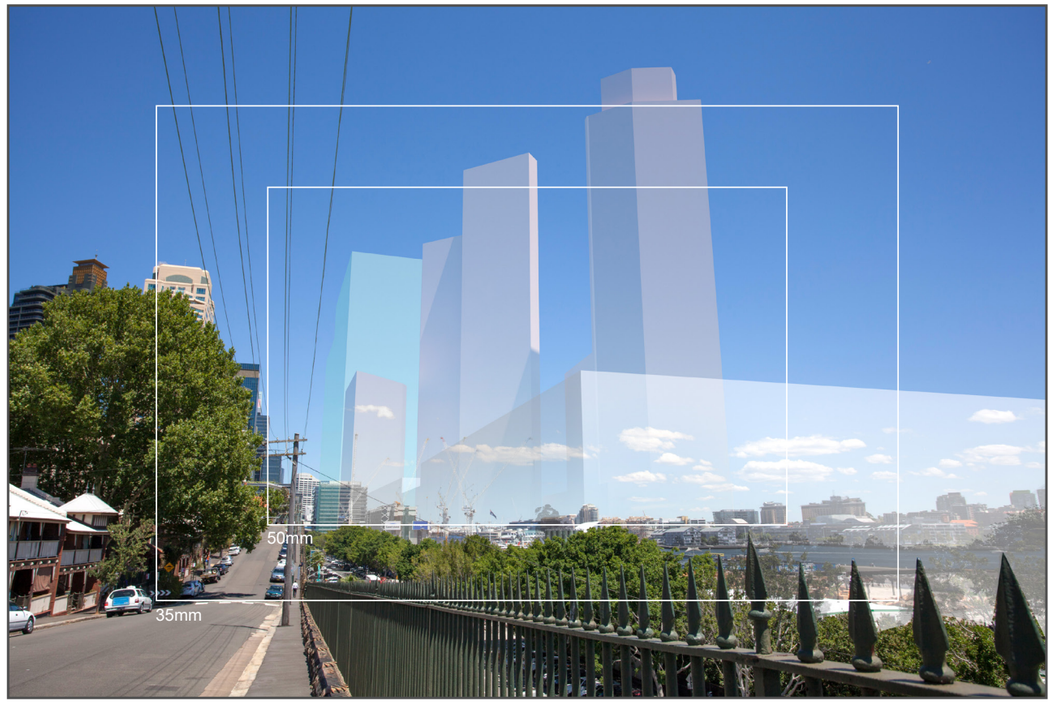


Image showing massing of the Approved Concept Plan Amendment (Mod 8)

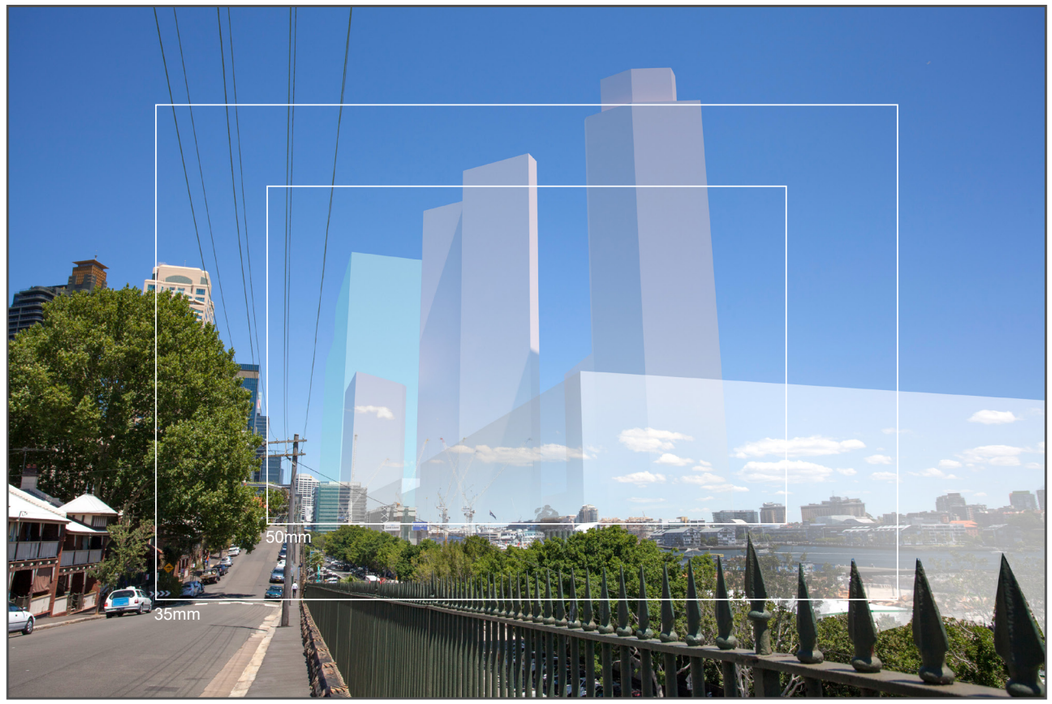


Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

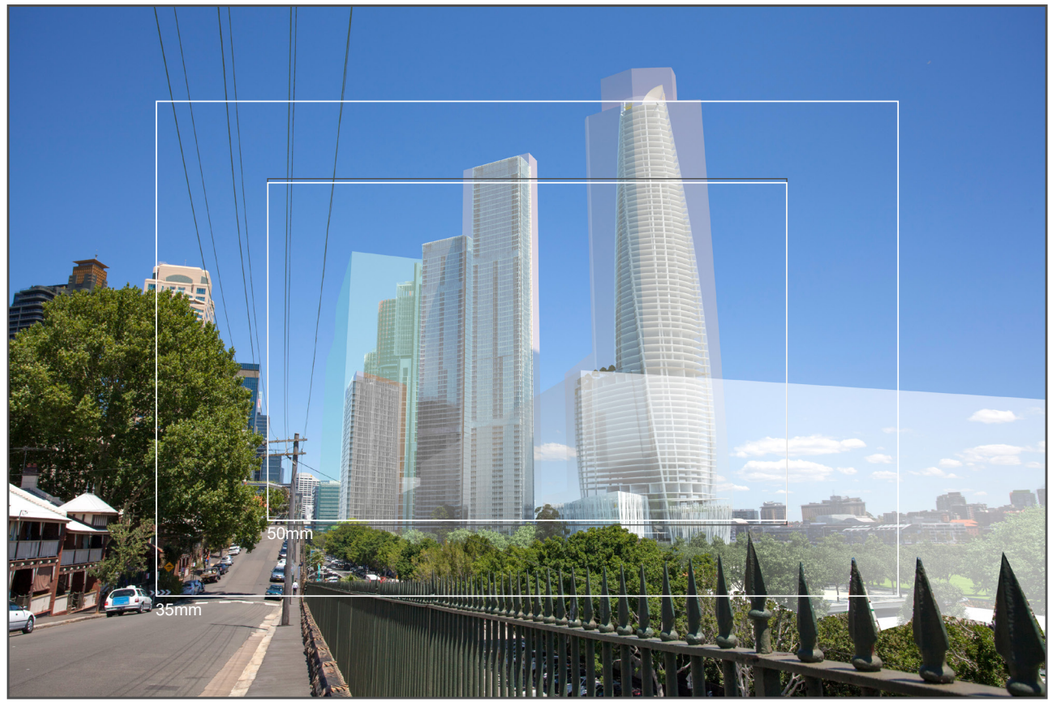


Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Original photo with crop marks to identify the field of view of longer lens sizes.

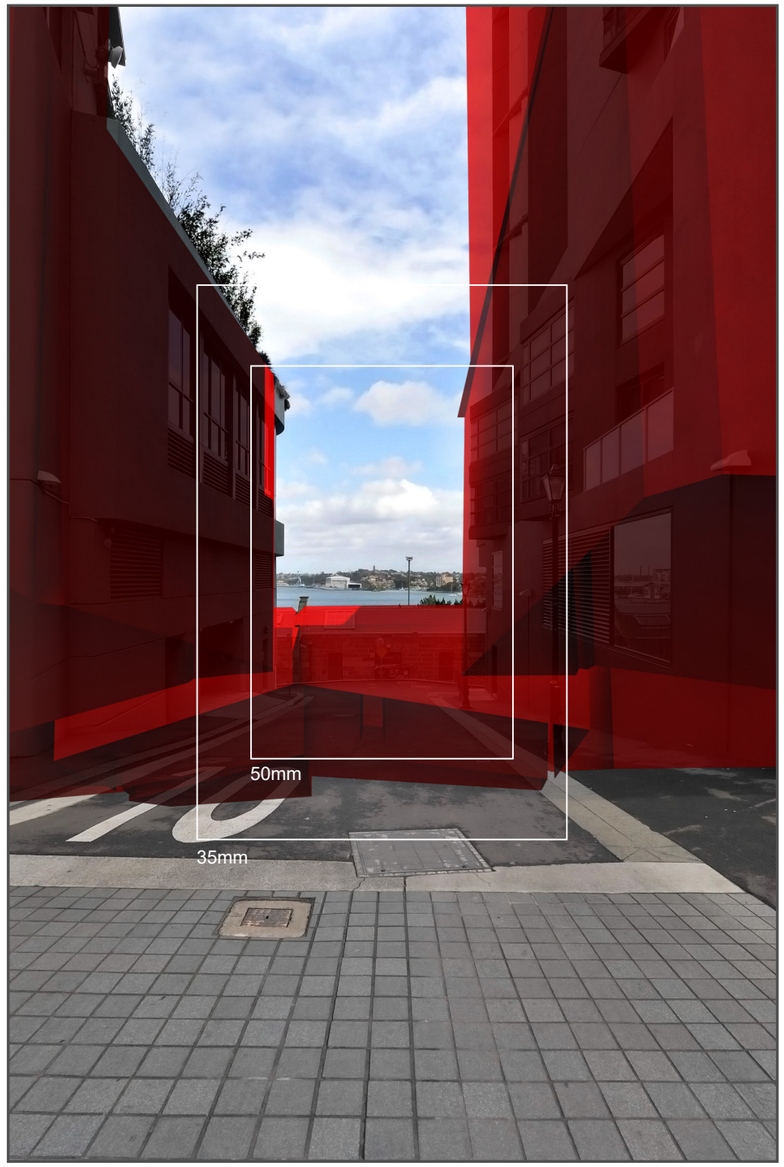


Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Photographic data

Location:	GAS LANE
Camera R.L.	21.17m
MGA coords:	X: 333142.1113, Y: 6251923.256
Lens:	17mm
Dimensions:	4368 x 2912
Date:	2/06/2010 4:55 PM
Camera:	Canon EOS 5D

Rationale for lens selection

The rationale for using a 17mm lens was to capture as much of the barangaroo buildings as possible as we were very close to the subject. We also wanted to show some of the sides of the Gas lane buildings .

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan amendment (Mod 8) with indicative design.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Original photo with crop marks to identify the field of view of longer lens sizes.

Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	MILLERS POINT (OBSERVATORY HILL)
Camera R.L.	43.2m
MGA coords:	X: 333894.874, Y: 6252001.792
Lens:	40mm
Dimensions:	4368 x 2912
Date:	2/06/2010 2:57 PM
Camera:	Canon EOS 5D

Rationale for lens selection

The rationale for using a 40mm lens was that from this specific location the wider lens only captured more of the underside of the canopy and did not see any additional built form. Therfore we selected a 40mm lens as this balanced the amount of built form vs the surrounding nature in the image.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Original photo with crop marks to identify the field of view of longer lens sizes.

Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	CLYNE RESERVE
Camera R.L.	20.78m
MGA coords:	X: 333657.71, Y: 6252257.07
Lens:	25mm
Dimensions:	5616 x 3744
Date:	14/11/2013, 12:28:48 PM
Camera:	Canon EOS 5D Mark II

Rationale for lens selection

The rationale for using a 25mm lens was to provide enough immediate context from the camera location, while still being able to see enough of the Barangaroo buildings in the distance.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

Note - Harbour Control Tower removed since Mod 8

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.
Note - Harbour Control Tower removed since Mod 8

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.
Note - Harbour Control Tower removed since Mod 8

Original photo with crop marks to identify the field of view of longer lens sizes.

Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	MUNN RESERVE
Camera R.L.	18.12m
MGA coords:	X: 333731.60, Y: 6252111.36
Lens:	25mm
Dimensions:	5616 x 3744
Date:	14/11/2013, 12:16:37 PM
Camera:	Canon EOS 5D Mark II

Rationale for lens selection

The rationale for using a 25mm lens was to provide enough immediate context from the camera location, while still being able to see enough of the Barangaroo buildings in the distance.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

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Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Original photo with crop marks to identify the field of view of longer lens sizes.

Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	SYDNEY HARBOUR BRIDGE
Camera R.L.	47.63m
MGA coords:	X: 334214.97, Y: 6252259.87
Lens:	25mm
Dimensions:	5616 x 3744
Date:	14/11/2013, 12:51:10 PM
Camera:	Canon EOS 5D Mark II

Rationale for lens selection

The rationale for using a 25mm lens was to provide enough immediate context from the camera location, while still being able to see enough of the Barangaroo buildings in the distance.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

Note - Harbour Control Tower removed since Mod 8

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.
Note - Harbour Control Tower removed since Mod 8

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.
Note - Harbour Control Tower removed since Mod 8

Original photo with crop marks to identify the filed of view of longer lens sizes.

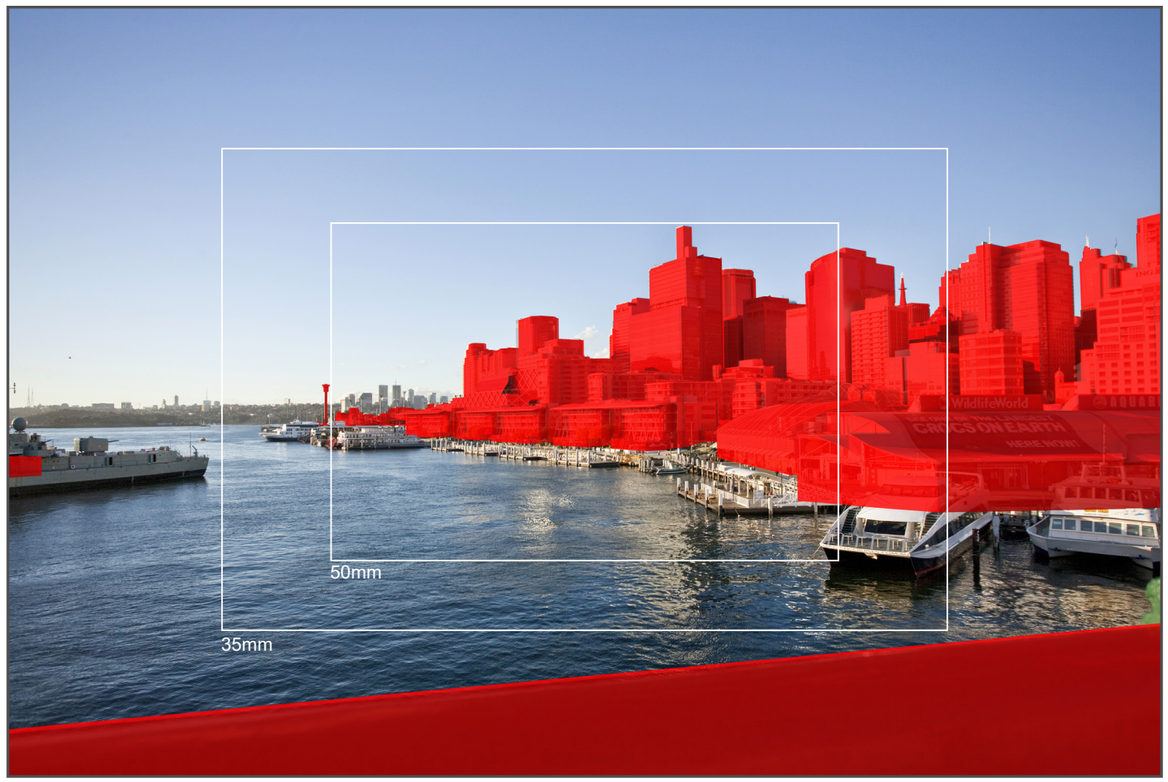


Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	DARLING HARBOUR (PYRMONT BRIDGE)
Camera R.L.	13.6m
MGA coords:	X: 333547.744, Y: 6250747.816
Lens:	22mm
Dimensions:	4368 x 2912
Date:	8/06/2010 5:15 PM
Camera:	Canon EOS 5D

Rationale for lens selection

The rationale for using a 22mm lens was to capture the surrounding city buildings, while capturing some of the foreground elements so that the viewer could feel like they were standing on the bridge.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image. (See apendix B)

Note - Harbour Control Tower removed since Mod 8

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

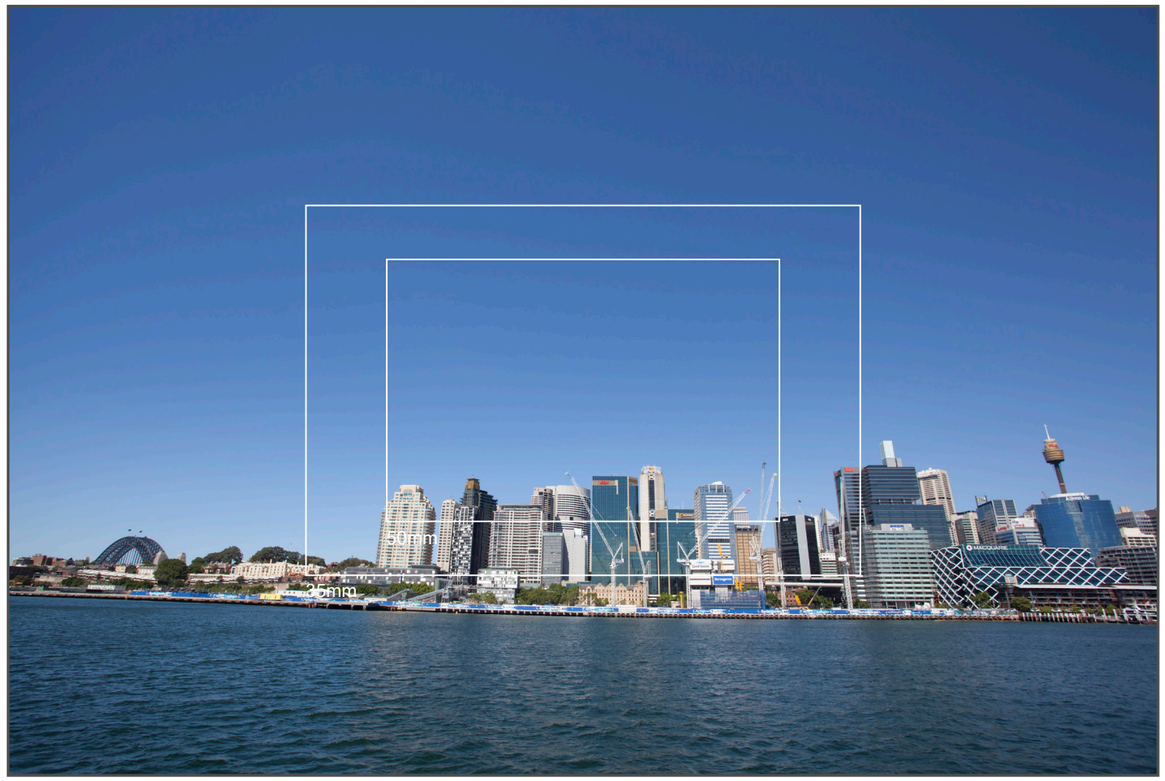
Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.
Note - Harbour Control Tower removed since Mod 8

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.
Note - Harbour Control Tower removed since Mod 8



Original photo with crop marks to identify the field of view of longer lens sizes.

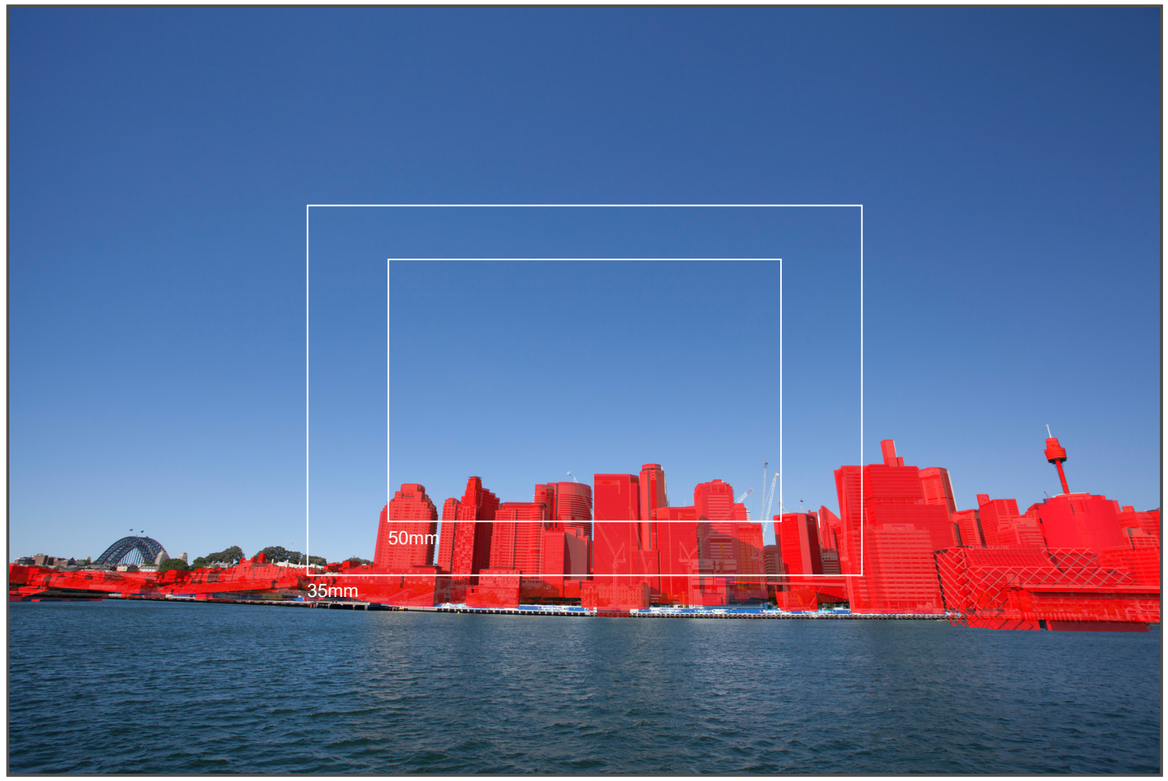


Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	BALLAARAT PARK
Camera R.L.	3.90m
MGA coords:	X: 333259.86, Y: 6251452.93
Lens:	17mm
Dimensions:	4368 x 2912
Date:	2/06/2010 2:57 PM
Camera:	Canon EOS 5D Mark II

Rationale for lens selection

The rationale for using a 17mm lens was to be able to show the entire Mod 8 buildings, along with some of the surrounding buildings.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

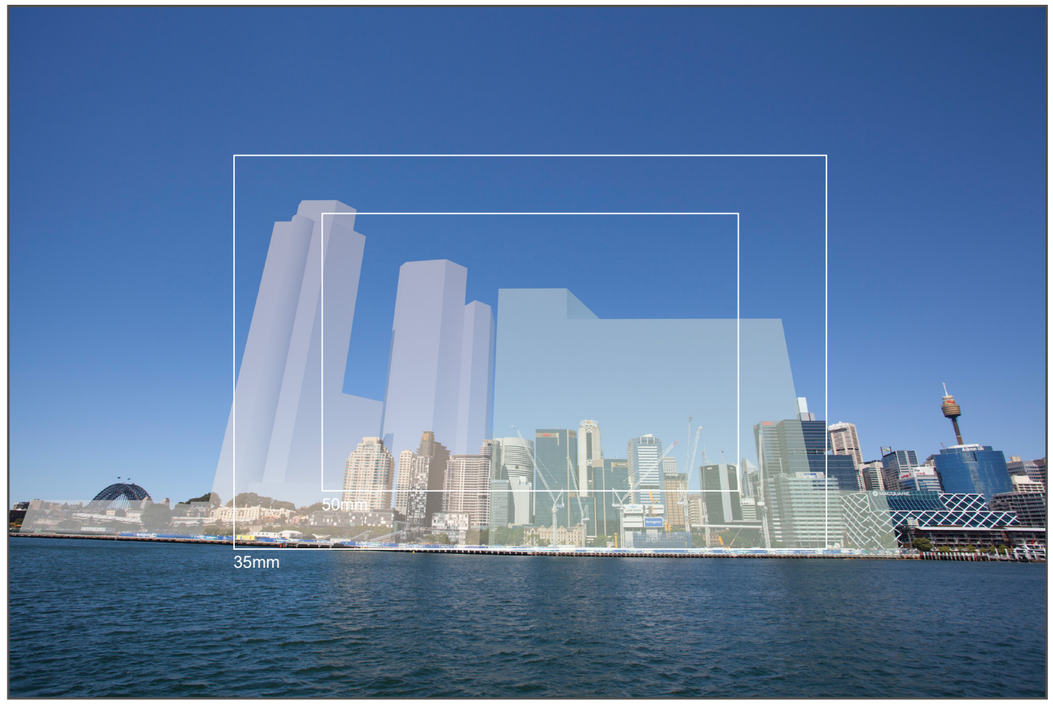


Image showing massing of the Approved Concept Plan Amendment (Mod 8)

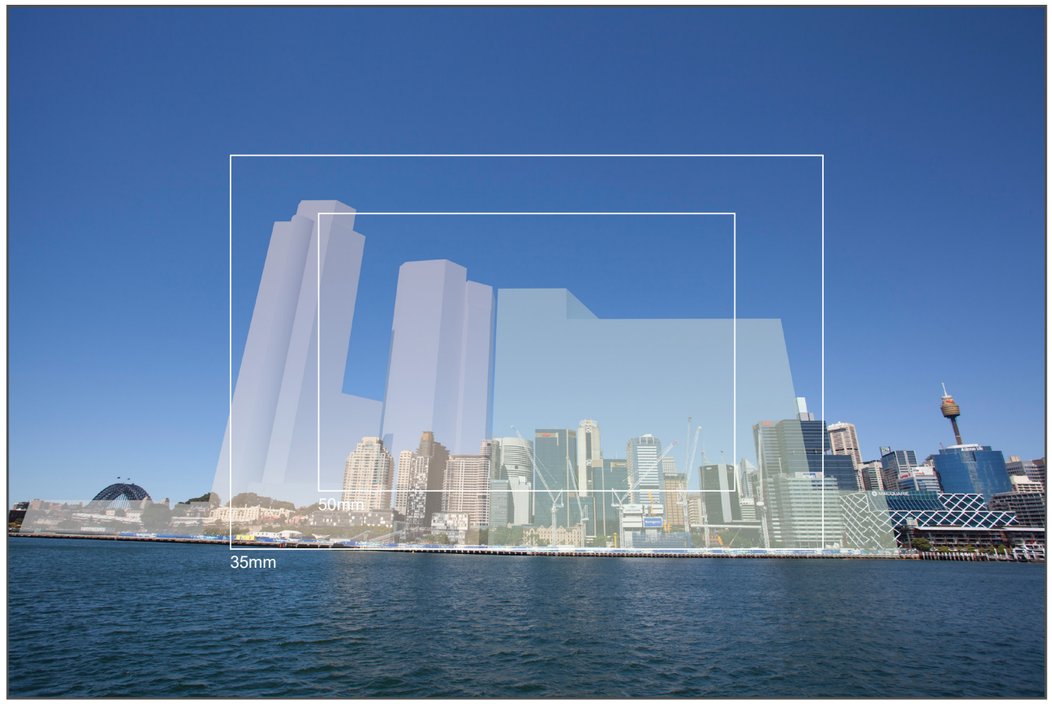


Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

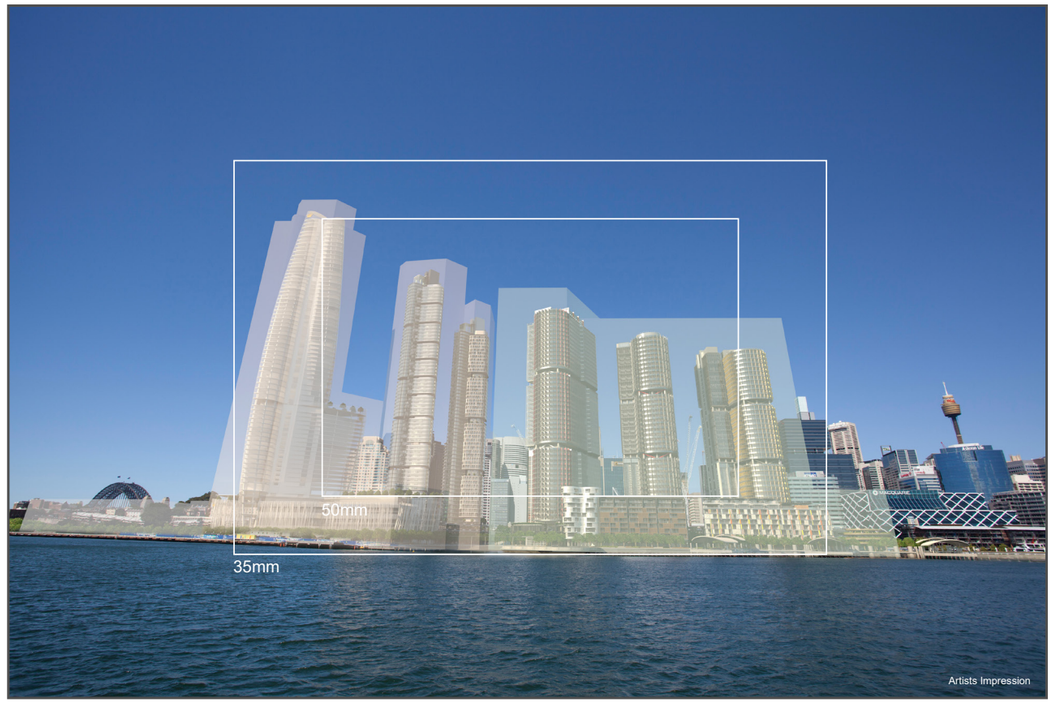


Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

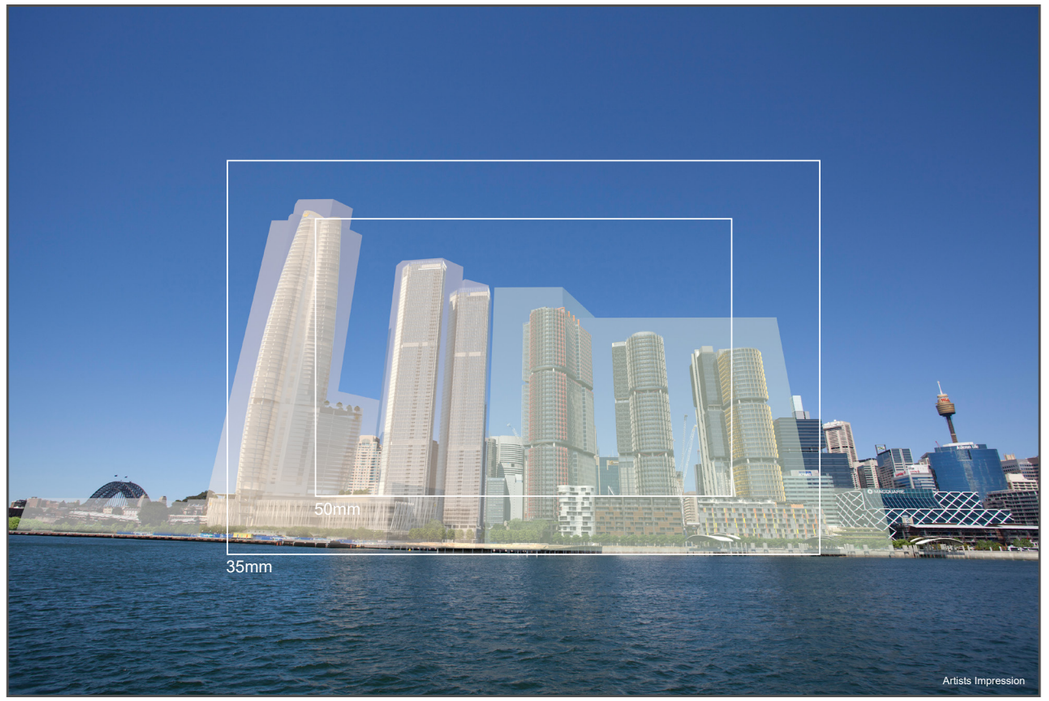


Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

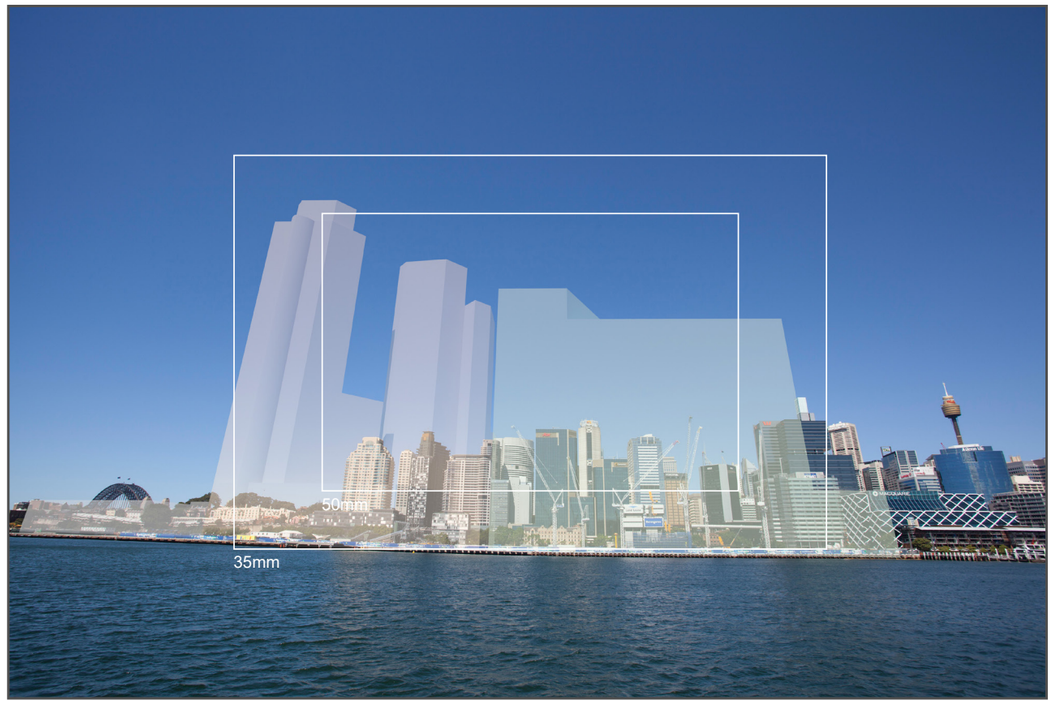


Image showing massing of the Approved Concept Plan Amendment (Mod 8)

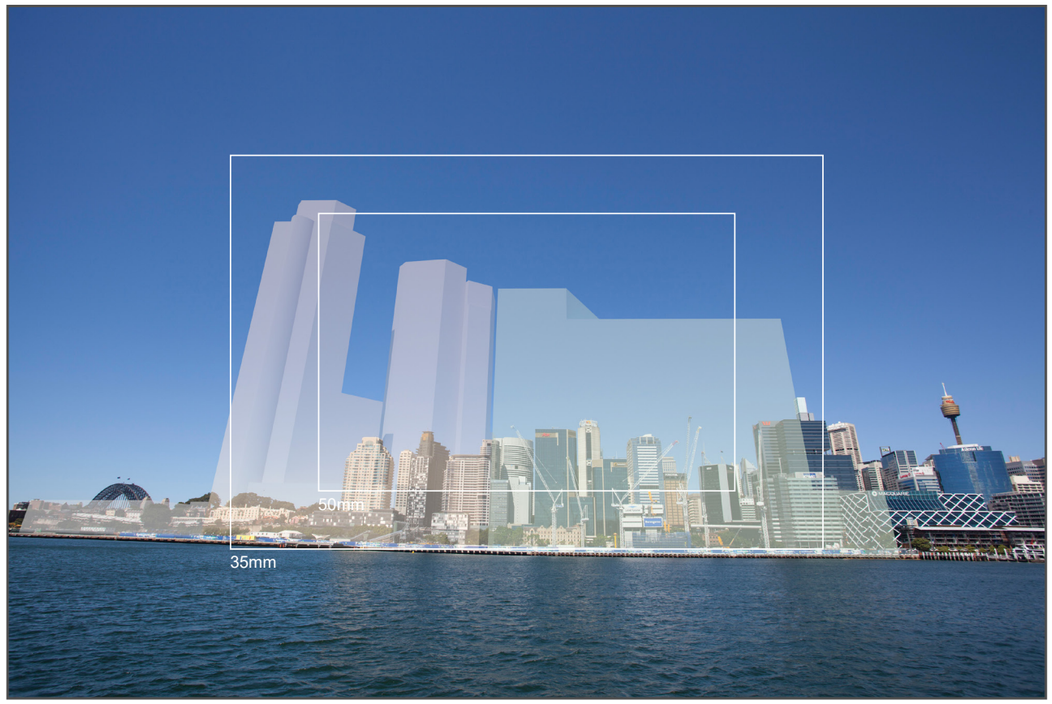


Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

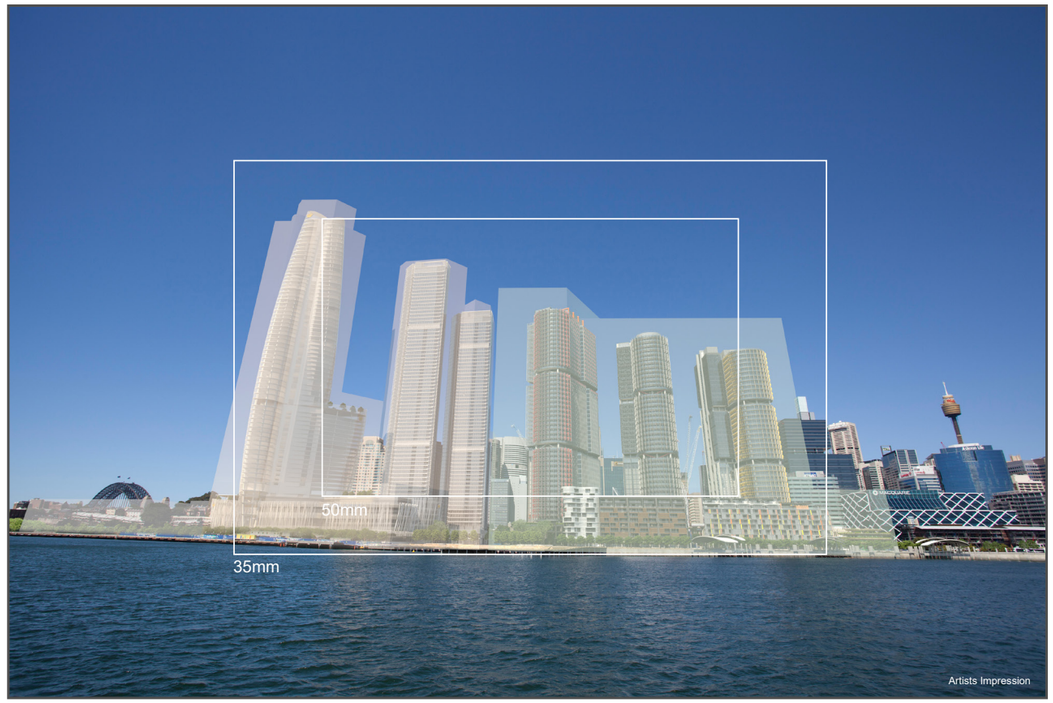


Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

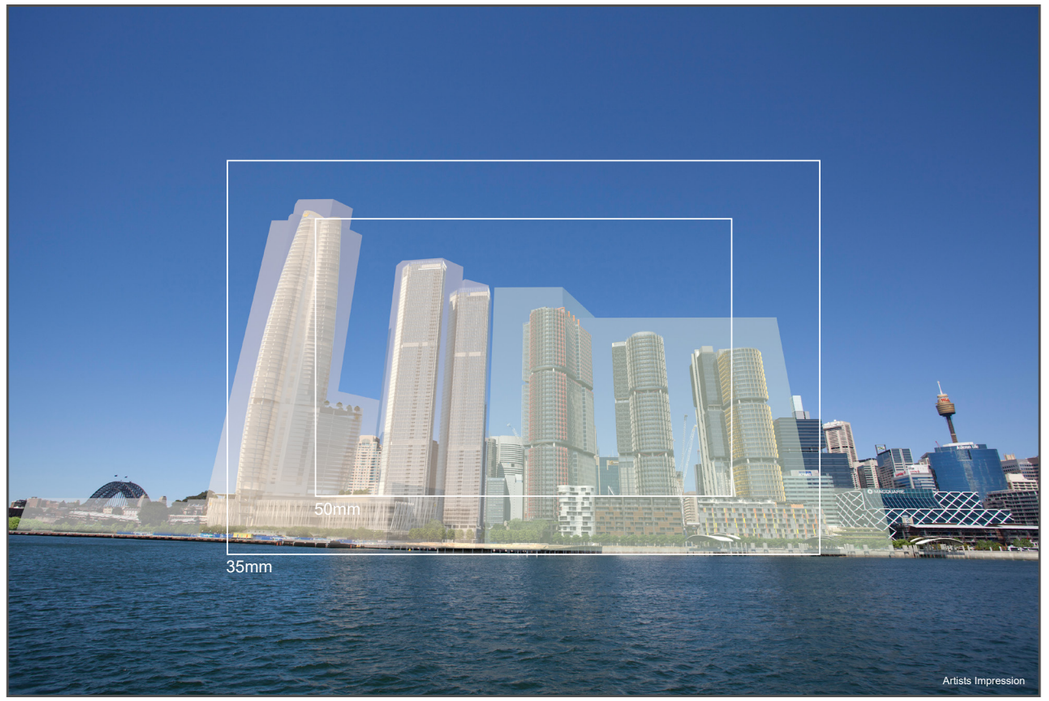


Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Original photo with crop marks to identify the field of view of longer lens sizes.

Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	PYRMONT PARK PIER
Camera R.L.	4.2m
MGA coords:	X: 333136.251, Y: 6251610.664
Lens:	24mm
Dimensions:	4368 x 2912
Date:	2/06/2010 4:55 PM
Camera:	Canon EOS 5D

Rationale for lens selection

The rationale for using a 24mm lens was to capture as much of the city buildings as possible from the selected position.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

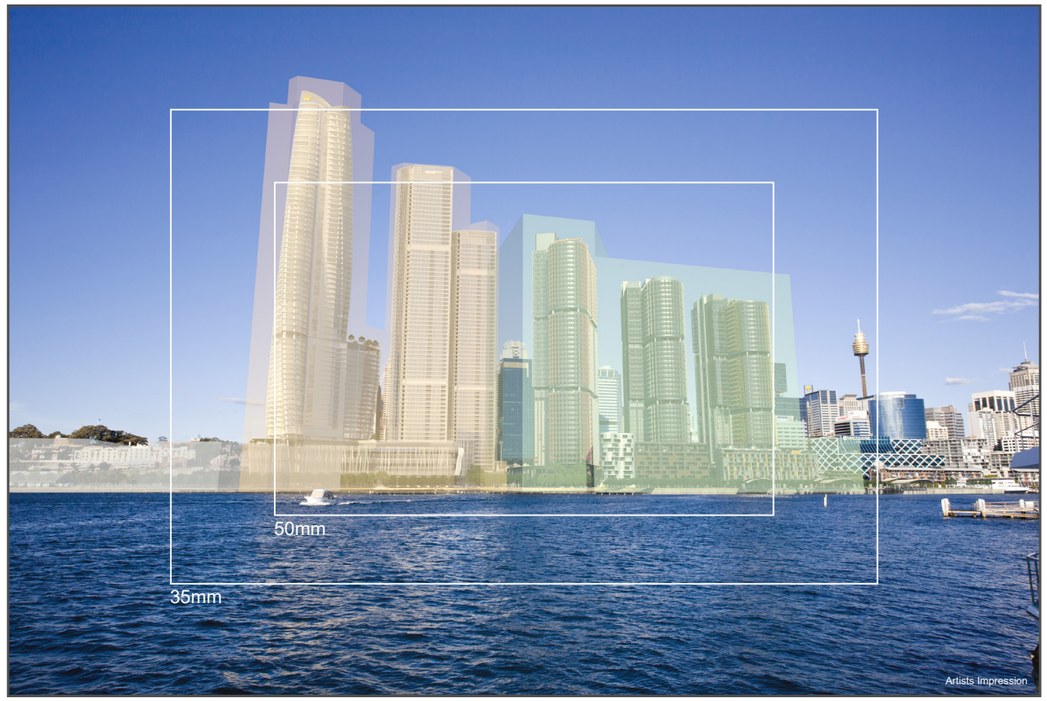


Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

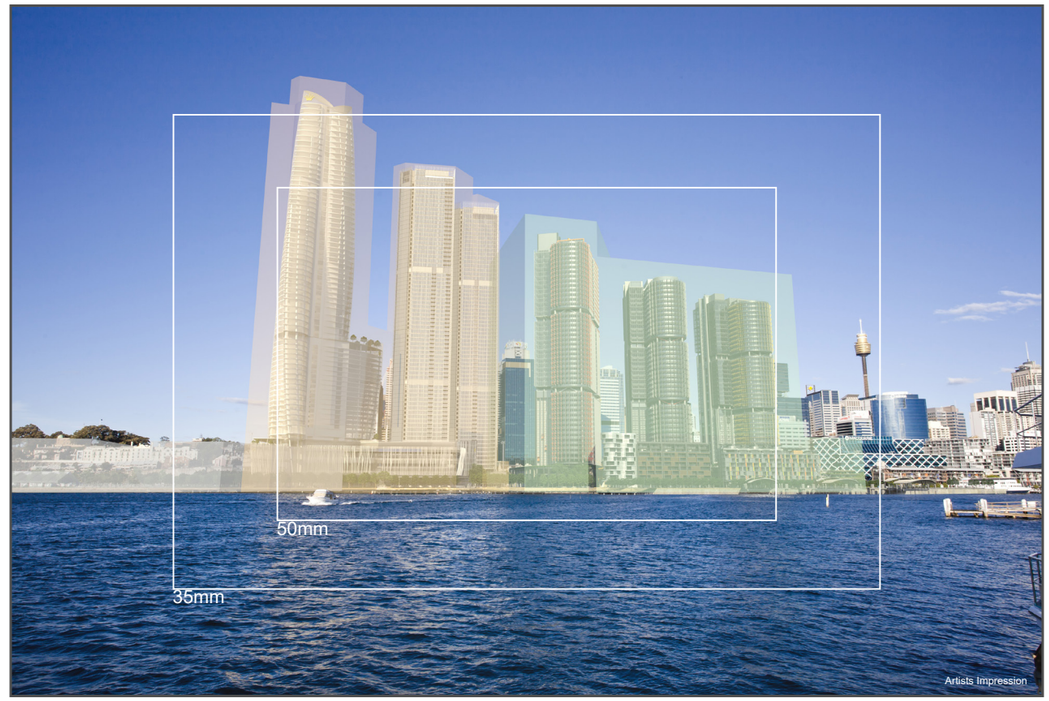


Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

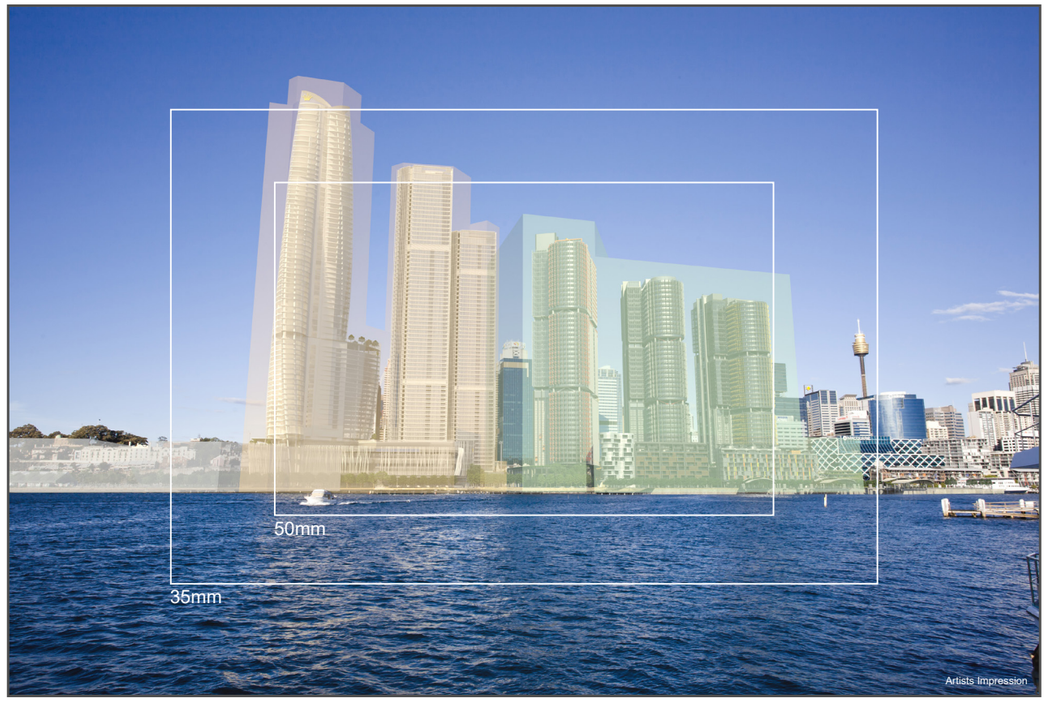


Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

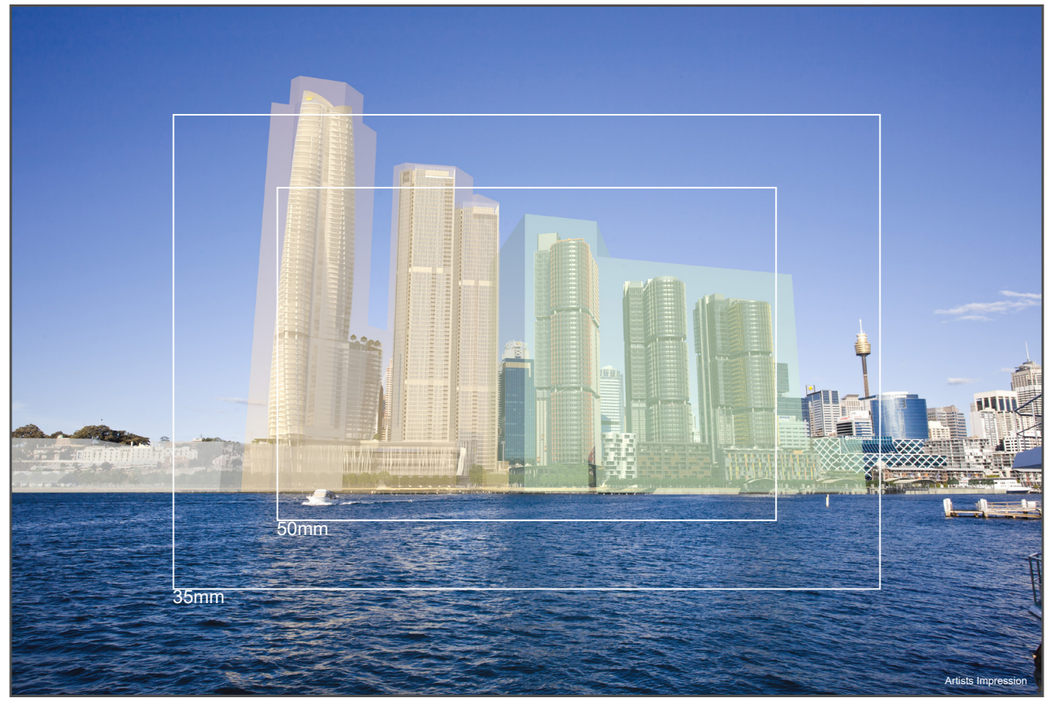


Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Original photo with crop marks to identify the field of view of longer lens sizes.

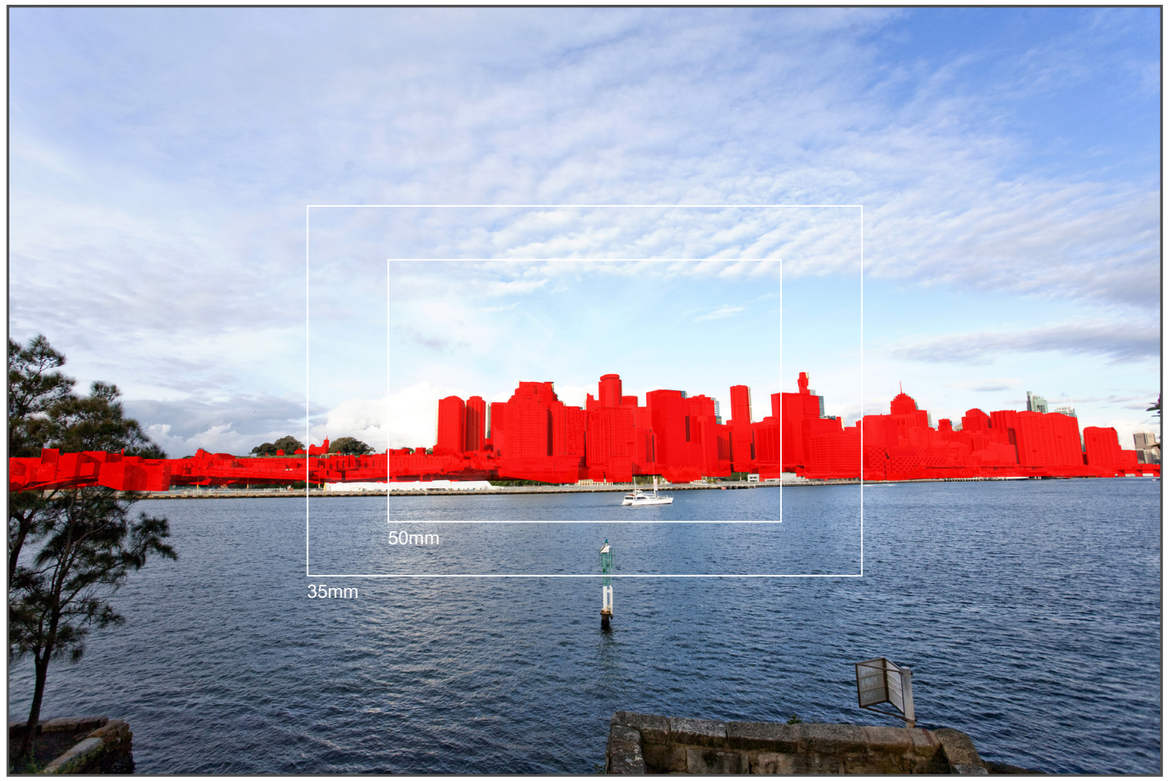


Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	BALMAIN EAST
Camera R.L.	11.6m
MGA coords:	X: 333142.111, Y: 6251923.256
Lens:	17mm
Dimensions:	4368 x 2912
Date:	2/06/2010 4:55 PM
Camera:	Canon EOS 5D

Rationale for lens selection

The rationale for using a 17mm lens was to capture as much of the city buildings as possible from the selected position. We also wanted to show some of the foreground element so the viewer knows where they are standing.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

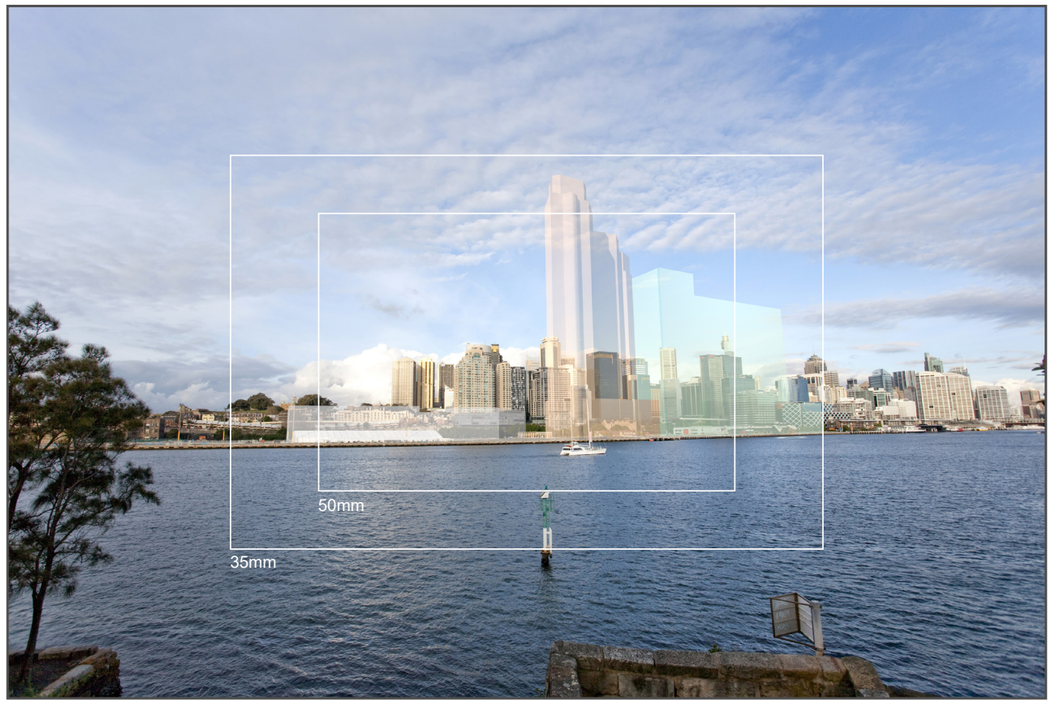


Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

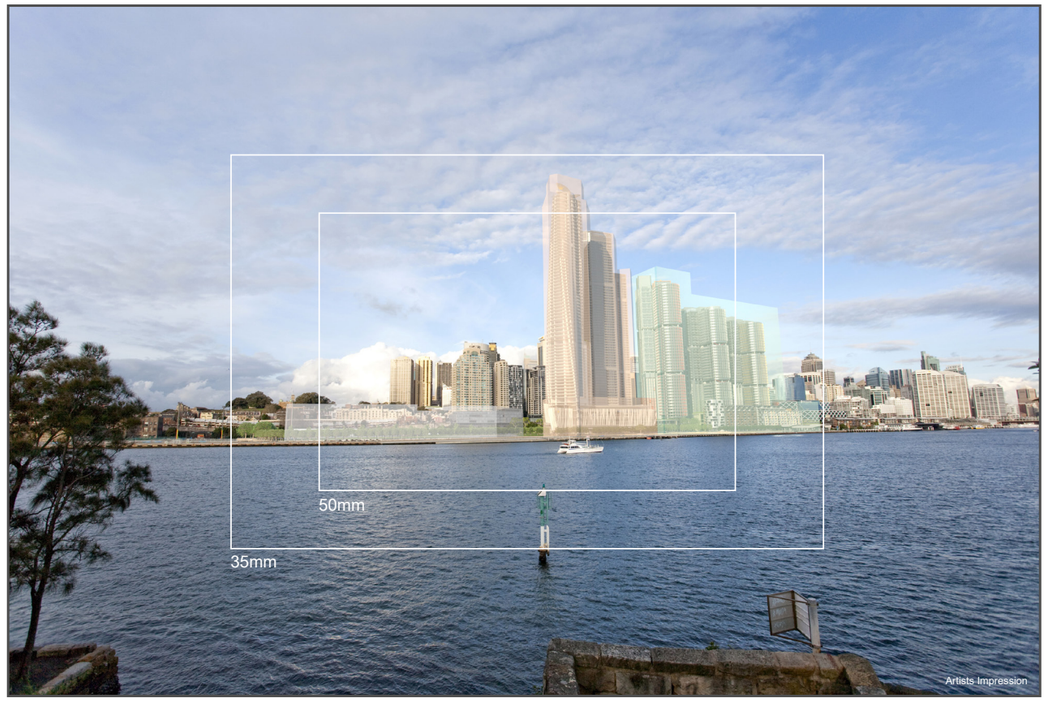


Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

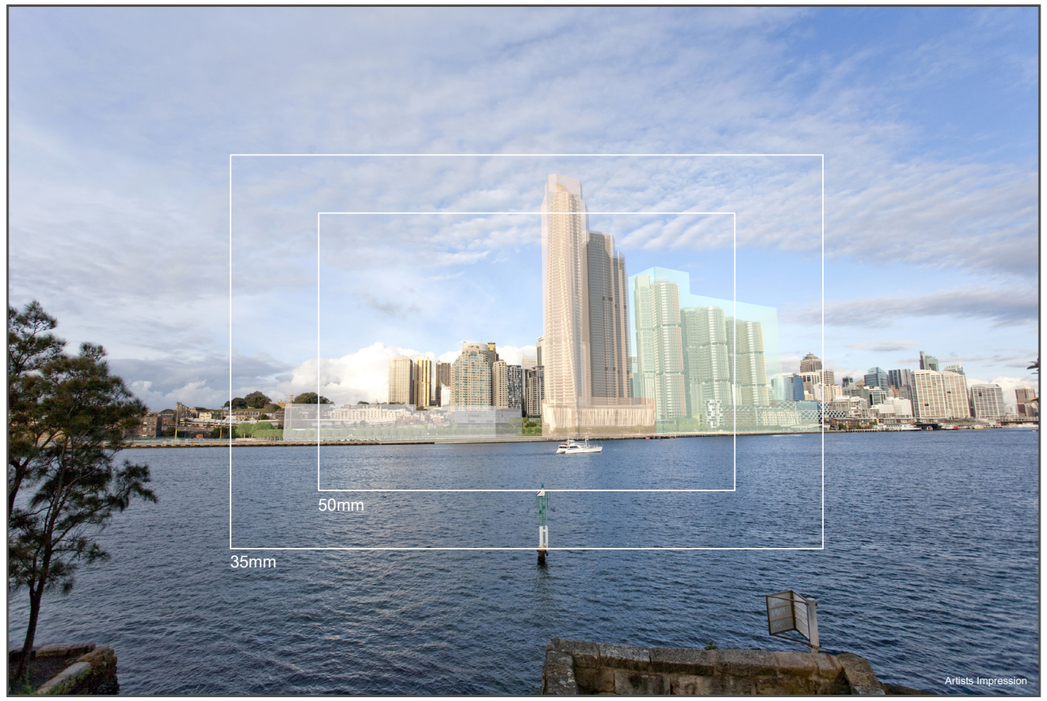


Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

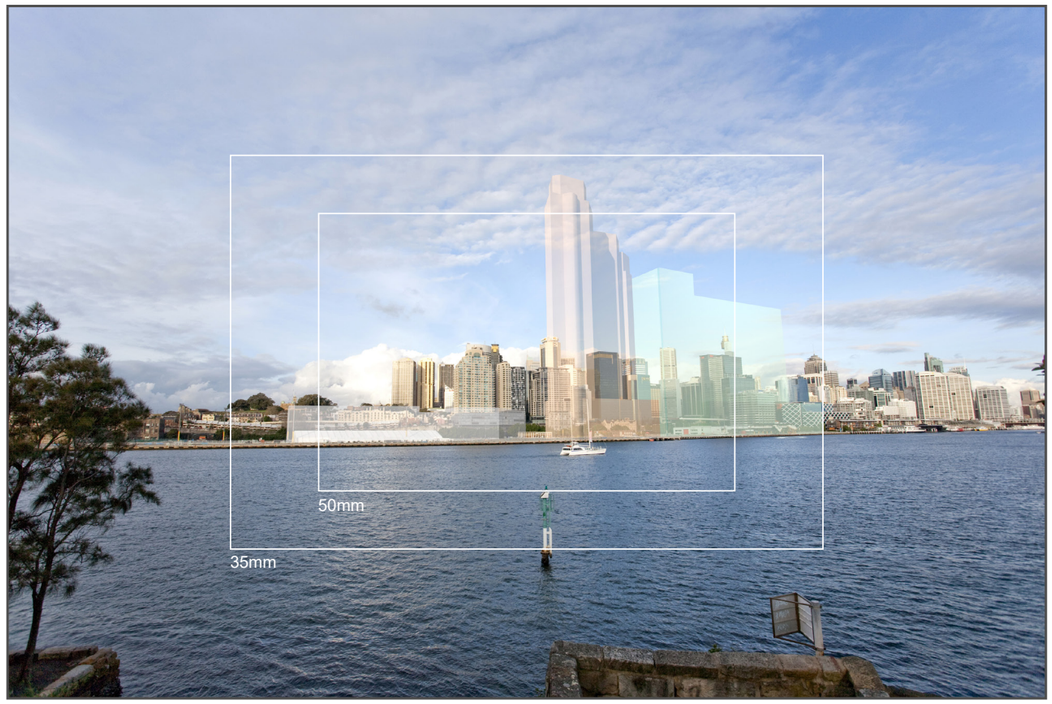


Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

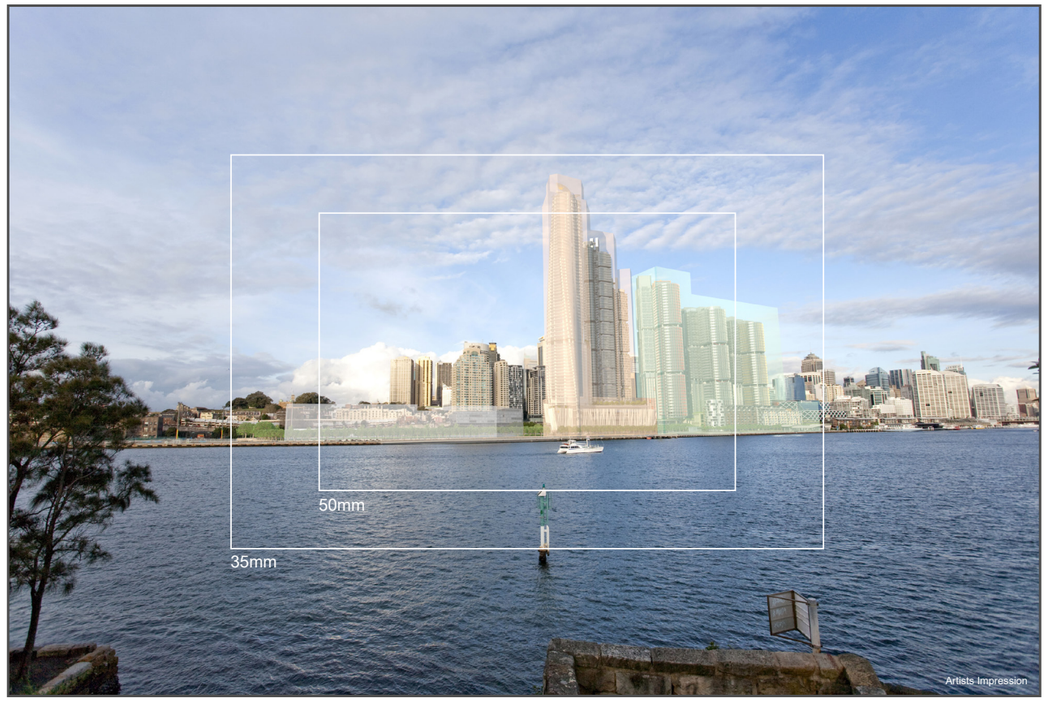


Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

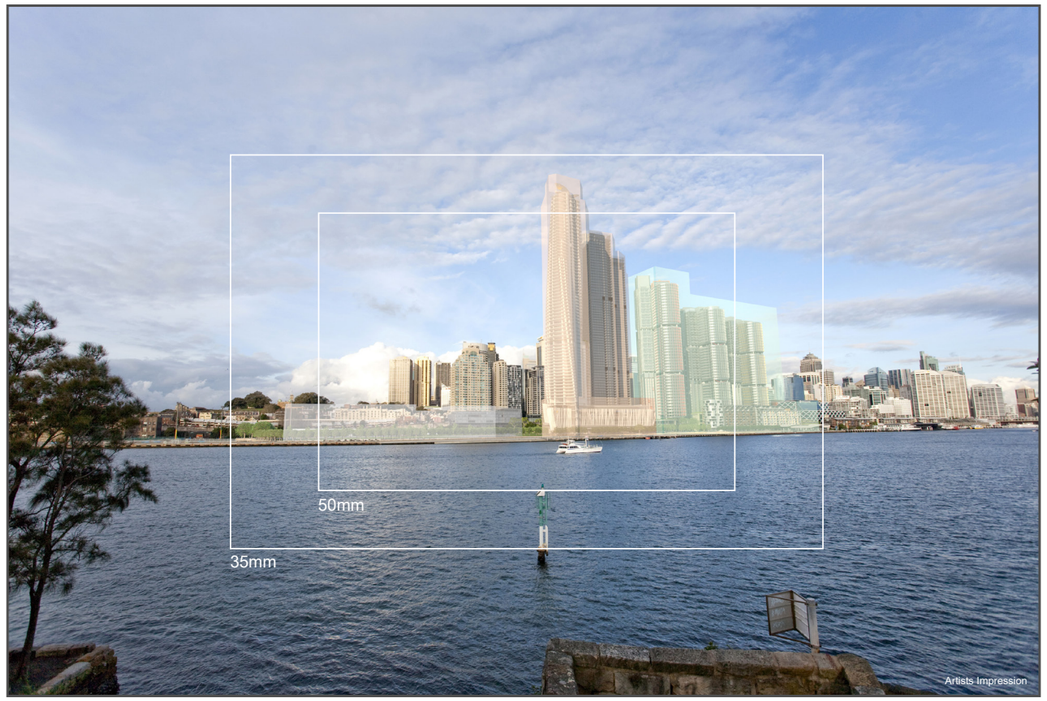
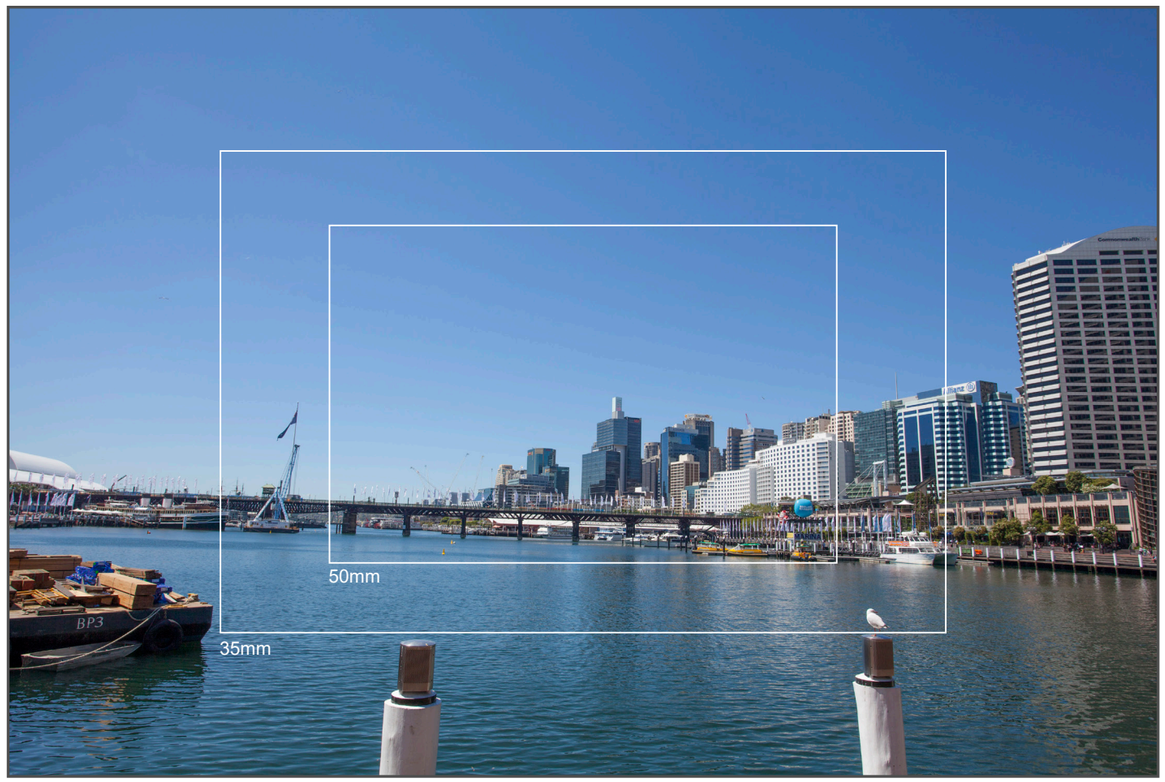


Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.



Original photo with crop marks to identify the field of view of longer lens sizes.

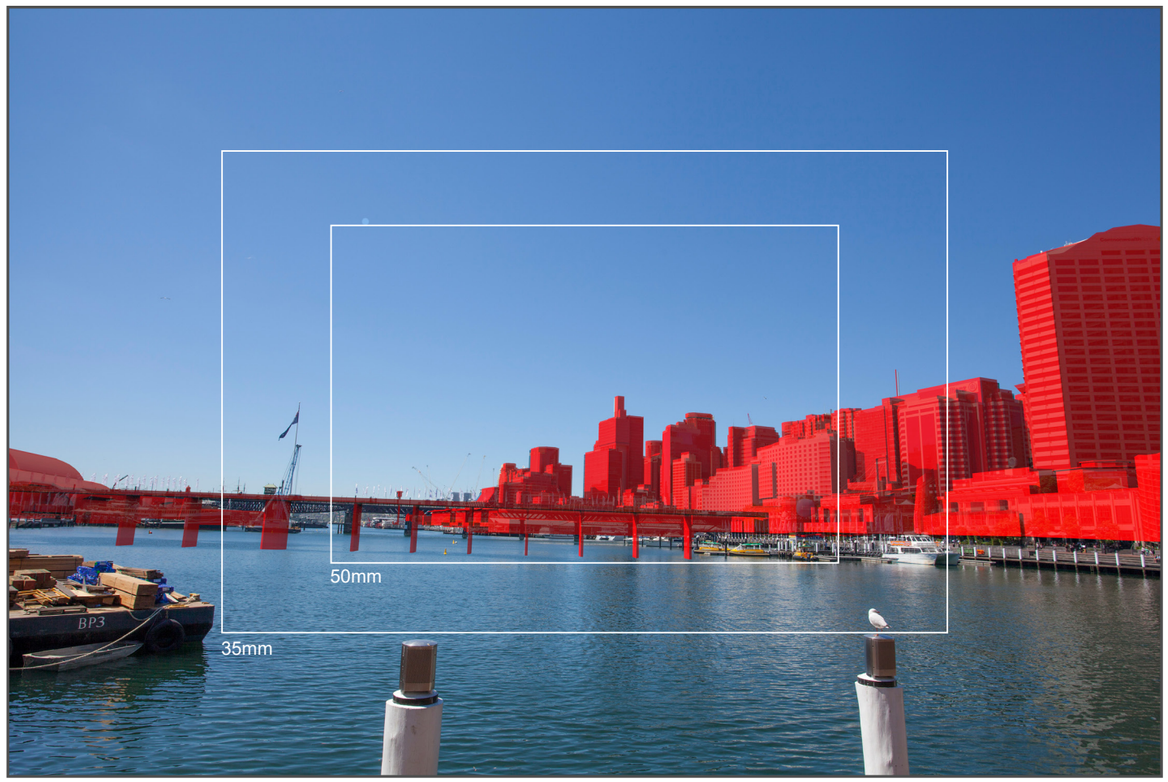


Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	DARLING HARBOUR
Camera R.L.	1.93m
MGA coords:	X: 333552.38, Y: 6250416.21
Lens:	22mm
Dimensions:	5616 x 3744
Date:	14/11/2013, 1:43:05 PM
Camera:	Canon EOS 5D Mark II

Rationale for lens selection

The rationale for using a 22mm lens was to capture the surrounding city buildings, while capturing some of the foreground elements so that the viewer could feel like they were standing in Darling Harbour.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

Note - Harbour Control Tower removed since Mod 8

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

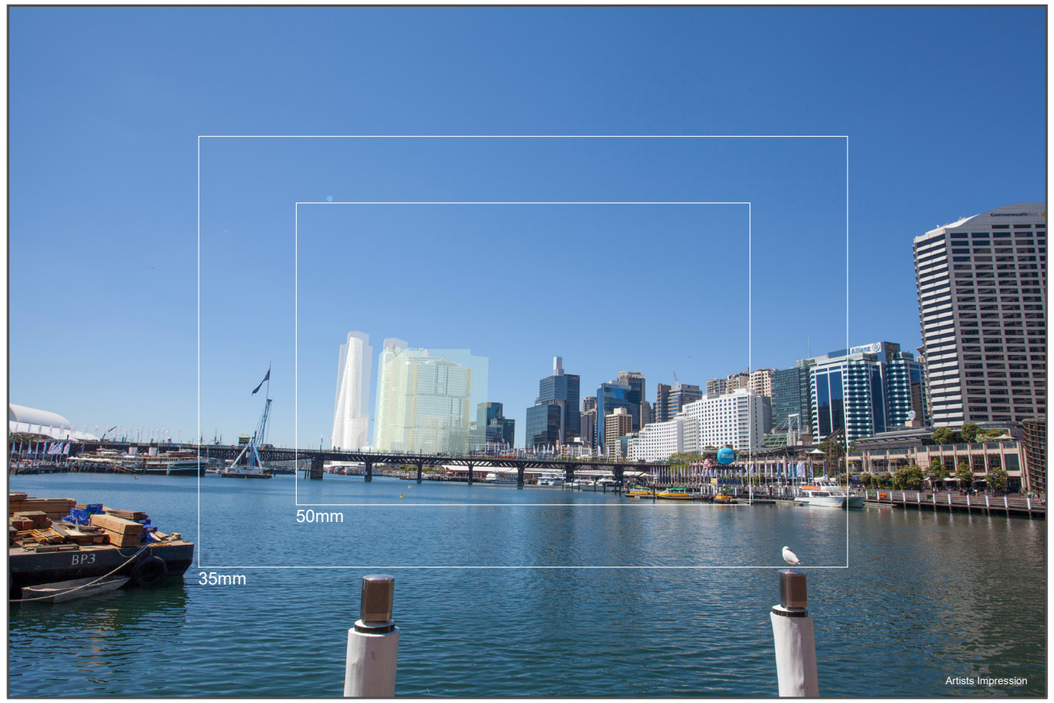


Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

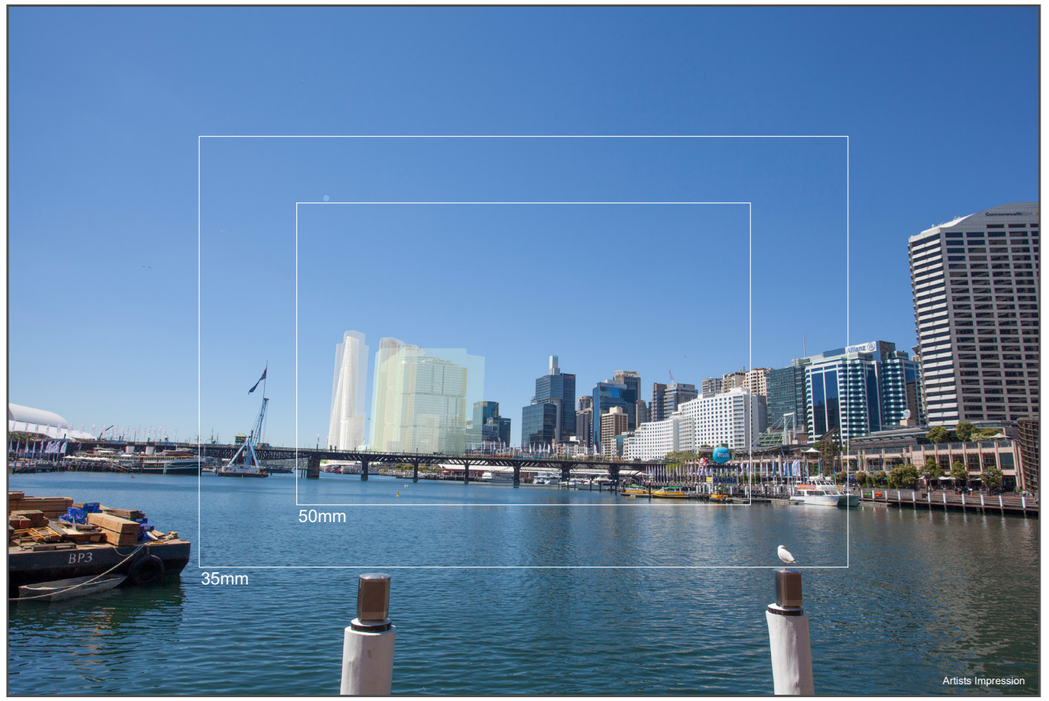


Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.
Note - Harbour Control Tower removed since Mod 8

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

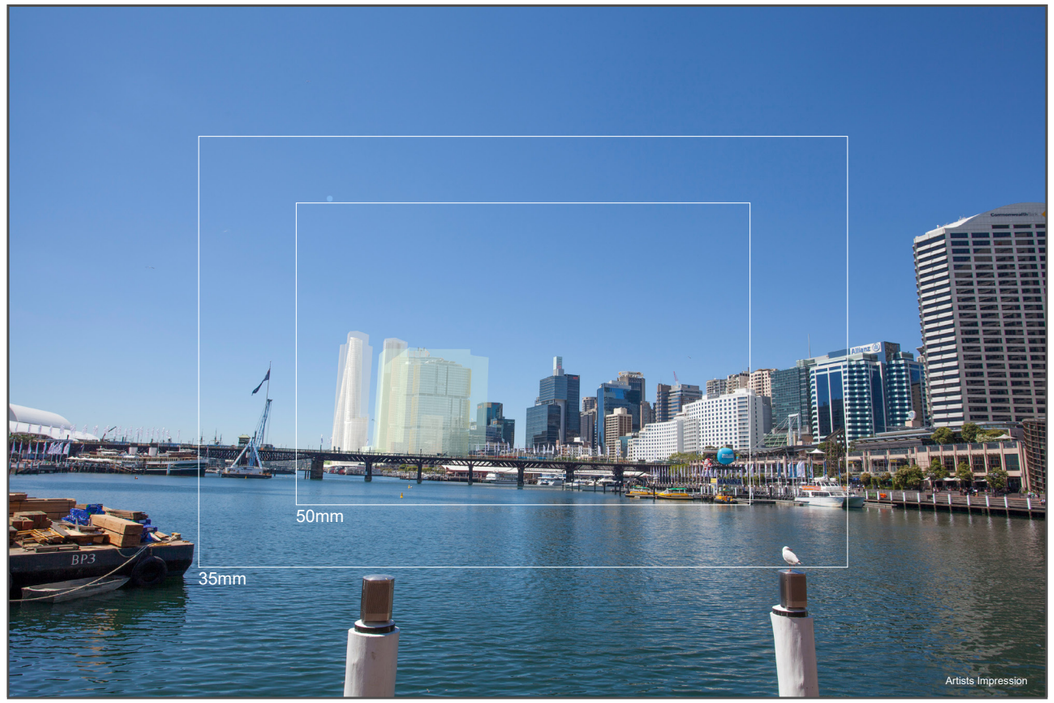


Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

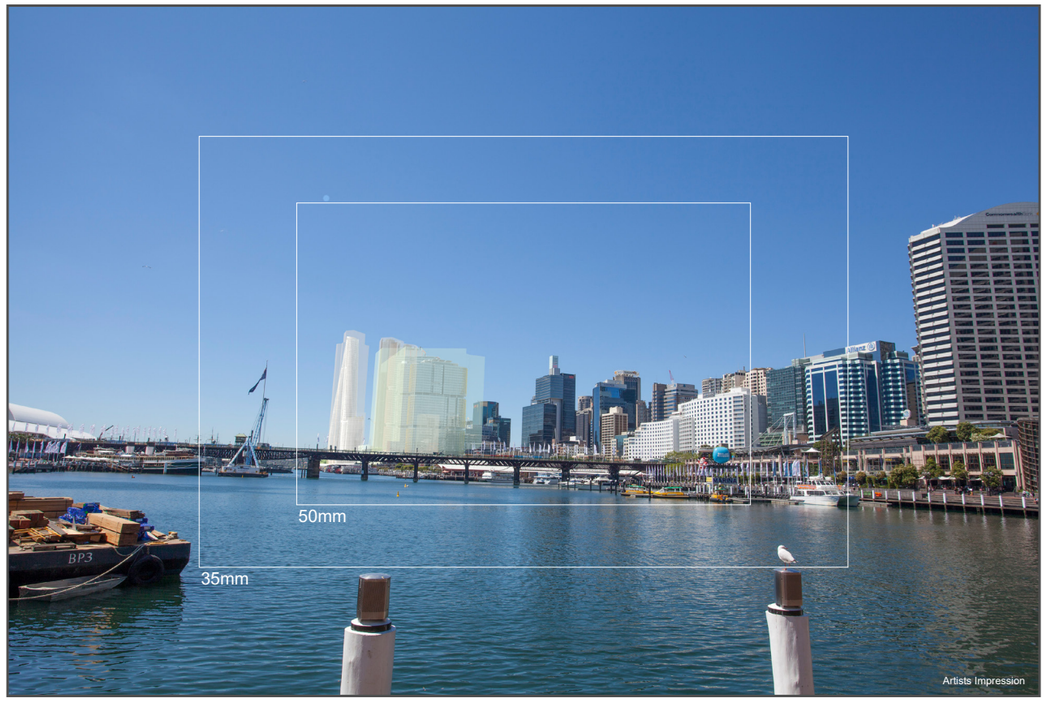


Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.
Note - Harbour Control Tower removed since Mod 8

Original photo with crop marks to identify the field of view of longer lens sizes.

Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	BLUES POINT
Camera R.L.	14.5m
MGA coords:	X: 333783.957, Y: 6253021.351
Lens:	21mm
Dimensions:	4368 x 2912
Date:	2/06/2010 3:58 PM
Camera:	Canon EOS 5D

Rationale for lens selection

The rationale for using a 21mm lens was to capture as much of the city buildings as possible from the selected position. We also wanted to show some of the foreground elements so the viewer knows where they are standing.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

Note - Harbour Control Tower removed since Mod 8

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.
Note - Harbour Control Tower removed since Mod 8

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.
Note - Harbour Control Tower removed since Mod 8

Original photo with crop marks to identify the field of view of longer lens sizes.

Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	OPERA HOUSE WESTERN FORECOURT
Camera R.L.	4.68m
MGA coords:	X: 334826.856, Y: 6252268.439
Lens:	25mm
Dimensions:	4368 x 2912
Date:	2/06/2010 4:55 PM
Camera:	Canon EOS 5D

Rationale for lens selection

The rationale for using a 25mm lens was to capture as much of the city skyline as possible from the selected position. We also wanted to show some of the bridge and also the foreground element so the viewer knows where they are standing.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Original photo with crop marks to identify the field of view of longer lens sizes.

Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	CREMORNE POINT
Camera R.L.	6.50m
MGA coords:	X: 336260.81, Y: 6253382.67
Lens:	40mm
Dimensions:	5616 x 3744
Date:	14/11/2013, 11:11:55 AM
Camera:	Canon EOS 5D Mark II

Rationale for lens selection

The rationale for using a 40mm lens was that from this specific location the wider lens did not provide a close enough view of the Barangaroo buildings.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

Note - Harbour Control Tower removed since Mod 8

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.
Note - Harbour Control Tower removed since Mod 8

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.
Note - Harbour Control Tower removed since Mod 8

Original photo with crop marks to identify the field of view of longer lens sizes.

Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	GLADESVILLE BRIDGE
Camera R.L.	41.57m
MGA coords:	X: 328625.52, Y: 6253826.63
Lens:	40mm
Dimensions:	5616 x 3744
Date:	14/11/2013, 2:41:51 PM
Camera:	Canon EOS 5D Mark II

Rationale for lens selection

The rationale for using a 40mm lens was that from this specific location the wider lens did not provide a close enough view of the Barangaroo buildings.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

Note - Harbour Control Tower removed since Mod 8

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.
Note - Harbour Control Tower removed since Mod 8

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.
Note - Harbour Control Tower removed since Mod 8

Original photo with crop marks to identify the field of view of longer lens sizes.

Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	WATSONS BAY
Camera R.L.	1.85m
MGA coords:	X: 341048.94, Y: 6253777.40
Lens:	40mm
Dimensions:	5616 x 3744
Date:	14/11/2013, 10:13:21 AM
Camera:	Canon EOS 5D Mark II

Rationale for lens selection

The rationale for using a 40mm lens was that from this specific location the wider lens did not provide a close enough view of the Barangaroo buildings.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

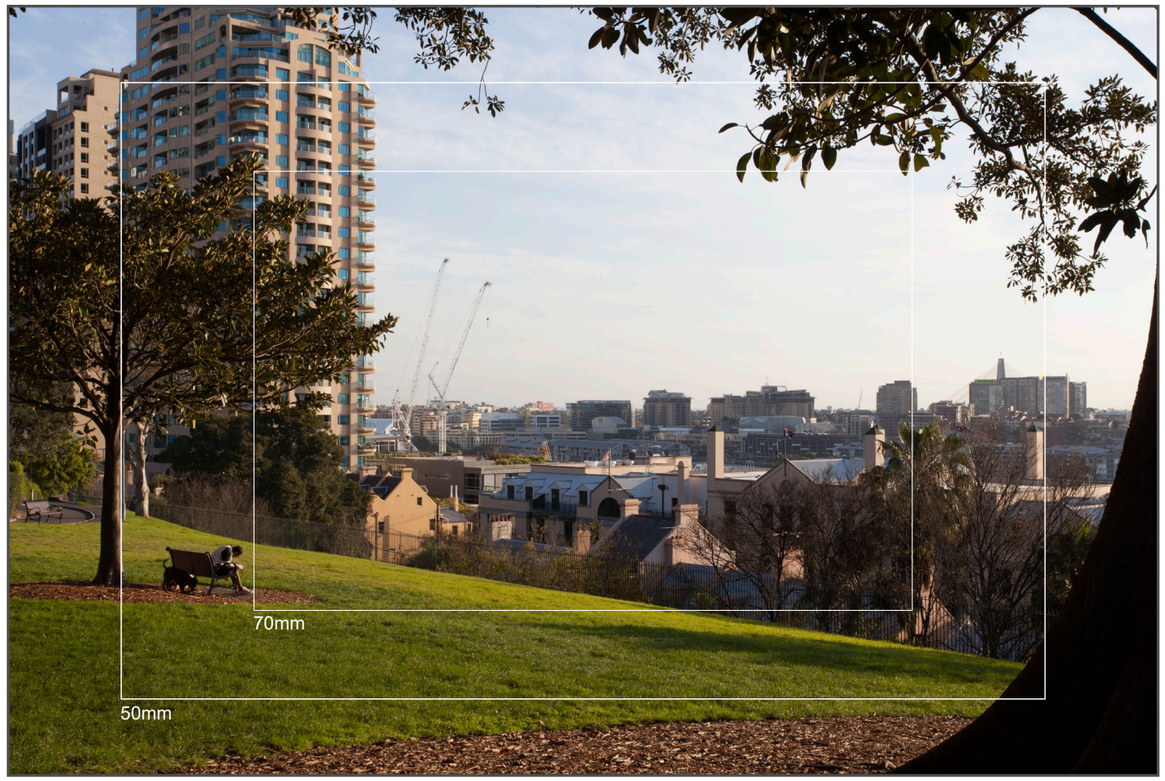
Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

Image showing massing of the Approved Concept Plan Amendment (Mod 8)

Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.



Original photo with crop marks to identify the field of view of longer lens sizes.

Image showing alignment of 3D model to photograph with the 3D model shown over in red.

Photographic data

Location:	SYDNEY OBSERVATORY GROUNDS
Camera R.L.	43.43m
MGA coords:	X: 333902.349, Y: 6251936.59
Lens:	40mm
Dimensions:	5616 x 3744
Date:	15/09/2014, 4:44:54 PM
Camera:	Canon EOS 5D Mark II

Rationale for lens selection

The rationale for using a 40mm lens was that from this specific location the wider lens did not provide a close enough view of the Barangaroo buildings.

Overlays showing longer lenses have been included to illustrate the effect of a longer lens. Note that using a longer lens from the same location will have the same effect as cropping the wider image.

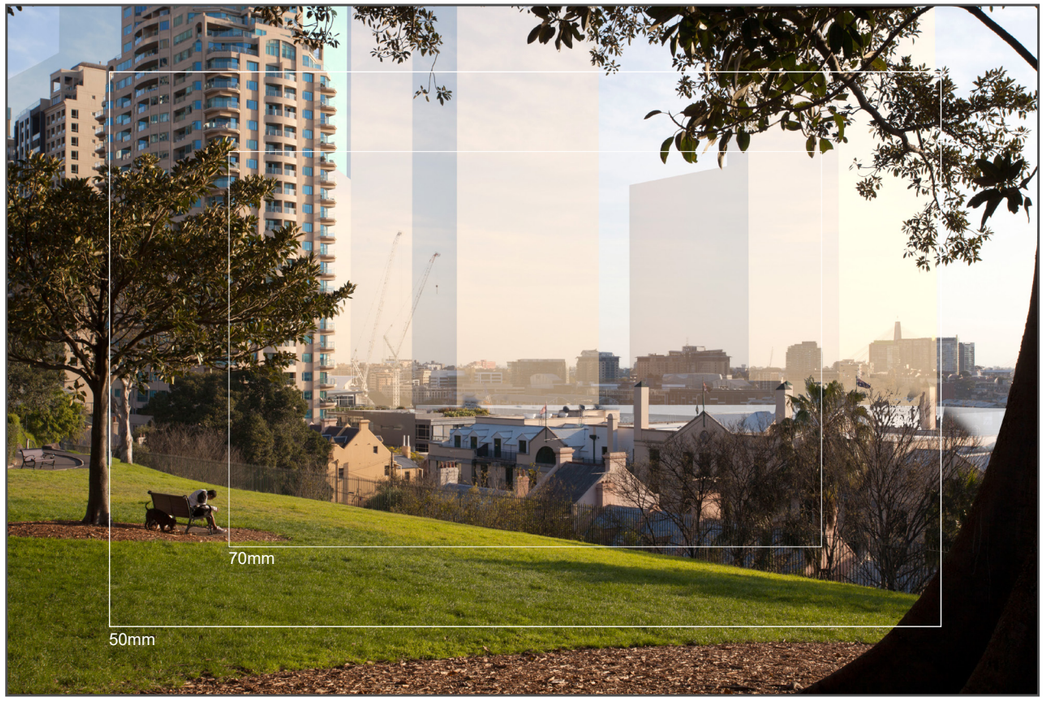


Image showing massing of the Approved Concept Plan Amendment (Mod 8)

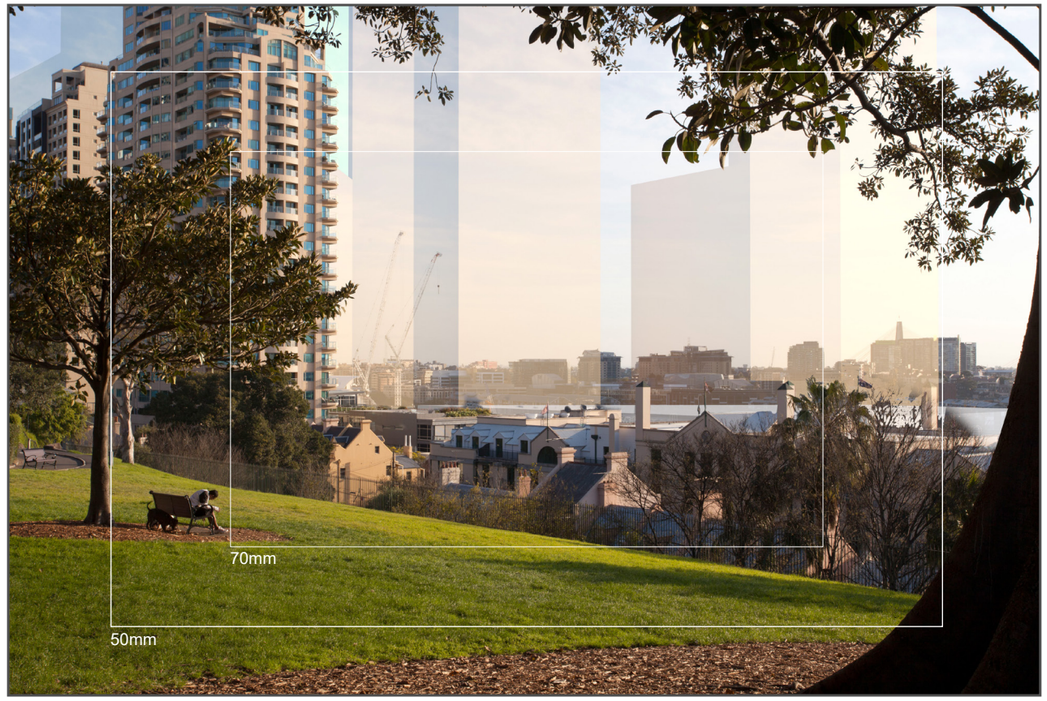


Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan Amendment (Mod 8) with indicative design.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

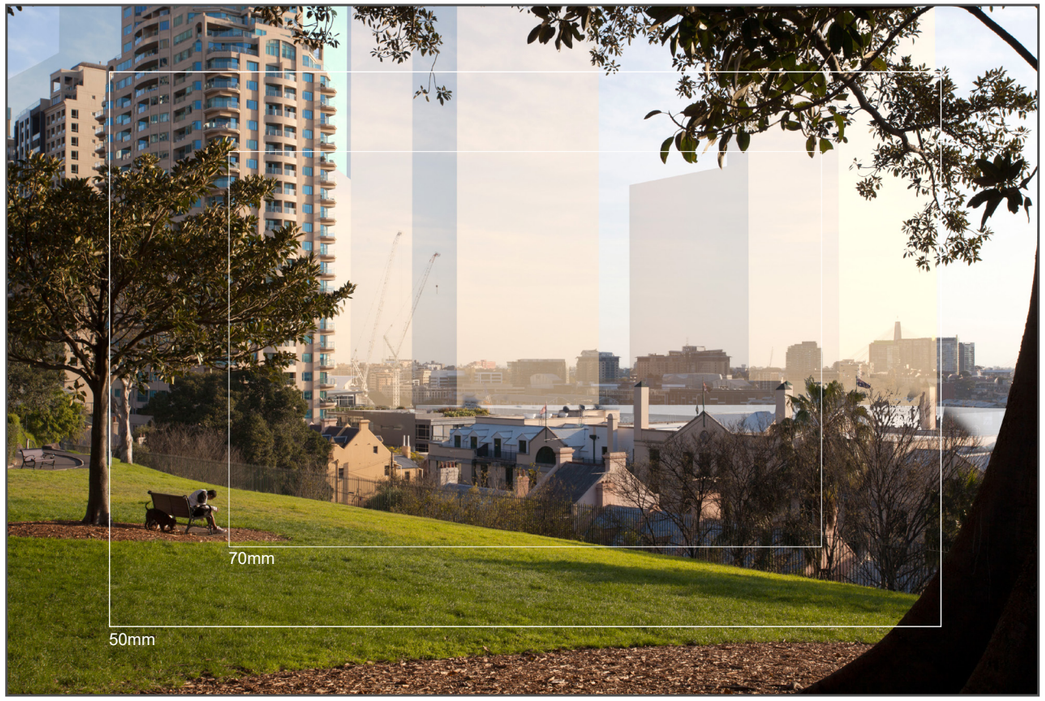


Image showing massing of the Approved Concept Plan Amendment (Mod 8)

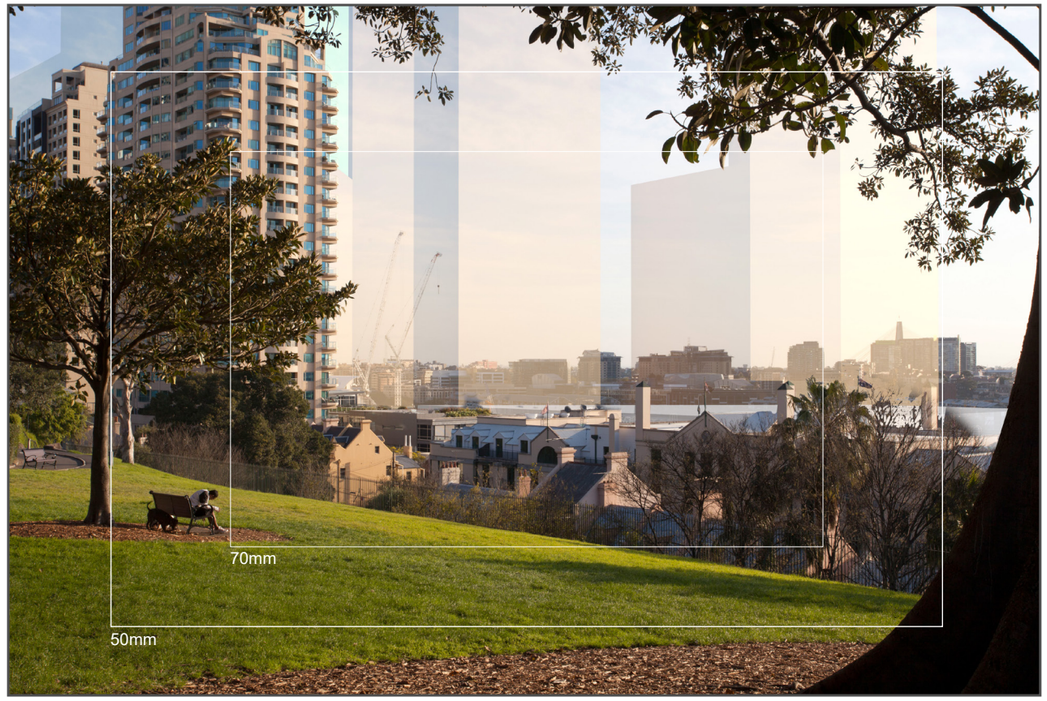


Image showing massing of the Proposed Concept Plan Amendment (Mod 10)

Image showing massing of the Approved Concept Plan (Mod 8) with Renzo Piano Building Workshop Built Form.

Image showing massing of the Proposed Concept Plan Amendment (Mod 10) with indicative design.

APPENDIX A - DIGITAL CAMERA LENSES FOR PHOTOMONTAGES AND VISUAL IMPACT ASSESSMENTS

The intention of a photomontage rendering is to visually communicate how proposed built form sits in respect to its surroundings. To achieve this, a digitally rendered image from a digital 3D model is accurately superimposed into a digital photograph to provide an accurate representation in terms of light, material, scale, and form.
Camera lens selection also plays an important part in creating a photomontage that communicates visual impact. There are several things to consider with respect to lens selection.

Field of View of the Human Eye

The field of view of the human eye is a topic that varies depending on the source of information. In many cases the field of view of the eye is stated to be 17mm. Other sources claim a smaller field around 22-24mm. Whichever the case, it is clear that the human eye has quite a wide field of view and when we stand close to a subject - or instance a building - our vision can potentially see all of the top, sides and bottom of the building at one glance. In addition to this, the human eye can change focus and target direction extremely quickly, allowing us to view a large structure in a very short period of time, effectively making our perceived field of view even larger.

The Perspective of the human eye

It is difficult to accurately reproduce what the human eye sees by the means of a printed image. As the back of the human eye is curved and the sensors on cameras are flat, the perspective of a photograph can look quite different to how we see things in the real world, especially with a larger field of view, or wider lens.
In digital photography circles it is commonly stated that using a longer lens (approx 50mm) reduces the amount of perspective in an image and therefore looks more like the human eye would see in reality, but this is talking about perspective only, and does not consider the field of view of the eye. If you take a photo using a 50mm lens, print the photo, and hold the print out against the actual view in the same location as the photo was taken, it becomes very clear that the human eye can see much more of the surrounding information than what is shown on the print out.

Changing the FOV on a digital camera

The main difference in using a longer lens vs. a wider lens is the amount of information that is displayed at the edges of the subject. Changing the lens to a smaller FOV produces the same result as cropping in on the wide angle image, providing that the position and the angle of the camera remains constant while taking the photographs. In short, a lens with a wider FOV does not create an image that has incorrect perspective, it simply means that the perspective is extended at the edges of the image showing more of the surrounds in the images.

What all of this means for visual assessment, is that there is no definitive solution for lens selection. If we follow the opinion that a longer lens produces images that are closer to the perspective of the human eye, we will inevitably be in the situation where we cannot show the entirety of our subject and enough of the surrounds in which the subject resides. Also, if we strictly stick to a 17mm lens, we will have situations where the subject is far away and looks very small in the image, again making it difficult to assess visual impact. For these reasons, we have taken the view that we can never totally represent what the human eye will see on a piece of paper, and for visual impact photomontages we should select lenses that strike a balance between the two and can accurately display the built form in its surroundings.

The most effective way to accurately gauge visual impact and get a real world feeling for scale would be to take prints of the photomontages to the exact site photography locations and compare the prints with the scale of the existing built form.