

Sydney Opera House – The Opera Lighting Impact Assessment

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Introduction

This Lighting Impact Assessment relates to the Monumental Steps on the Forecourt at Sydney Opera House, Bennelong Point which will be the site for Opera Australia's *Sydney Opera House – The Opera*.

It has been developed to determine the impact of the theatrical and safety lighting relating to the seating, site, stage and set items, on the surrounding environs, including maritime, aviation and the general public, as well as neighbouring stakeholders. The report focuses on the lighting states developed for *Sydney Opera House – The Opera* and will apply for all productions in each year of the event.

The Lighting Impact Assessment should be read in conjunction with the *Sydney Opera House – The Opera* Event Management Plan.

Baseline Conditions

General lighting in the area includes minimal pathway and Forecourt lighting to ensure the safety of the general public moving through the site. Vehicular traffic is permitted on the Forecourt via the manned roadway. Outside of daylight hours the level of lighting is suitable for the proposed use.

The Sydney Opera House Forecourt site regularly hosts performance events, which have included the use of high intensity strobe lighting, rock and roll type lighting, and disco effects. There are also events that use large marquees requiring external security lighting as well as internal general lighting.

Sydney Opera House – The Opera Lighting

Sydney Opera House – The Opera is a high quality theatrical production requiring theatrical lighting for the stage and surrounding event site. For each event, Opera Australia will engage lighting designers to design the lighting for the stage production as well as the site. There will also be the need for security and general site lighting overnight to allow security personnel to patrol the site and provide a safe site for the passing general public. Opera Australia will be using generator powered day makers as a backup for the audience house lights and as emergency lighting if required.

The lighting equipment for *Sydney Opera House – The Opera* will have two off-site effects. The first is direct illumination from the source (i.e. direct view through to the source), and the second is refracted light from the scenery and site elements.

The direct illumination is generally of major concern to maritime, aviation and general public as it can startle and bewilder if it is of a relative high intensity. The intensity of a light depends on the distance from source and general relative light levels. This will be investigated, taking into account the relative lighting positions, light source and throw of the light.

The second effect of refracted light from the scenery and site elements is relative to the existing aesthetic and design of the site, as well as the provision of safe ingress and egress throughout the site. On the site there will be an artificial and subdued lighting state during the evening hours, which means there will be a minimal impact on the various stakeholders that are on the boundary of the site. This will be from the refracted light on the site and this will be investigated.

Direct Illumination from Source

Theatrical Equipment: Performance

Following is a list of theatrical lighting equipment used to illuminate the stage and seating area during the performance.:

- Martin Mac III Performance
- Martin Mac 2000 XB Wash
- Martin Viper Profile
- Clay Paky Alpha 1500 Profile
- Clay Paky Sharpy
- VL 3500 Spot
- VL3500 Wash FX
- Martin Vipers
- 4Kw HMI Fresnel with shutters/dowser and a colour scroller
- Syncrolite 3k or 4K Xenon Skylight
- Studio Duo City Colour 2.5Kw Wash or an LED option
- 8-Lite Molefay with a colour scroller
- Molefay Duet
- LED RGBW Wash Lights
- Colour Kinetics Colourblast or outdoor RGB flood
- Colour Kinetics Colourblaze 72 LED Batten
- Par 64 NSP w/ colour scroller
- Smoke or Fog Machines – (suitable for high output and outdoor use)

There are seven general lighting positions planned for the theatrical lighting of the performers and stage. These are:

1. Front of House Stage Right (FOHR)
2. Front of House Centre (FOHC)
3. Front of House Stage Left (FOHL)
4. Stage Right Tower (SRT)
5. Stage Left Tower (SLT)
6. Up Stage Right Tower (USRT)
7. Up Stage Left Tower (USLT)

These positions are shown on the Lighting Positions Plan, attachment DA-1-LX & Rigging Positions

The general purpose work lights at all of these seven lighting positions, will facilitate localised work and safety lighting for staff during the evening and will only be activated if staff are present in these areas. Generally, these will be common quartz halogen flood lights of no more than 1000w and a limited impact area of no more than 10 metres around its rigging point.

The impact of the general purpose work lights on stage is:

Environmental Impact	Nil
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Maritime Impact	Nil
Aviation Impact	Nil
General Public Impact	Nil

The FOHR, FOHL and FOHC lighting positions light from the seating areas towards the stage. The stage is constructed over the Sydney Opera House Monumental Steps approximately 60 metres away from these lighting positions. With the stage being 24 metres deep, the possibility of light over spill from these lights into surrounding environs will be approximately 40 metres.

The theatrical lights at the FOHR, FOHL and FOHC consist of four types per position:

- VL3500 spots
- Mac 3 Performances
- Clay Packy Alpha 1500W Spots
- Lycian 4k Follow Spot
- Phillips Arena Vision 2000w Metal Halide Flood

The theatrical lighting at the distance of 60 metres is generally considered as no brighter than what you would expect in a family living room. At 100 metres from that source of light, the light output is generally considered to represent twilight in a clear sky.

The impact of the FOHR, FOHL and FOHC theatrical lights is:

Environmental Impact	Nil
Maritime Impact	Nil
Aviation Impact	Nil
General Public Impact	Nil

Both the SRT and SLT lighting positions light towards the stage from the side. With the stage being 86 metres wide through direct line of sight, there should be no spill from these lights into surrounding environs.

The theatrical lights on these positions consist of two types per position:

- Mac 3 Performances
- Clay Packy Alpha 1500W Spots
- Robert Juliet Follow Spot
- Phillips Arena Vision 2000w Metal Halide Flood
- Studio Duo City Colour 2.5K Wash or an LED alternative
- 8-Lite Molefay with a colour scroller

The theatrical lighting at the distance of 50 metres is generally no brighter than what you would expect from a family living room. At 100 metres from that source of light, the light output is generally considered to represent twilight in a clear sky. Therefore there should be no possibility of light over spill from these lights into surrounding environs.

The impact of the SRT and SLT lighting positions is:

Environmental Impact	Nil
Maritime Impact	Nil
Aviation Impact	Nil
General Public Impact	Nil

The USRT and the USLT lighting positions are constructed on the Box Office Podium level directly over or on the stage. With the stage being 86 metres wide by 24 metres deep, the possibility of light spill from these lights into surrounding environs will be approximately 23 metres.

The theatrical lights on these positions consist of the following types:

- Mac 2K XB
- Martin Vipers
- Martin Vipers
- VL3500 Wash FX
- 4Kw HMI Fresnel with shutters/dowser and a colour scroller
- Syncrolite 6k or 4K Xenon Skylight
- Studio Duo City Colour 2.5K Wash or an LED alternative
- 8-Lite Molefay with a colour scroller
- Molefay Duet
- Colour Kinetics Colourblast 12 or outdoor RGB flood
- Colour Kinetics Colourblaze 72 LED Batten
- Par 64 NSP with colour scroller
- Smoke or Fog Machines – (suitable for high output and outdoor use)
- Phillips Arena Vision 2000w Metal Halide Flood

The theatrical lights will be utilised to top light and back light the stage and should spill no further than 10 metres from the edge of stage.

The theatrical lighting at the distance of 23 metres is generally no brighter than what you would expect from a bright overcast day. At 100 metres from that source of light, the light output is generally considered to represent twilight in a clear sky.

The stage theatrical lighting will be masked from shining out towards the harbour or surrounding stakeholders by the footprint of the scenery. However, if a search light was to point directly up into the sky it may pose a slight distraction to passing aviation travelling into Sydney International Airport. CASA will be notified if the designer chooses to use of these lights for *Sydney Opera House – The Opera*.

The only consideration in respect to Colour Blaze 72 lights is that they will point directly up, which may interfere with Aviation. However at 100 metres, this can be classed as negligible. The impact of the USRT, and USLT lighting positions is:

Environmental Impact	Nil
Maritime Impact	Nil
Aviation Impact	Nil
General Public Impact	Nil

Please refer to the Event Management Plan – Lighting Impact Assessment for dates and hours of operation of the theatrical lighting equipment for this event.

Theatrical Equipment: Site

The lighting to be used on site will theme the space and provide safety lighting for audience members during the performance period. The lighting will help to enhance the positive experience for the audience as well as provide a safe environment for the audience travelling to and from the event.

The majority of lighting in this area will be localised lighting and generally will not spill outside an area of 10 metres from the source. None of the equipment should be pointed away from the site in the direction of our surrounding environs. The impact of the site lighting is:

Environmental Impact	Nil
Maritime Impact	Nil
Aviation Impact	Nil

General Public Impact Nil

Please refer to the Event Management Plan – Lighting Impact Assessment for dates and hours of operation for the site lighting equipment.

Site Safety Lighting

The site for this event is part of Sydney Opera House, which is open 24 hours a day to the public. Opera Australia has a duty of care to provide reasonable lighting to ensure a safe passage through the site for the general public at all times including when the site is inactive. At the same time we must also provide adequate lighting for security staff to patrol and for Sydney Opera House to monitor infrared cameras.

This being said adequate lighting for the site is considered to be similar in level of intensity to what is normally provided by the Sydney Opera House at this location. Where existing lighting levels are affected by Opera Australia scenery and equipment additional lighting equipment, will be installed to ensure the ambient level is maintained over the site.

The lighting in use on the site during these other hours of darkness will consist of low power and intensity halogens, sodium vapours, and LED lighting equipment. These lights will have minimal to nil impact on the local area and should not impact any further than 10 metres from individual sources. The impact of the site safety lighting is:

Environmental Impact	Nil
Maritime Impact	Nil
Aviation Impact	Nil
General Public Impact	Nil

Please refer to the Event Management Plan – Lighting Impact Assessment for dates and hours of operation for the site safety lighting equipment.

Indirect Lighting

There are a number of factors that are major contributors to indirect lighting that affects neighbouring stakeholders. The more important ones are the reflectivity of the surface and intensity of the light source.

There are three major areas of notice on the site that will be lit directly by the theatrical lights. They are the stage, seating and site as follows:

- **Stage**

All the surfaces facing towards the various neighbouring stakeholders will have minimal refracted properties due to these parts of the site being painted in a mat or satin gloss paint and thus there should be little or no visual impact from the site towards them. This will be the case during the performance as well as after hours.

- **Site**

The Sydney Opera House – The Opera event site will only be lit with theatrical lighting during the performance and rehearsal periods, to help the audience move around the site safely and to enhance the beauty of the site. All of the original assets on this site have low reflectivity. The audience seating will consist of lightly coloured stackable chairs, also of low reflectivity and therefore should not produce any form of bounce lighting towards the neighbouring stakeholders.

In non-performance times the site area will be minimally lit to provide safety for the general public and to assist with site security. At no point during the performance will the theatrical lighting or projections point directly towards neighbouring stakeholders. To ensure the nearest neighbours at Bennelong Apartments or Circular Quay are not affected by during the rehearsal period, Opera Australia will ensure that the majority of the lighting cues will be pre-programmed.

Conclusion

This event will result in an increase in the level of illumination not usual to the current standard operational settings used during non-event periods. The increase is to facilitate the production lighting design and site operational requirements. The production lighting design is of a theatrical nature, containing subtler tones, a framed master piece with hues of light touching gently across the stage as if a canvas touched by the brush of one of the great artists, leaving behind a wonderful impression of a famed master piece. Whereas previously held music concerts have lit this historical site with brash use of provocative colours, aggressive movement, drastic changes in intensity and sharp flashes of light. A stark contrast to gentle use of light and colour employed in the operatic world.

There have been many other events that occur on the site and due to the fact that this is a theatrical event and not a dance party or music festival with strobes and disco effects the impact will not be as intrusive as these events.

Opera Australia has employed a professional lighting designer to light the stage. The lighting, while being bright enough to light the stage and performers should not be of the intensity to affect the neighbouring stakeholders. Each lighting state is programed and played back via a control system that includes redundant back-ups. This negates the possibility of lights acting differently night to night, and re-assures the local residential and commercial premises, that every care taken during programming to minimise light pollution and potential disruptions, is adhered to through-out the performances.

The effect on the surrounding environment is minimal or nil, as the lighting fixtures will be directed towards the stage and not at other inhabited sites.

The effect on aviation will be nil given the majority of the lighting fixtures will point towards the stage only. If the designer wishes to use search lights, or a search light effect, then CASA will be notified as a precaution, even though those lights will have no effect at the minimal safe altitude of the area at night.

Opera Australia is confident that the luminal impact of the lighting system for this event on the surrounding environs is minimal and will ensure a safe environment for the general public to pass through the site.