

SHORT SHARP MANUALS  
1502  
Lighting



archoncad.com  
Making Vectorworks easy!  
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# Introduction

I think rendering is one the really fun parts of Vectorworks. It can really look like your design is coming to life, but without good lighting, all your work can be wasted. Good lighting can even make a dull model come to life.

In this manual we will be looking at the different types of light sources you can put in your model along with the other lighting options. Putting in the correct light sources and managing them is fundamental to showing your model in the best possible way.

This manual starts by looking at lighting options such as environmental lighting, ambient lighting, and background. These are important to give your overall scene the correct tone and shadows. Next the manual will look at the different types of lights that you can apply to your model. Using the correct lighting and managing its settings is crucial if you want your design to read correctly. Finally, we will look at bringing all of these techniques together to light a scene using a viewport.

You could divide lighting into two main components, **Lighting Options** and **Light Sources**.

**Light Sources** covers the lights that you place in the scene to light the project. There are several types of light source that you can add, each one for a different visual effect.

**Lighting Options** control all the other aspects of the scene.

# Lighting Options

## [cadmovie1502\\_01](#)

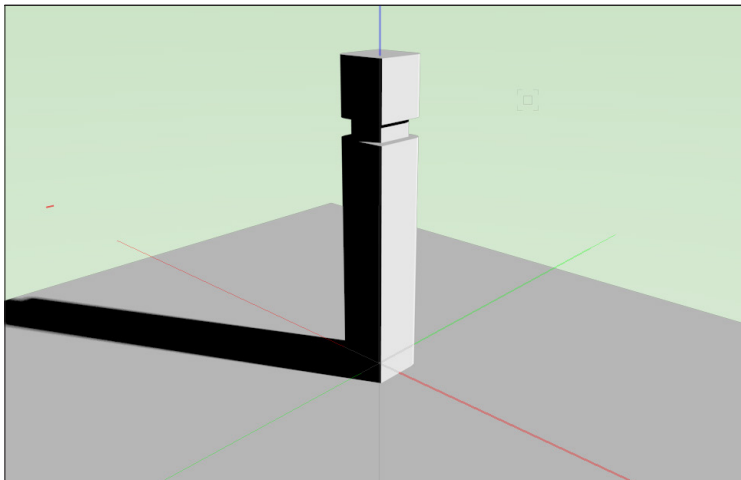
Lighting options control the effects of the light in the scene and have a strong impact on how the light sources will light your project. It is easy to overlook these, but they have a very strong impact on the rendered view. The Lighting Options have subtle controls and need to be dealt with carefully.

There are four main lighting options:

- ambient info
- emitter brightness
- environmental lighting
- indirect lighting

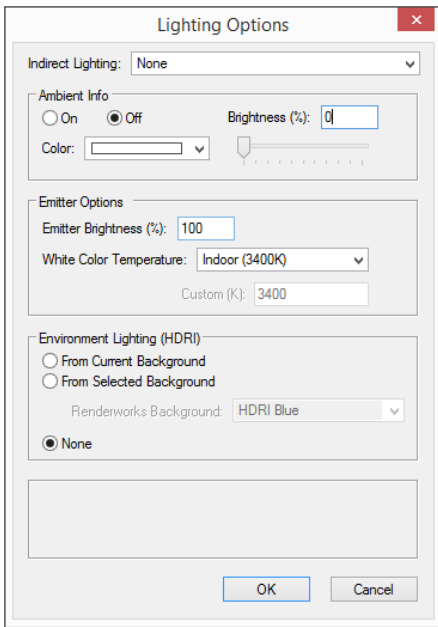
## Ambient Info

Ambient light is a light that goes over the whole scene, both the lit areas and the shadow areas. It is not a light from a source it is a general level of lighting that goes everywhere.

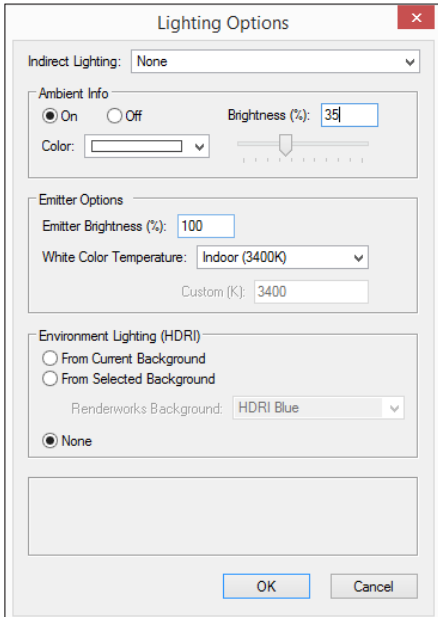


In this image there is a sun but no ambient light. Notice how dark the shadow areas are. This kind of shadow is not realistic, usually there is some light to fill in the shadow areas.

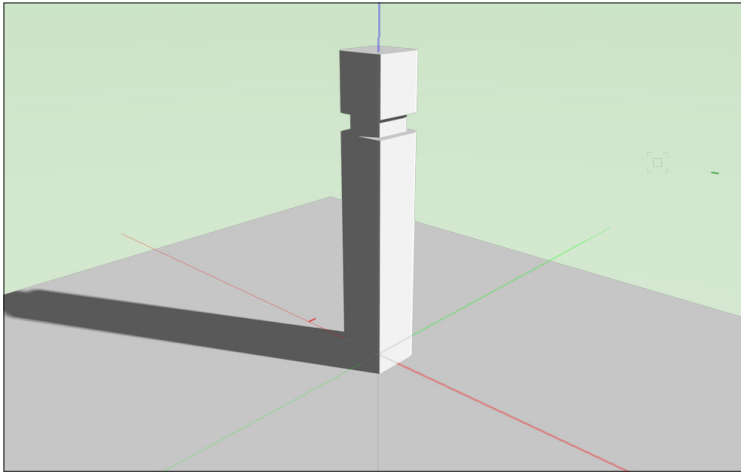
- To add or adjust the **Ambient Lighting**, go to the **Menu** bar and choose
- **View > Lighting > Set Lighting Options...**
- This will open a dialog box where you can choose your lighting options.
- Adjust the brightness and the color to suit.



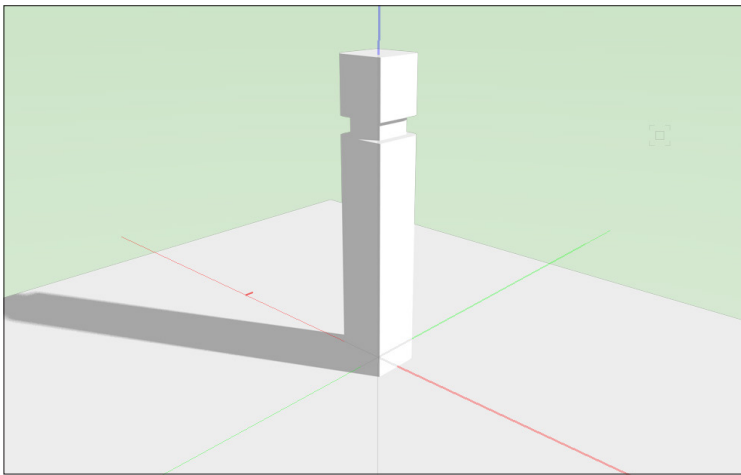
- To add ambient lighting, go to the **Ambient Info** area of the dialog box.
- Click on the **On** radio button to turn on the ambient lighting.
- In this image I have activated the ambient lighting and have assigned a Brightness of 35%.



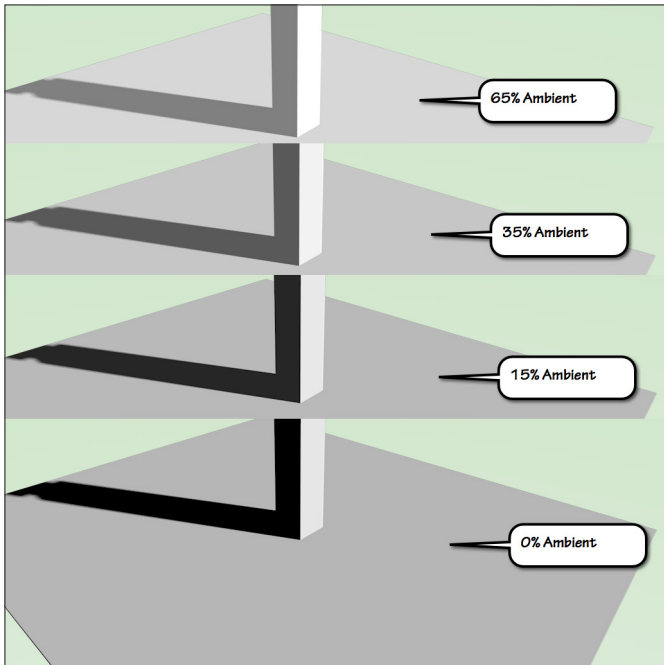
- Click on the **OK** button to assign the changes and return to the scene.



- Notice how the shadows are still visible but they are no longer as dramatic as in the previous image.



- In this image I have set the ambient lighting to 65%. Notice how weak the shadows have become, but also notice the extra light that is visible on the face of the object. The ambient light is a light that covers the entire scene, not just the shadow areas.

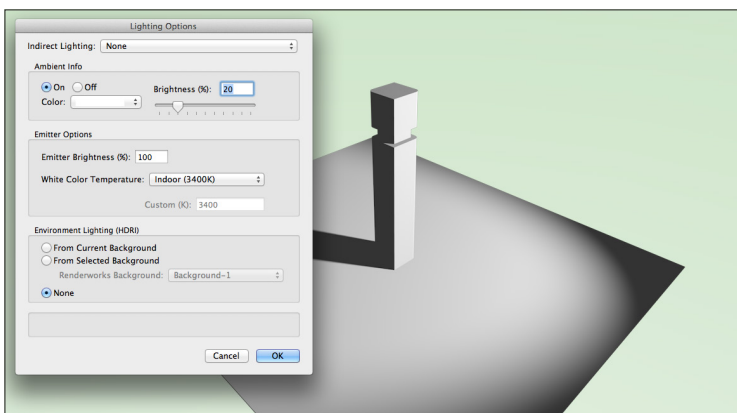


- In this image you can see the effects of the different ambient light amounts.

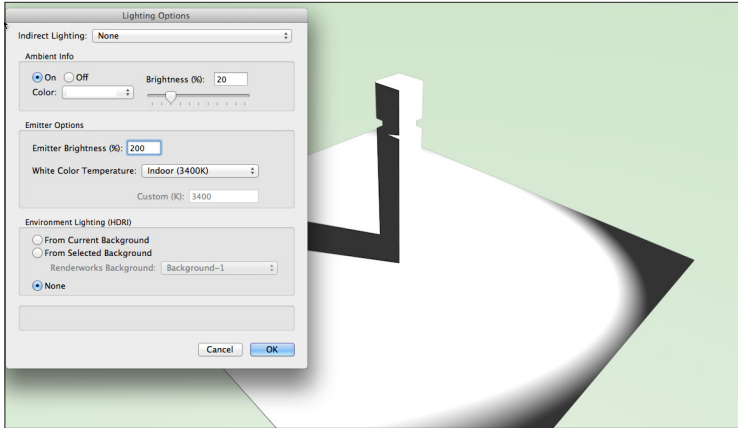
I often use a small amount of ambient light to ensure that the darkest areas of the scene are still readable.

## Emitter Brightness

Emitter brightness is tied to the light source. When you create lights you can choose the light output as a brightness (in percentage terms) or you can choose to use an emitter and specify the output in lumens or candelas. When you create lights that use an emitter, you can adjust the **Emitter Brightness (%)**: option to control all the lights in the scene, making them all brighter or making them less bright. This is a crude way of adjusting the overall lighting.



- In the image above there is one light that is set to use Emitter Brightness. The light has an intensity of 1000 lumens. You will notice on the Lighting Options dialog box that the Emitter Brightness has been sent to 100%.

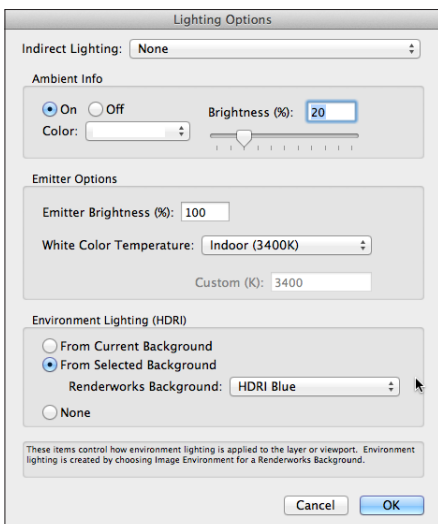


- In the image above the Lighting Options have been edited and the Emitter Brightness has been increased to 200%. This has effectively increased all of the light intensity, making each light twice as bright as it was previously.

Although you can use this technique to increase the overall lighting in the scene, it does not allow you to control individual lights. If you have some lights that are set to use emitters and others that do not, only the emitter lights will be controlled by this setting.

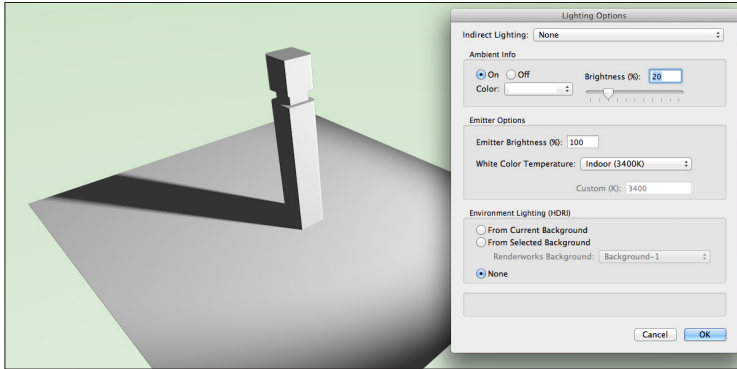
## Environment Lighting

Environmental lighting is the background lighting. The background lighting can be an image file (High Dynamic Range Image), many come standard with Renderworks, or a physical sun (connected to the **Heliodon** tool).

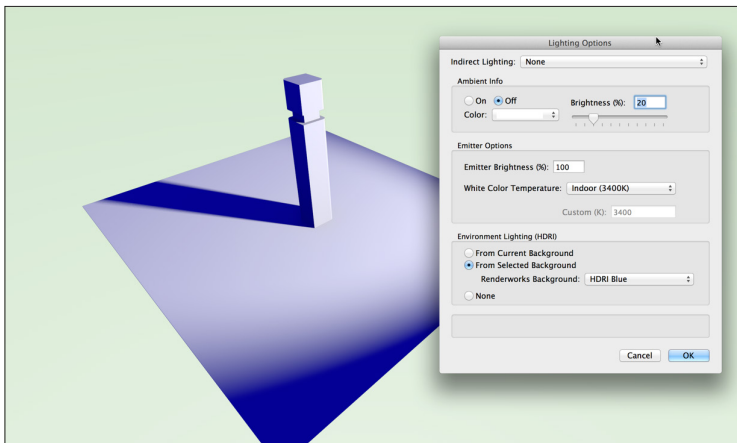


**Environment Lighting** settings have to be chosen carefully as they can change the color of a scene considerably.

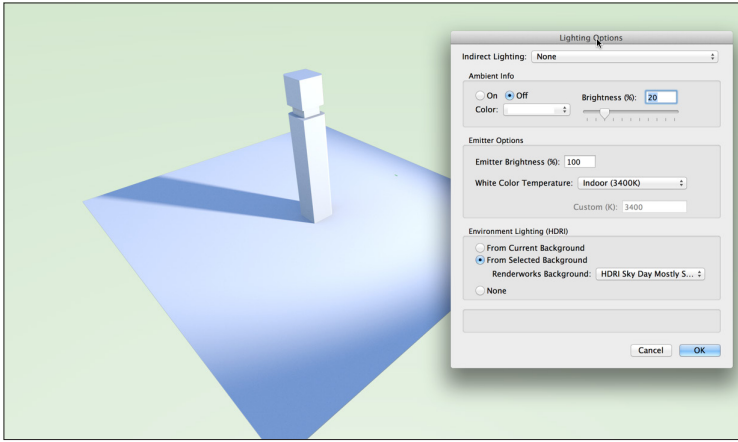
This image below shows the scene with no environmental lighting, and 20% ambient light.



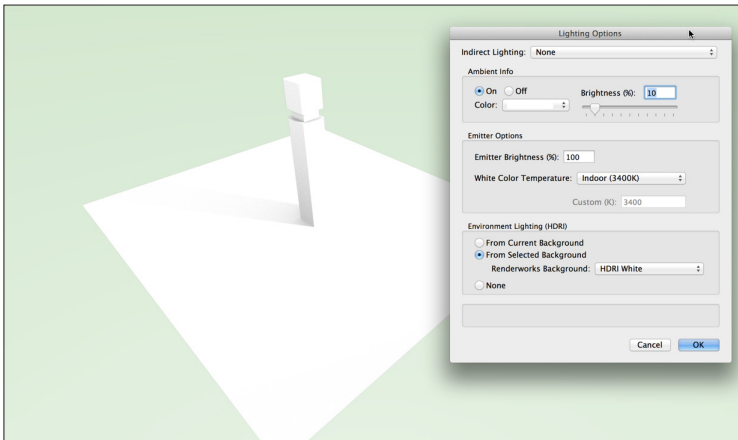
The image below shows the same scene with **HDRI Blue** environmental lighting. Notice how the entire scene has a blue tint. This is what can happen if you choose the wrong environmental lighting.



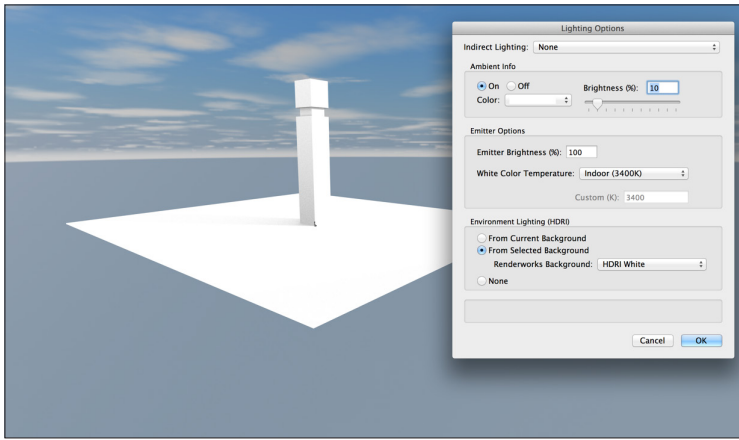
In this next image the environmental lighting has been changed to **HDRI Sky Mostly Sunny**. You will notice that the color tint over the scene is not as strong as the blue one. In reality, the sky is blue and does tint the scene slightly, but your eyes adjust to it and you don't notice it.



This image below shows the same scene with **HDRI White** environmental lighting. This background has a white overall color. Although the environmental lighting is called a background, in this case it is not adding a background to the scene, it is just adding lighting.



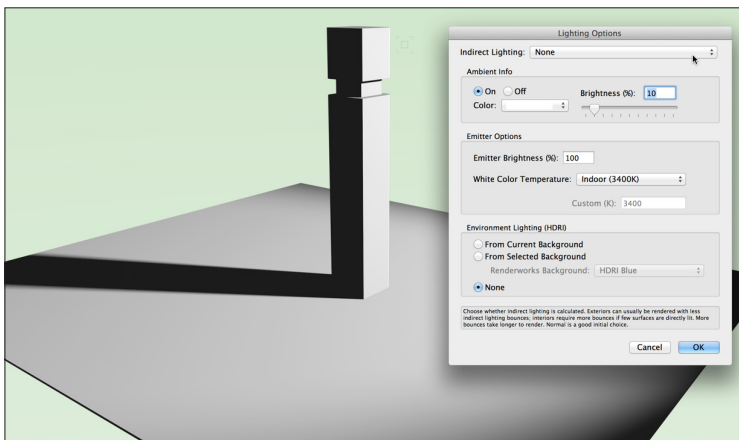
The next image shows the same model with the same environmental lighting, but I have added the HDRI Mostly Sunny image as a background. You can choose to have different images for the background and lighting.



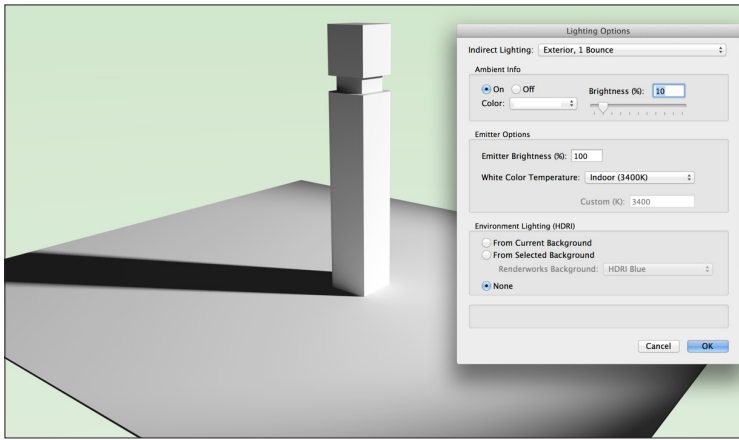
## Indirect Lighting

Indirect lighting is a very powerful addition to Vectorworks. In basic terms indirect lighting bounces the light around the scene. You can choose how often the light is calculated to bounce around the model. Each time you add bounces, the rendering time will increase.

In this image I have a single light source, no background, no environmental lighting, and 10% ambient light. Although this is a reasonable quality rendering, it can be substantially improved by adding indirect lighting.

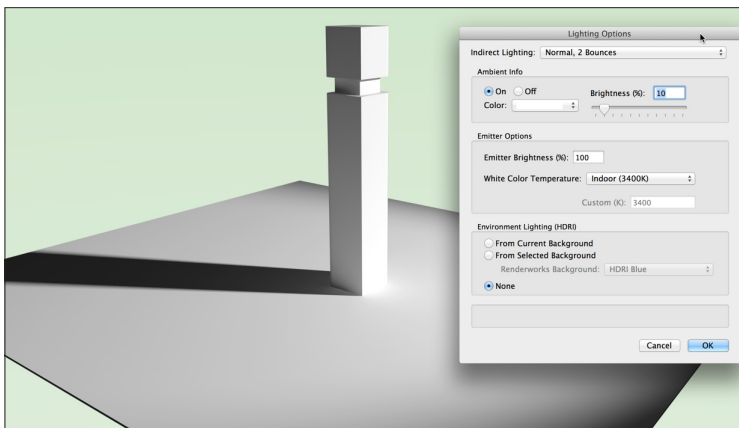


- To add indirect lighting, go to the **Menu** bar and choose
- **View > Lighting > Set Lighting Options...**
- Choose the level of **Indirect Lighting** required.
- In the image below I have a single light source, no background, no environmental lighting, 10% ambient light, and one bounce of indirect light.

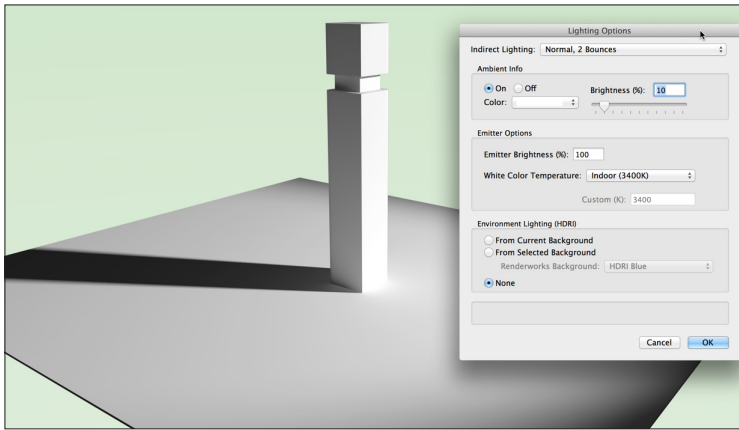


One bounce of indirect lighting is already a dramatic improvement on the rendering of the scene. The trade-off is that it does take substantially longer to render, but I think the benefits outweigh the cost.

You will also notice that as you add extra bounces of indirect lighting, the overall lighting in the scene goes up as well. In this image there are two bounces of indirect light. A single light source does not show the effect of several bounces of light accurately, but when you place several lights in a scene you do have to be careful to make sure you render it with all of the bounces turned on before you adjust the light intensity.



This is the same scene with four bounces of light. If you look at the bottom of the object where it meets the ground you will notice that it is substantially brighter and this view than in the others.



These are the main **Lighting Options** that you have in addition to the **Light Sources**. In reality you do not use one separate from all the others, you will use a combination of all of these options on your rendered projects. Emitter brightness might be one that you do not use very often, but the three others you will certainly use on every project.

# Light Sources

The light sources are the lights that make the rendered image come to life. If you try to render a file without any lighting, Vectorworks will insert a light behind you to light the scene, but you will not see any shadows, the light always stays behind you. But the best results will come when you add lights to your scene.

When you add lights your projects, do not try to re-create every light. This might mean that you have some lights that you would have in reality, but you might have many additional lights that would not be in the real project but are used to help tell the story of the model.

There are five types of light sources, which we will look at in detail:

- Directional
- Heliodon
- Point
- Spot
- Line Lights
- Area Lights

## Directional Light

### [cadmovie1502\\_02](#)

The directional light is like a sun, it is an outside light. The directional light is the type of light that is placed when you use the **Set Sun Position** from the **View** menu (only in Fundamentals).

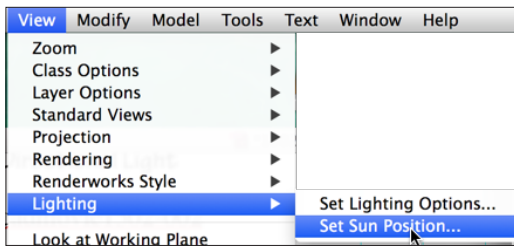
This light source has a direction and casts shadows but its position in the file is not critical as it casts a general light from a direction rather than from a point.

There are two directional light techniques that you can use. If you have Vectorworks Architect or Vectorworks Landmark, you can use the **Heliodon** tool. If you have Vectorworks Fundamentals, then use the **Set Sun Position...** command

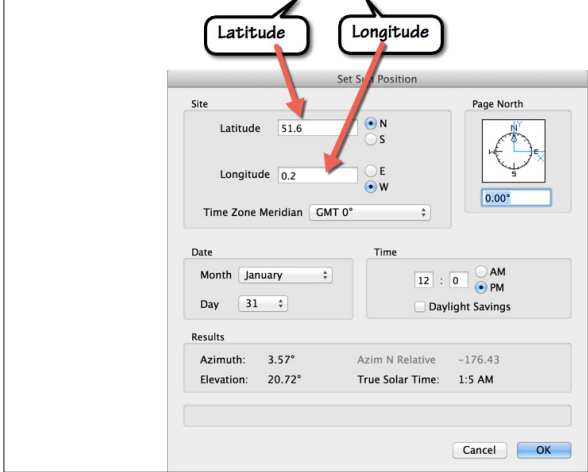
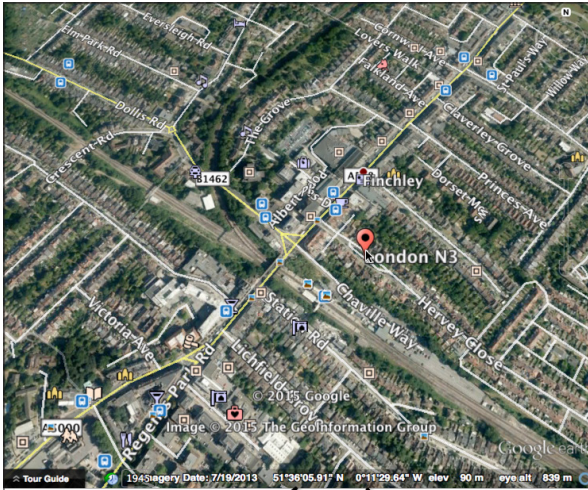
### Set Sun Position

If you have Vectorworks Architect or Vectorworks Landmark, then you have a tool called the Heliodon tool that will place the sun and give you control over the time, date, and location. If you have Vectorworks Fundamentals then you will have to use this command, but you will have to know the latitude and longitude of your site.

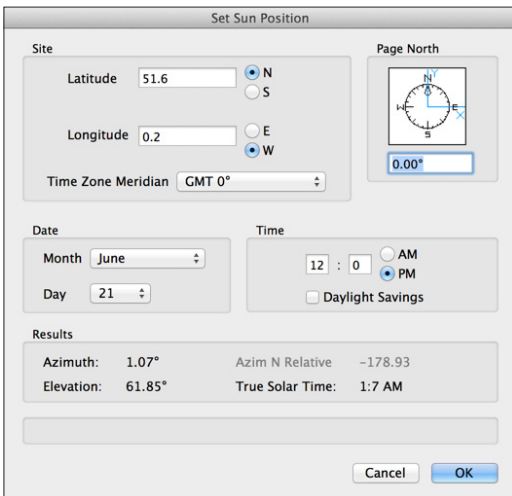
- To place a sun, go to the **Menu** bar.
- Choose **View > Lighting > Set Sun Position...**



To place an accurate sun, you need the latitude and longitude of your site. If you do not know these, use Google Earth to find the site. At the bottom of the Google Earth screen are the latitude and longitude.

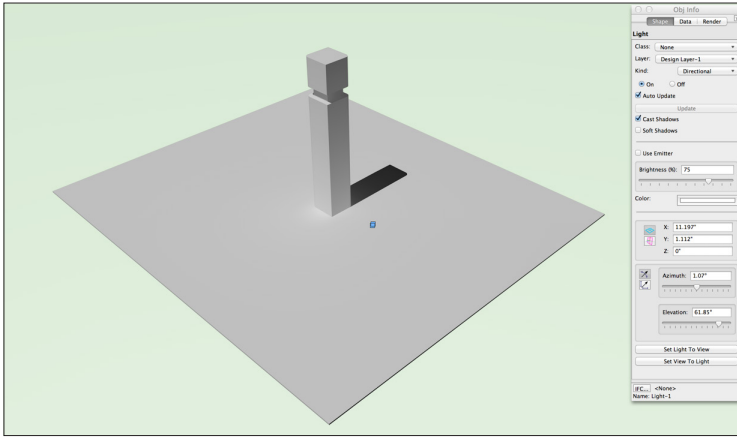


- On the dialog box that opens you can set the latitude, longitude, month, day and time.



This dialog box assumes that the model is drawn with north directly up the page.

- If you have not draw the model with North directly up the page, use the **Page North** to tell Vectorworks where North should be.
- Click on the **OK** button.

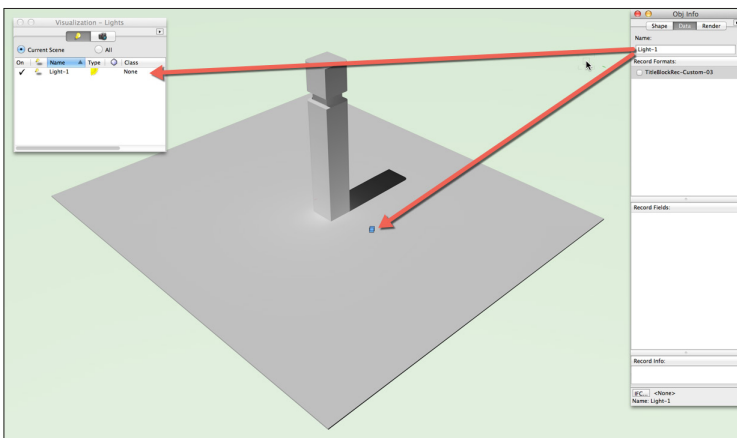


- Render the view. You can't see the actual light source, but you can see the results of the light source. Notice that when using this light source, the light does not fall off as you move away from the light.

If you have the light selected and you choose **Set Sun Position...** again, it changes the position of the selected sun, it does not place a new sun. Vectorworks will insert a directional light with the correct direction and angle.

You may find the scene too bright. If the sun is selected, you can edit it on the **Object Info** palette to reduce the brightness, and change the color.

- Lights appear on the **Visualization** palette.
- Open the **Visualization** palette from the **Window > Palettes** menu.
- The **Visualization** palette allows you to create, edit, duplicate, delete and select lights, by right mouse clicking in the palette.



If you want to create a solar animation, do not add a directional light. The

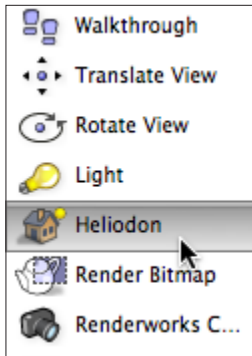
solar animation command will add its own light. Your extra directional light will confuse things by adding extra shadows.

## Heliodon

### [cadmovie1502\\_03](#)

The **Heliodon** tool is similar to the Set Sun Position command. Vectorworks places a specific **Heliodon** object whose parameters can be adjusted in the **Object Info** palette. This makes it much more flexible than the Set Sun Position command, allowing you to change the time of the day or the day of the year directly from the **Object Info** palette. As well as this, the **Heliodon** is connected to a Physical Sky. As you change the time of the day the physical sky will update to reflect that time of the day. For example, if you set the time of the day to be around sunset, the physical sky will change to reflect a dusky sky. If you set the time of the day to be after the sun has gone down, the physical sky will change to show stars rather than clouds.

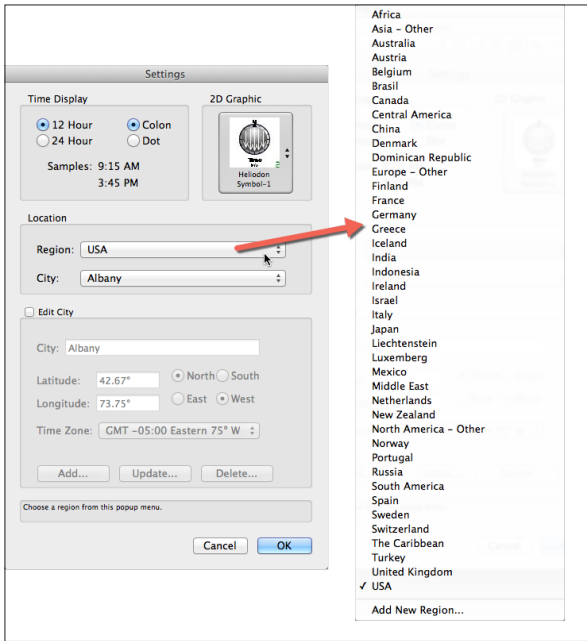
- Go to the **Visualization** tool set.
- Click on the **Heliodon** tool. This tool will place a sun. You choose the location, month, day, and time.



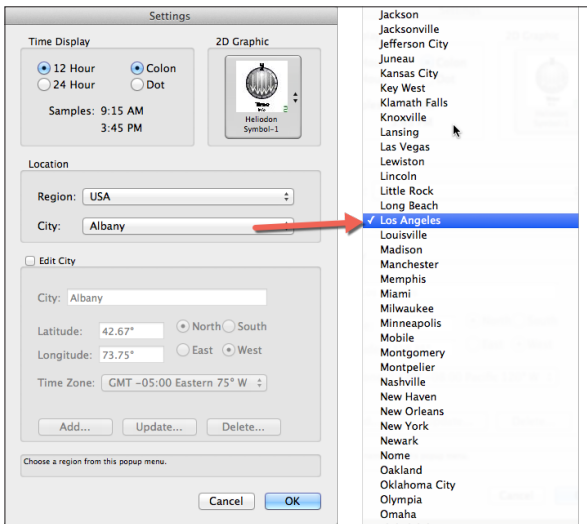
- Go to the **Tool** bar.
- Click on the **Heliodon** preferences.



- Choose the region first, these are the countries.



- If your region is not here, you can add your region, using the **Add New Region...** option at the bottom.
- After adding your region, or selecting the region where you live, you can select your city from the pop-up list of cities.



- If your city is not on that list you can easily add it. All you need to know is the latitude and longitude of your city. Google Earth is a great way to find these. If you can find your city in Google Earth there is a data bar at the bottom of the screen which gives you the latitude and longitude that you will need.

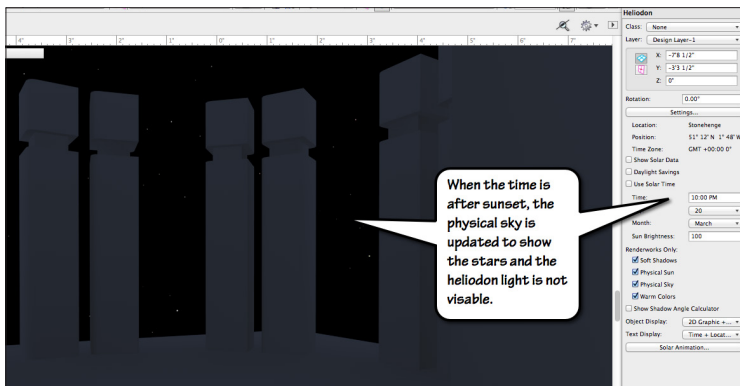
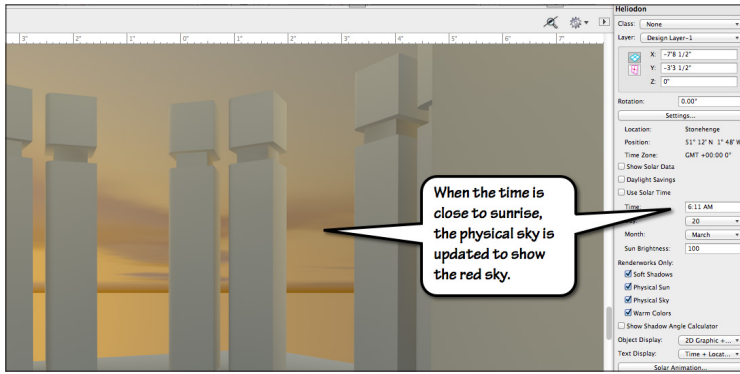
- Enter the name of your city.
- Fill in the **Latitude** and **Longitude**.
- Choose the correct **Time Zone**.

- Click on the **Add...** button to add your city to the **Heliodon** tool. The **Heliodon** tool stores all the new cities in your user folder, making them available on every project.
- Click on the **Yes** button.

Now the **Heliodon** tool knows exactly which city it relates to.

- Move your cursor into the drawing area.
- Double-click to place the **Heliodon**.
- Go to the **Object Info** palette.
- Choose the month, day, and time.

- The Heliodon also has the ability to control the Physical Sky, which changes its appearance depending on the time set on the **Heliodon** tool.



If you are rendering interiors, then it is essential to add a sun or a **Heliodon**. Showing the effect of the light coming into the building is important. Even if this is the only light you place in the scene, it can be effective.

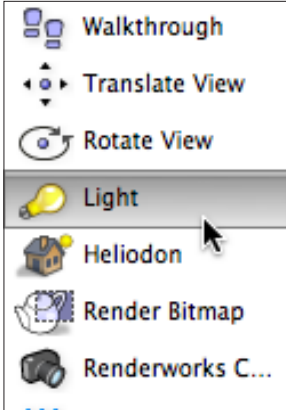


# Point Light

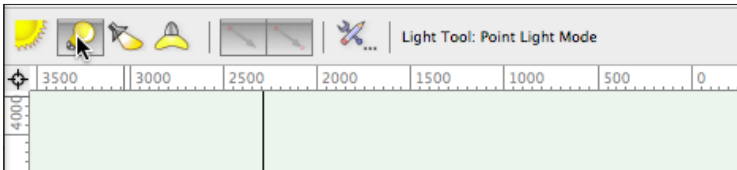
[cadmovie1502\\_04](#)

A point light is like a bare light bulb. The light goes out in all directions. I often use this light to replicate the effect of light sources in fittings.

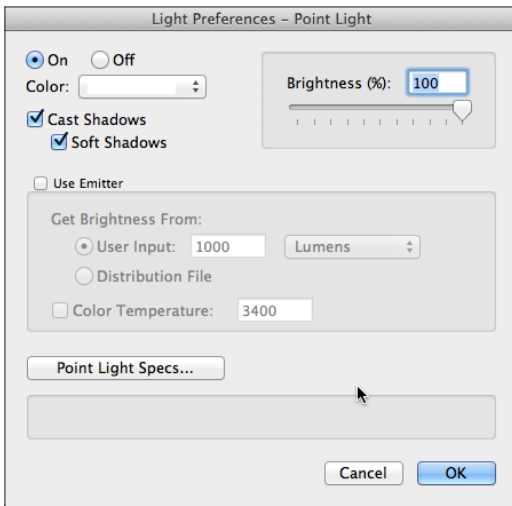
- Go to the **Visualization** tool Set.
- Click on the **Light Tool**.



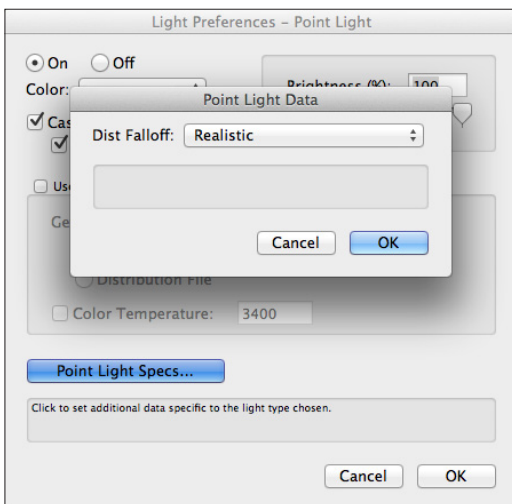
- Go to the **Tool** bar.
- Click on the second mode, the **Point Light** mode.



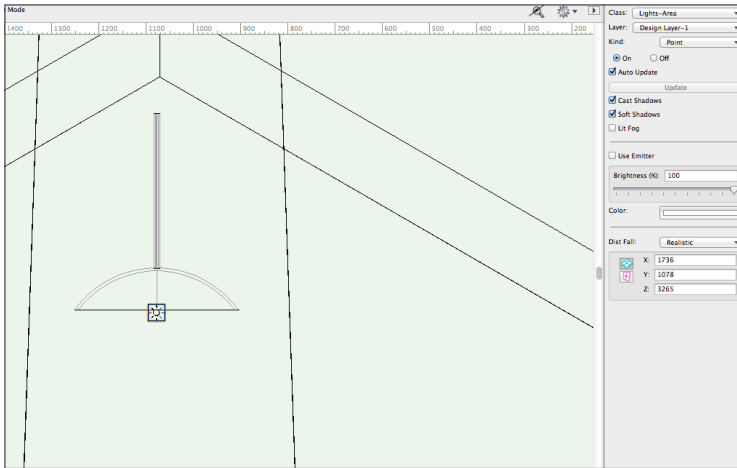
- Go to the **Tool** bar.
- Click on the **Preferences** button, the last mode.



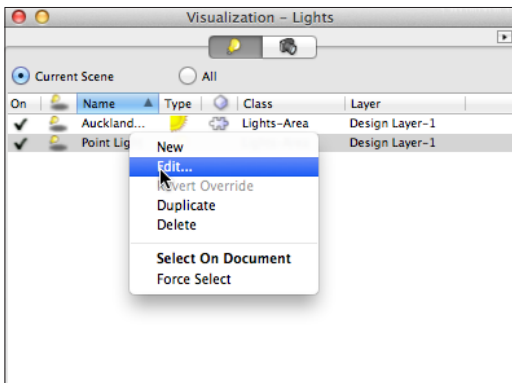
- Check your preferences. You can change the color and brightness, but beware of putting in too many bright lights and having too much brightness on each light.
- Click on the **Point Light Specs...** button. This is where you set the distance falloff. The distance falloff is the way light gets less as you move away from the light source. In real terms the intensity of the light at the source is a fixed amount. As you move away from the light source the power remains the same, but the light spreads out and covers a larger area, thus it looks like the light intensity falls off. This is controlled by the Inverse-Square Law in physics.



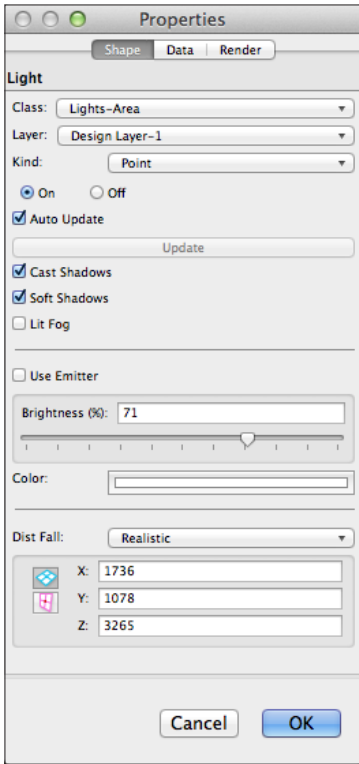
- Click in the drawing area to place a light object. You can use the model as a guide, and line up with it. Check the position of the light in plan and in elevation.



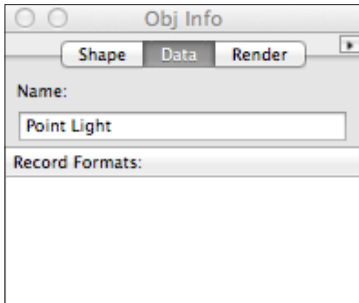
- Go to the **Visualization** palette.
- Right mouse click on the light.
- Choose **Edit...**



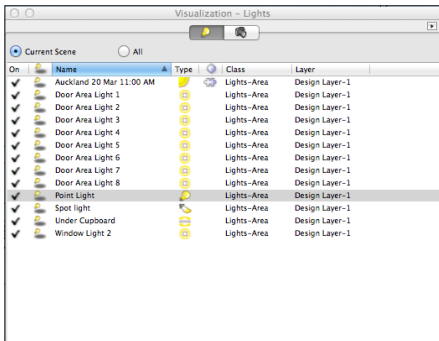
- You can change any of the settings on the light using this palette, or you can use the **Object Info** palette if the light is selected.



- Change any of the settings as required.
- Click on the **Data** pane.



- Edit the name of the light. Always name your lights so that you can locate them easily on the **Visibility** palette.



- This is the view. You can't see the actual light source, but you can see

the results of the light source. You can see the bright spot near the light and the light falls off as you move away from the light.



This is the same view with a different texture on the light fitting. It can make a big difference, so be careful with your textures.

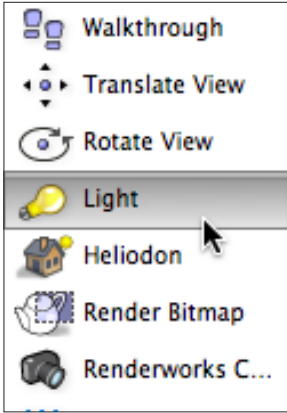


# Spot Light

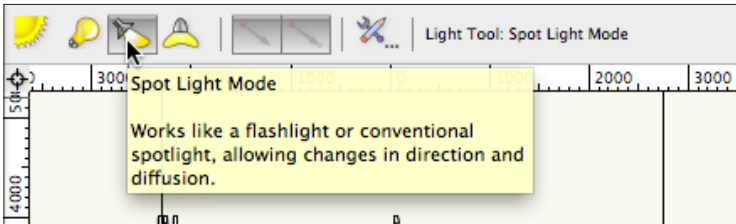
[cadmovie1502\\_05](#)

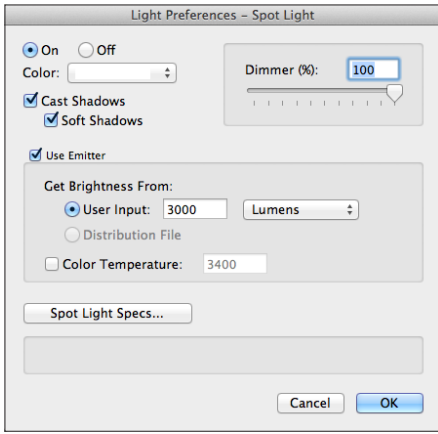
Spot lights are directional lights that point at a particular location, and they have a controllable beam and spread. Spot lights are best placed in plan and then checked in elevation.

- Change your view to a **Top View**.
- Go to the **Visualization** tool Set.
- Click on the **Light** tool.

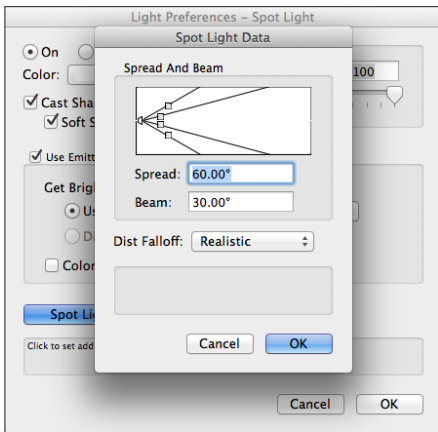


- Go to the **Tool bar**.
- Click on the **third** mode, the **Spot Light Mode**.

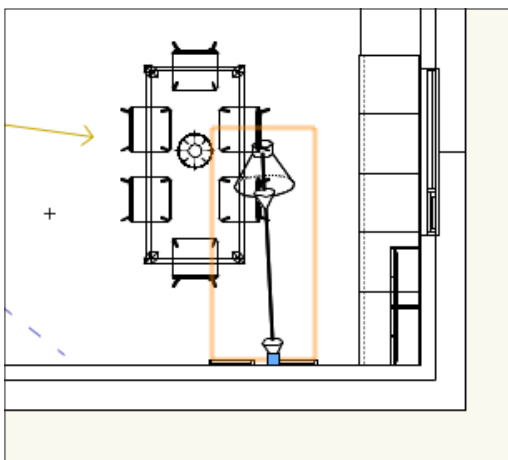




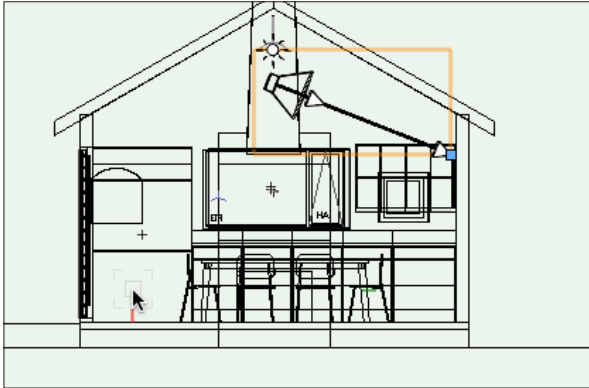
- Click on the **Spot Light Specs...** button to adjust the **Spread, Beam and Dist Falloff**.



- Click on the **OK** button to return to the **Light Preferences**.
- Click on the **OK** button again to return to the drawing.
- Click on the screen to place the light.
- Click on the screen to show where the light is pointing towards. This places the spot light in plan.



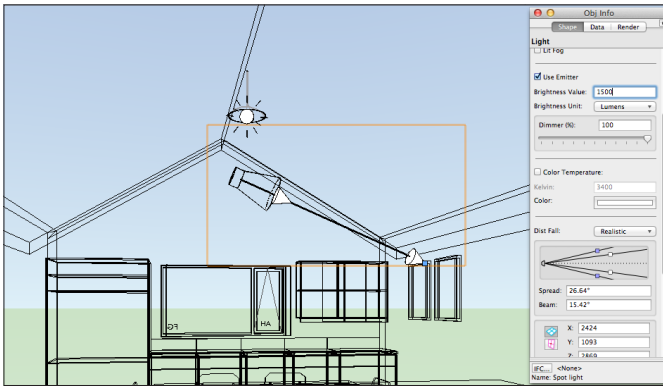
- Go to the **Basic** tool palette.
- Click on the **Selection** tool.
- Change views to right view to check the position of the light in elevation.
- Drag the light up.
- Move your cursor to the end of the spotlight.
- The cursor should change to an interactive scaling cursor (reshape).
- Drag the end of the light down.



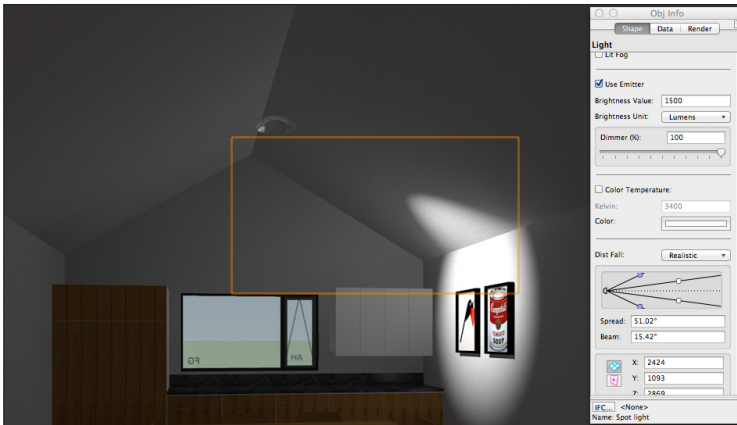
- If you render the view you can see the result of the spot light.



- With the light selected, go to the **Object Info** palette.
- Adjust the **Beam** by dragging the handles.
- Adjust the **Spread** by dragging the handles.



- The difference is dramatic.



- Go to the **Object Info** palette.
- Turn on **Lit Fog**.
- This shows you the beam of light. Be careful with this option, it can add a lot of light to the scene, but if you are careful, the results can be very nice.



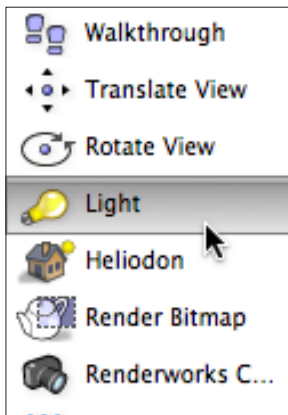
# Custom Light

## [cadmovie1502\\_06](#)

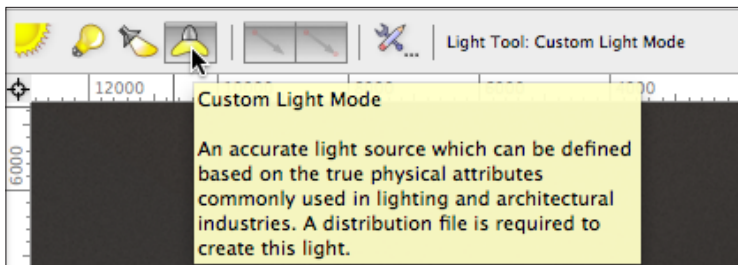
Custom lights allow you to import the light intensity from a lighting designer or manufacturer. The idea behind the custom light is that you can create a very accurate light by using the technical data from the manufacturer.

Custom lights are directional lights that point at a particular location, and they have a controllable beam and spread. Custom lights are best placed in plan and then checked in elevation.

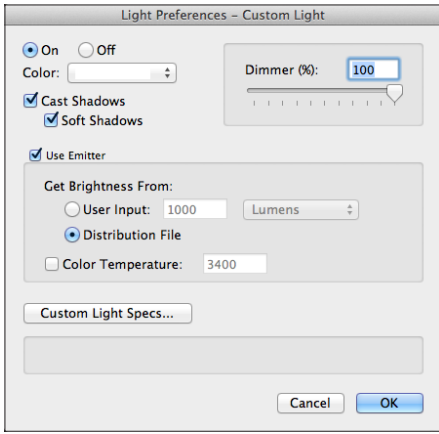
- Change your view to a **Top View**.
- Go to the **Visualization** Tool Set.
- Click on the **Light** tool.



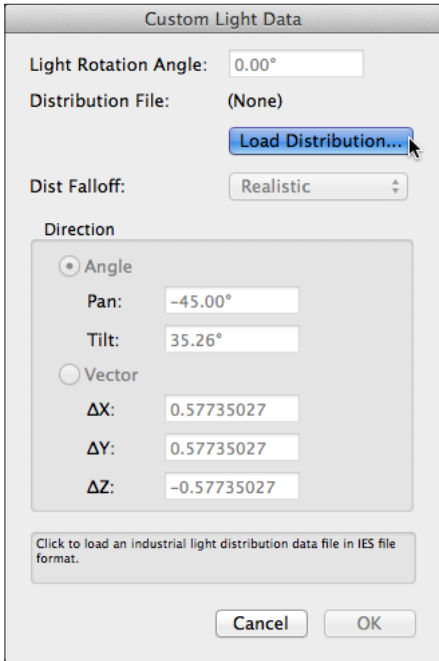
- Go to the **Tool bar**.
- Click on the **fourth** mode, the **Custom Light Mode**.



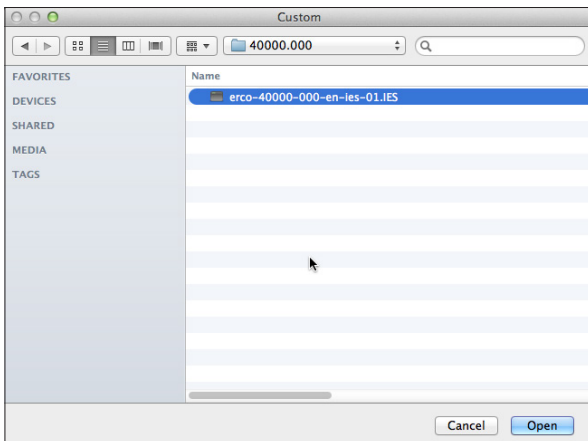
- Go to the **Tool bar**.
- Click on the **Preferences...** button.
- Click on the **Custom Light Specs...** button.



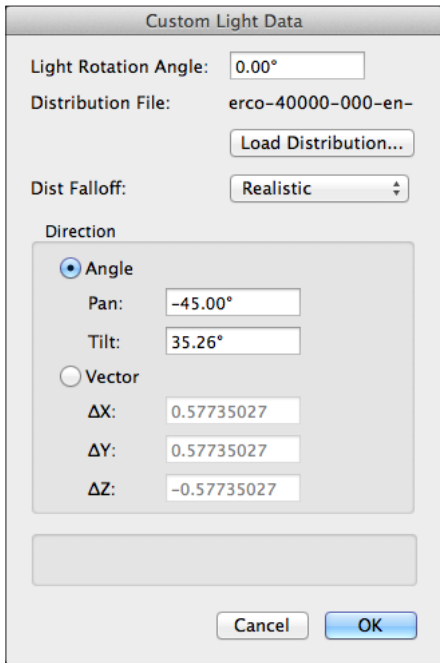
- Click on the **Load Distribution...** button.



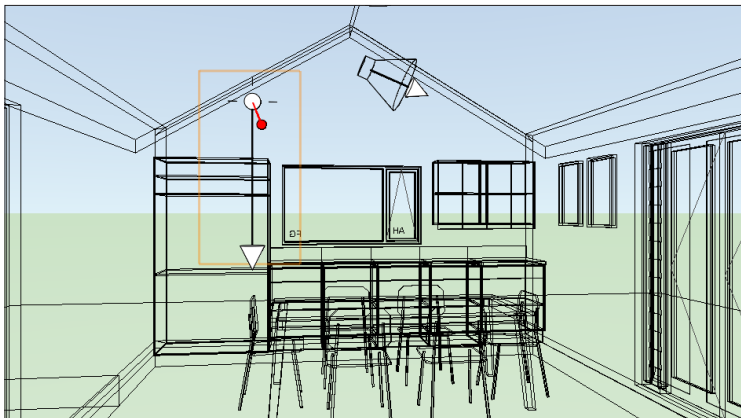
- Locate the distribution file from the lighting manufacturer.



- Click on the **Open** button.



- Click on the **OK** button to return to the Light Preferences - Custom Light dialog box.
- Click on the **OK** button to return to the drawing.
- Click on the screen to place the light.
- Use the **Object Info** palette to edit the height, pan, and tilt of the light.



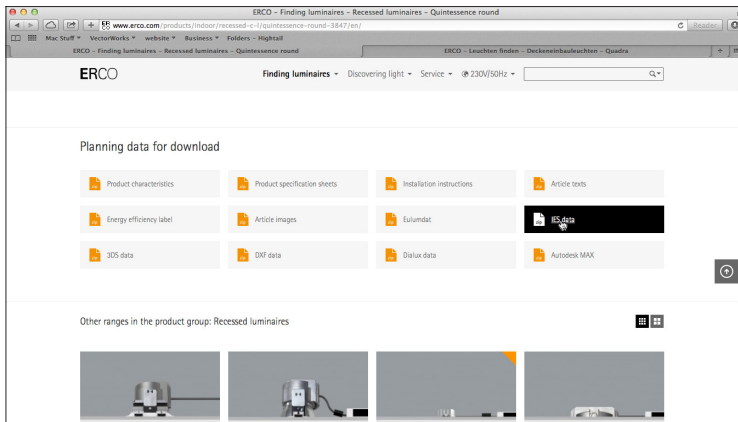
- Go to the **Basic** tool palette.
- Click on the **Selection** tool.
- Change views to right view to check the position of the light in elevation.
- If you render the view you can see the result of the lighting.



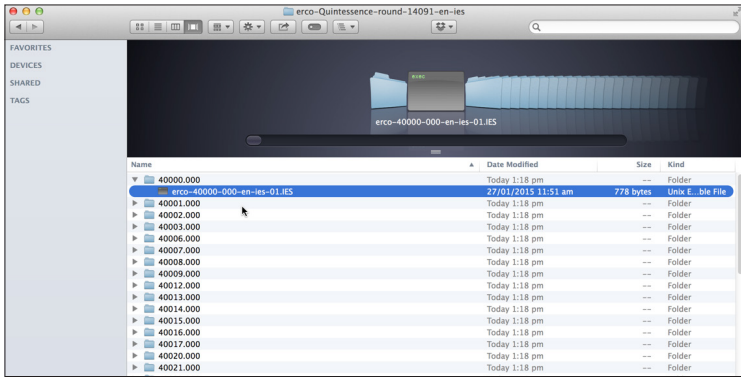
- Use the **Object Info** palette to adjust the pan and tilt.



- Light manufacturers have IES data on their websites. IES data is the load distribution files that you need to make your **Custom Lights**.



- When you download the data, you might find that you have all the data for several different light sources. Make sure that you select the correct light.

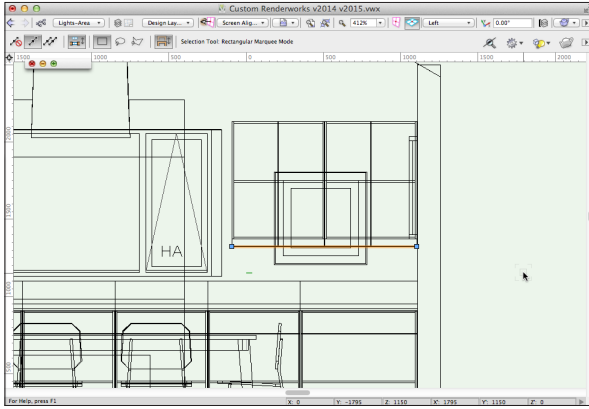


# Line Light

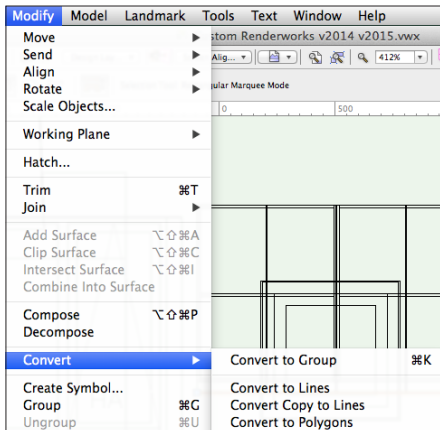
## [cadmovie1502\\_07](#)

**Line Lights** can be used to replicate tube lighting and neon lighting. In the past they used to take a long time to render, but now they are as quick as any other light. Use a line light whenever you need a continuous strip of light. There is no tool to use. You draw a shape you want and use a command to convert the shape to a line light.

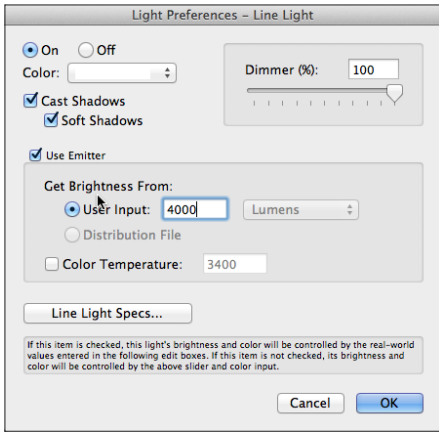
- Draw a shape, or shapes, that you want. I have drawn a line in an elevation view.



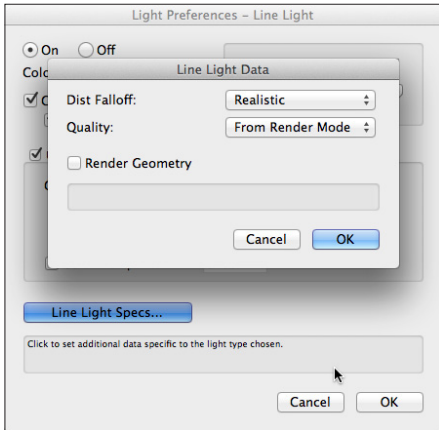
- Go to the **Menu** bar.
- Choose **Modify > Convert > Convert to Line Light...**



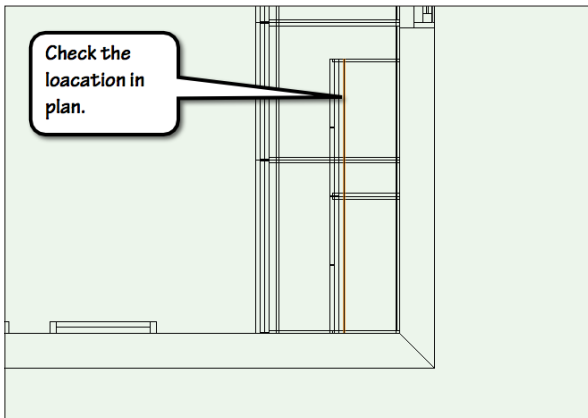
- Choose your lighting options. If you want neon lighting, choose a suitable color.



- Click on the **Line Light Specs...** button.



- Click on the **OK** button to return to the Line Light Preferences dialog box.
- Click on the **OK** button once more to close the dialog box.
- Check the location of your line light in plan as well as elevation.



- When you render the view the effect of the line light should be visible. If the effect is too strong, use the **Object Info** palette to turn down the intensity of the light, if the light is not strong enough, turn up the

intensity.



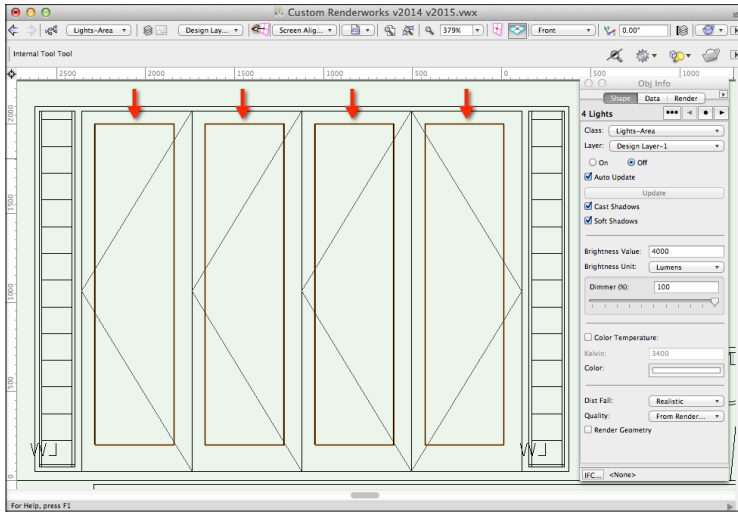
- If you use more than one object to create a **Line Light**, Vectorworks will group the lights together.

# Area Light

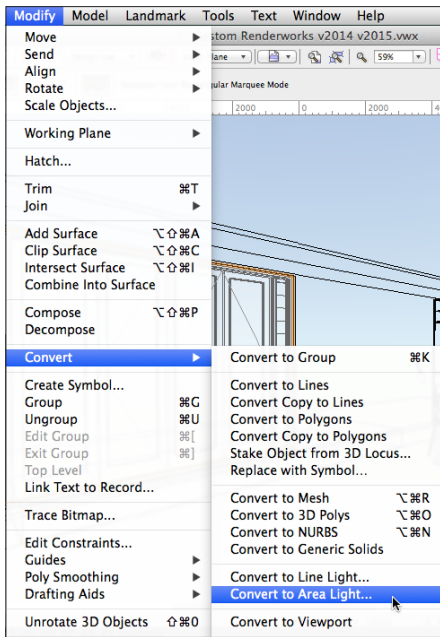
## [cadmovie1502\\_08](#)

**Area Lights** can be used to simulate a large area of lighting, like a window. There is no tool to use. You draw a shape you want and use a command to convert the shape to an area light.

- Draw a shape, or shapes that you want. I have used a rectangle, and created it in a front view so it will be at the correct height and width.



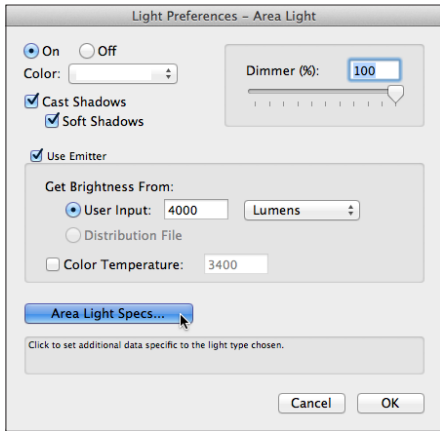
- Go to the **Menu** bar.
- Choose **Modify > Convert > Convert to Area Light...**



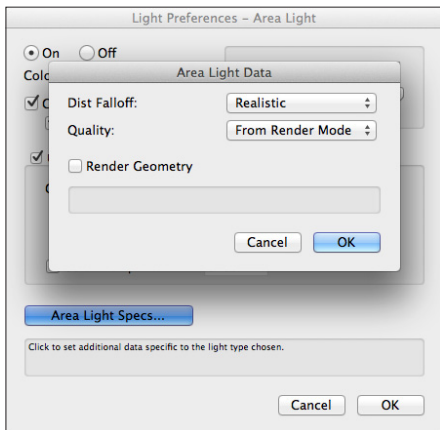
- Choose your lighting options. Choose a suitable color. Use **Emitter**

gives you control over the light output using Lux or Lumens, rather than just brightness.

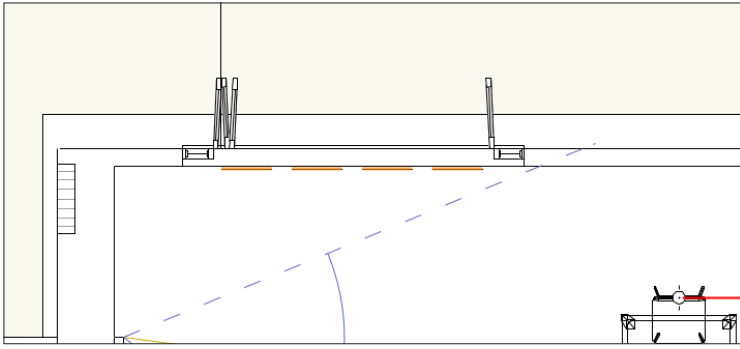
- Click on the **Area Light Specs...** button.



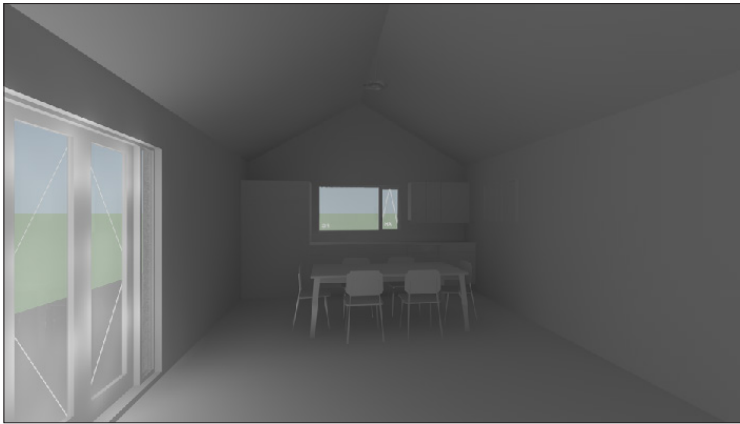
- Chose the options here. To find the solution you like best, try the settings shown, and render the view. Use the **Object Info** palette to edit the settings and render the view. See what you like.



- Click on the **OK** button to return to the Light Preferences.
- Click on the **OK** button to finish.
- Check the lights in plan view.
- Ensure you do not place the area light behind a solid object, like a wall, glass and so on.



- Change to your perspective view. This image shows the scene with the colors turned off. This should allow you to see the effect of the lighting without the confusion of the textures.



This is the scene with all the lights and textures.

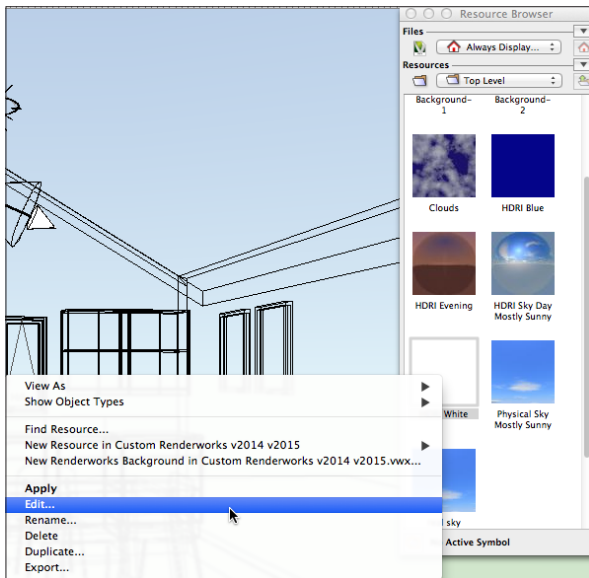


# Edit HDRI Backgrounds

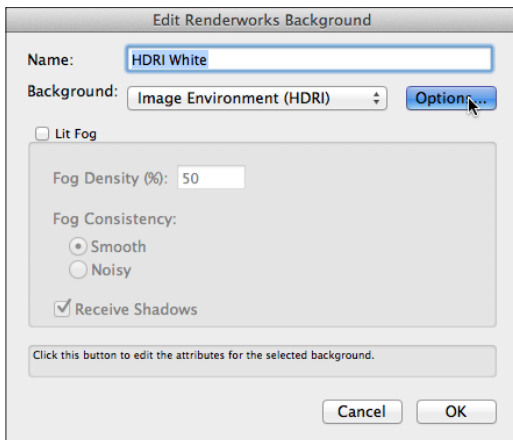
[cadmovie1502\\_09](#)

Earlier in the manual we looked at the HDRI backgrounds, now we can look at how to edit them.

- Go to the **Resource Browser**.
- Locate the required HDRI background.
- Right-click on it.
- Choose **Edit...**

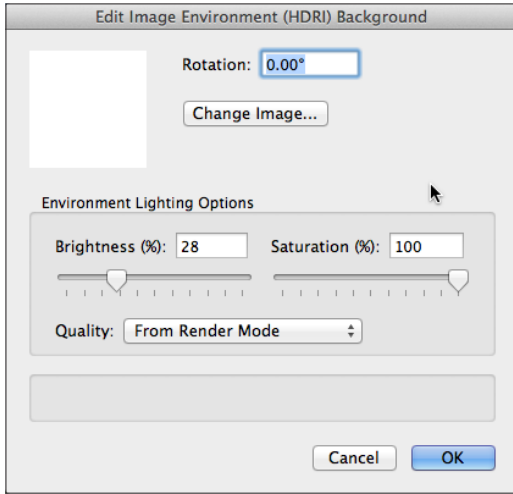


- This dialog box allows you to edit the name, but to edit the intensity of the HDRI background, click on the **Options...** button.



- I often find that the background is adding too much extra light to the scene. The solution to this is the reduce the brightness of the HDRI background.

- Start with 50% brightness, then try rendering the view. If the environmental lighting is still too much, try reducing the brightness again.



# Visibility Palette

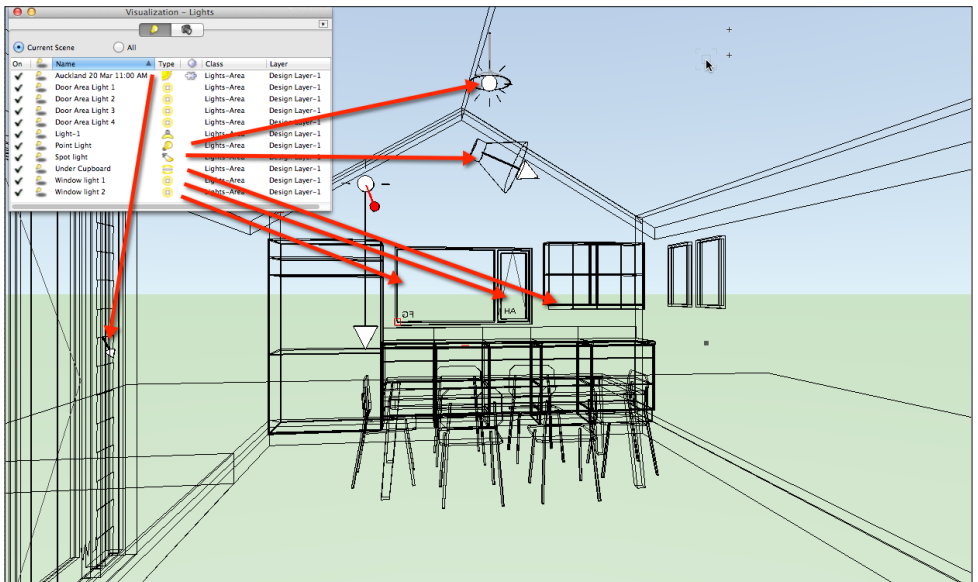
[cadmovie1502\\_10](#)

When you start adding lights to the project, the **Visibility** palette becomes very useful. You can use this palette to see all the lights and cameras in the file, you can use it to select lights and cameras, and you can use it to edit them.

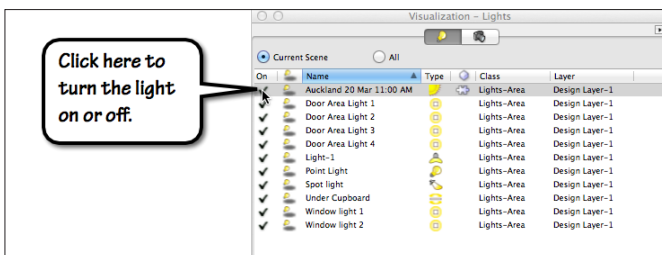
## Lights and Cameras on the Visibility palette

The lights and the cameras appear on the **Visibility** palette. This palette allows you to control and edit lights and cameras.

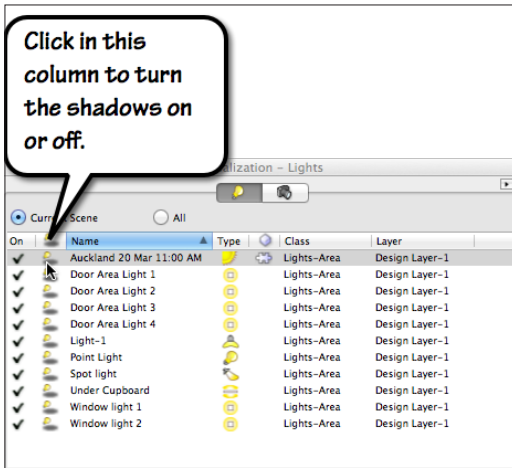
- If you name your lights with a meaningful name, it makes it easy to find the lights and to control them.



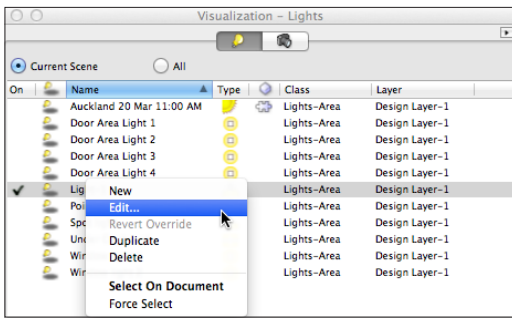
- The first column controls the light in the scene. The tick shows that the light is on. If you click on the tick, the light will turn off. This allows you to control all the lights in the scene from one place.



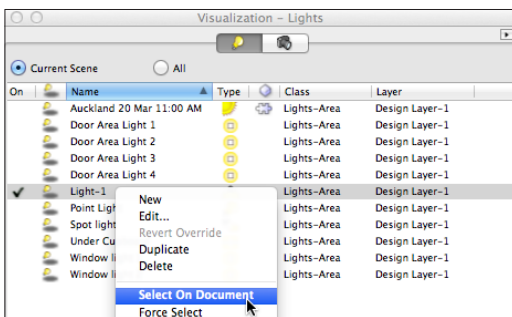
- The next column controls the shadows.



- Right click on a light to edit it. This will open the **Properties** dialog box where you can edit the light.



- Right click on a light to select it. Then you can use the **Object Info** palette to edit the light.

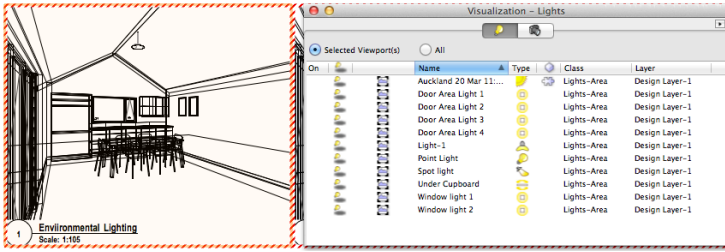


## Controlling Lights in Viewports

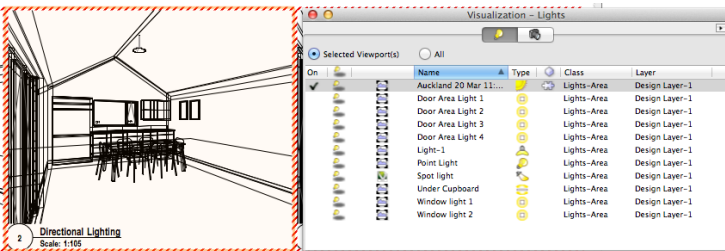
One of the very powerful techniques with the **Visualization** palette is the ability to control lights in the scene and in the selected viewport. When you select a viewport that contains lights, the Visualization palette will show the lights that are available in the selected viewport only.

- Notice how, when you select a viewport, the **Visualization** palette changes to show a radio button above the lights that says **Selected**

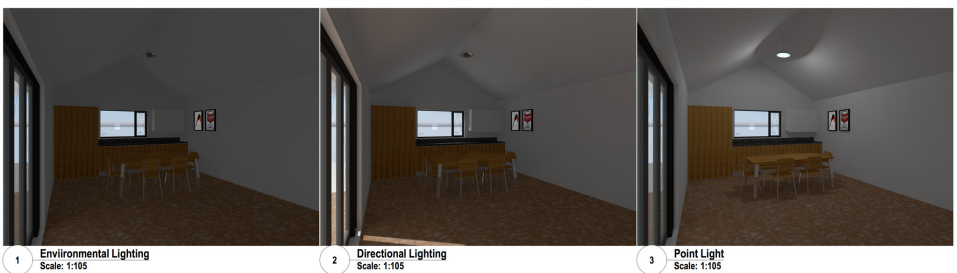
**Viewports.** This means that the controls for the lights shown on the **Visualization** palette are only controlling the lights in that viewport.



- This gives you the ability to have different lights visible in different viewpoints. As well as controlling whether or not the lights are on or off, you can also control the shadows of individual lights, whether or not these lights will cast a shadow in the scene.



- And finally, the **Visualization** palette gives you the ability to change the intensity of individual lights on individual viewports, giving you an amazing ability to change the lighting from one viewport to the next. I have often used this to control the lighting on all my viewports to create different lighting effects. For example, you could have two identical viewports, except one might be at daytime and one might be at nighttime, just by changing the light settings on the **Visibility** palette.



Thank you

We trust that you have enjoyed working through this manual and that it has been informative and constructive.

For more information, please visit: <http://learn.archoncad.com/>. If you just want someone to help you learn Vectorworks, to carry out some Vectorworks contract work, or you want someone to make Vectorworks easier, contact us, as this is a service that we also offer: [jon@archoncad.com](mailto:jon@archoncad.com).

Thank you again,

Jonathan Pickup

February 2015

