



# RADEON PRO

SOFTWARE

## Radeon ProRender plug-in for 3ds Max

User Guide v1.0

This document is a user and setup guide with tips and tricks on how to render photorealistic images in real-time, set materials and lighting.

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# OVERVIEW

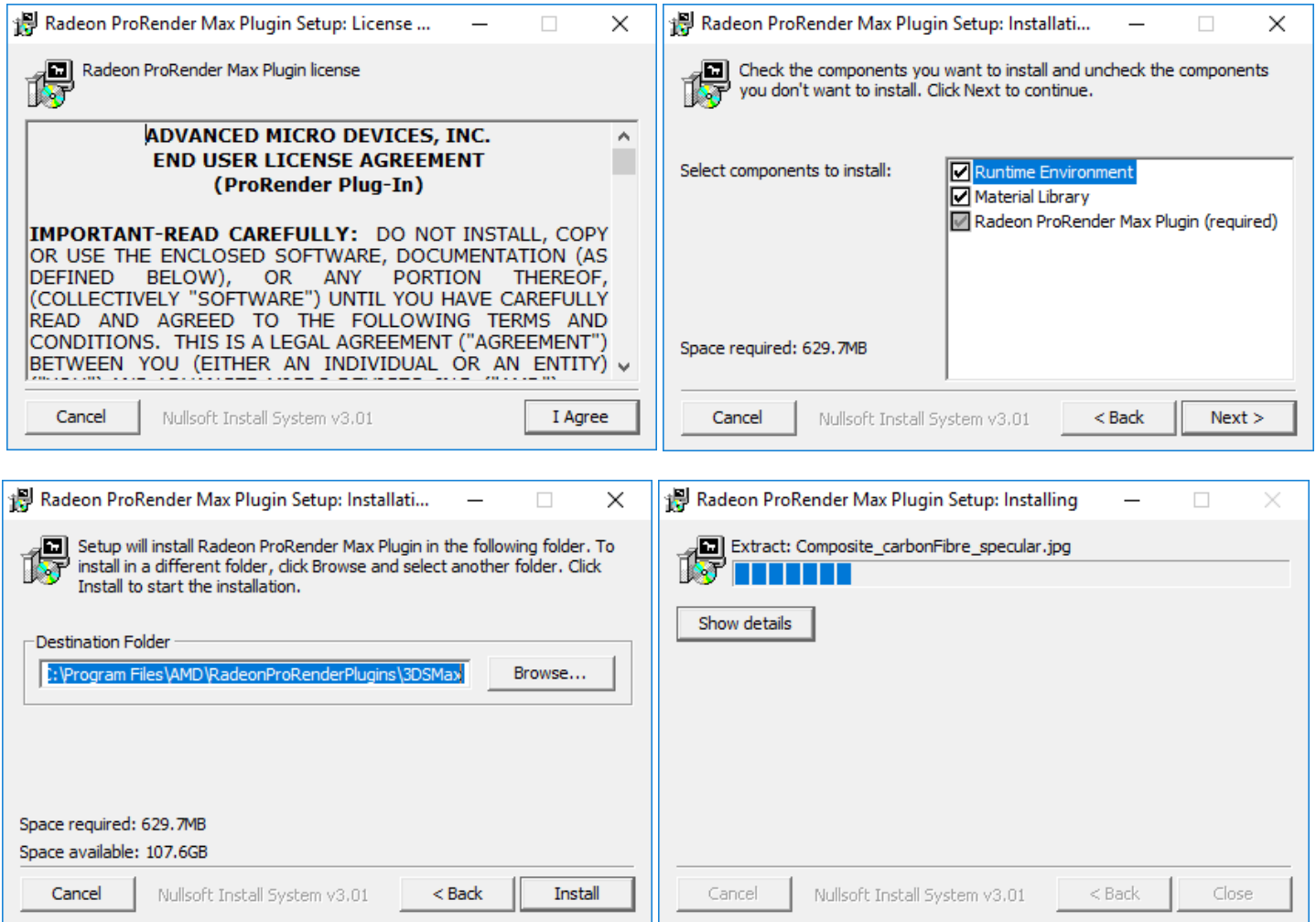
Radeon™ ProRender is a free un-biased rendering add-in for your design needs in Autodesk® 3ds Max®. Using physically accurate path-tracing technology, Radeon™ ProRender can produce stunning photorealistic images of your scene and provides real-time interactive rendering and continuous effects adjustments to help create the perfect rendered image. The Radeon™ ProRender plugin is fully integrated into 3ds Max – it supports the 3ds Max lights, materials, and textures and renders your geometry accurately. Radeon™ ProRender also comes with a library of materials to get you started.

This user guide will describe how to use and setup Radeon™ ProRender for 3ds Max.

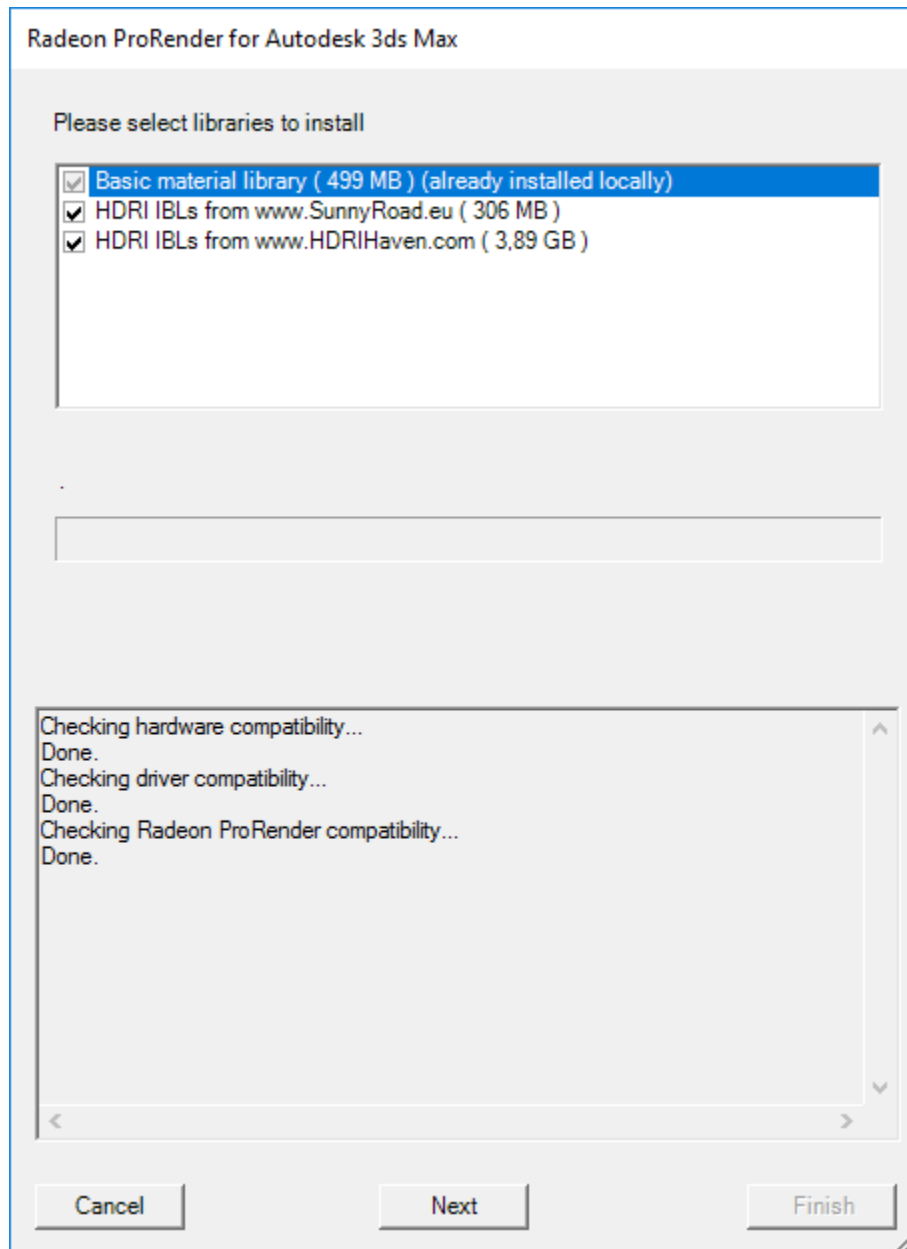
# Install Radeon ProRender plug-in

## Radeon ProRender for Microsoft Windows

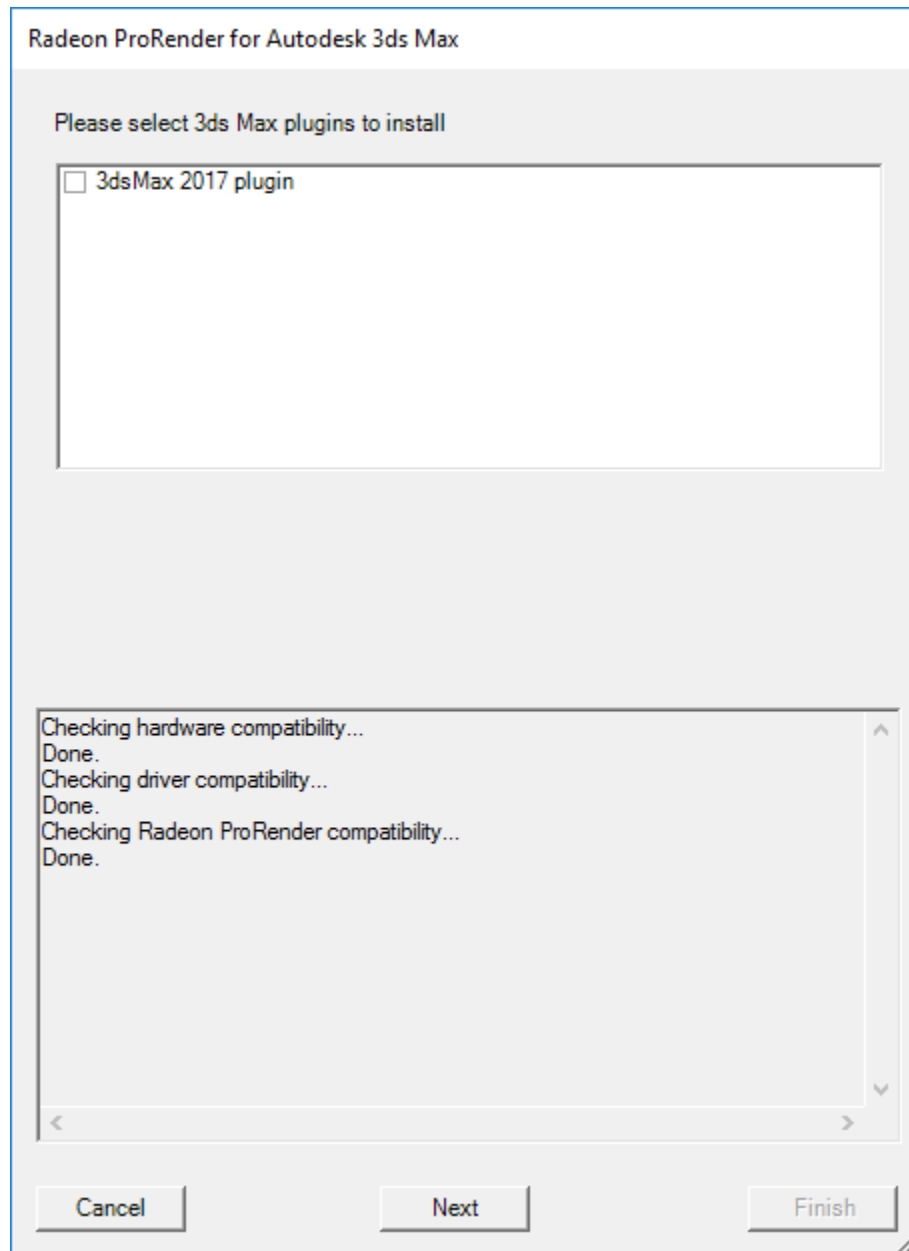
Download the Radeon™ ProRender plug-in for 3ds Max for Microsoft Windows®, launch the installer and agree to the license.



Check the libraries you wish to install. HDRI IBLs can be used to display realistic background lighting.

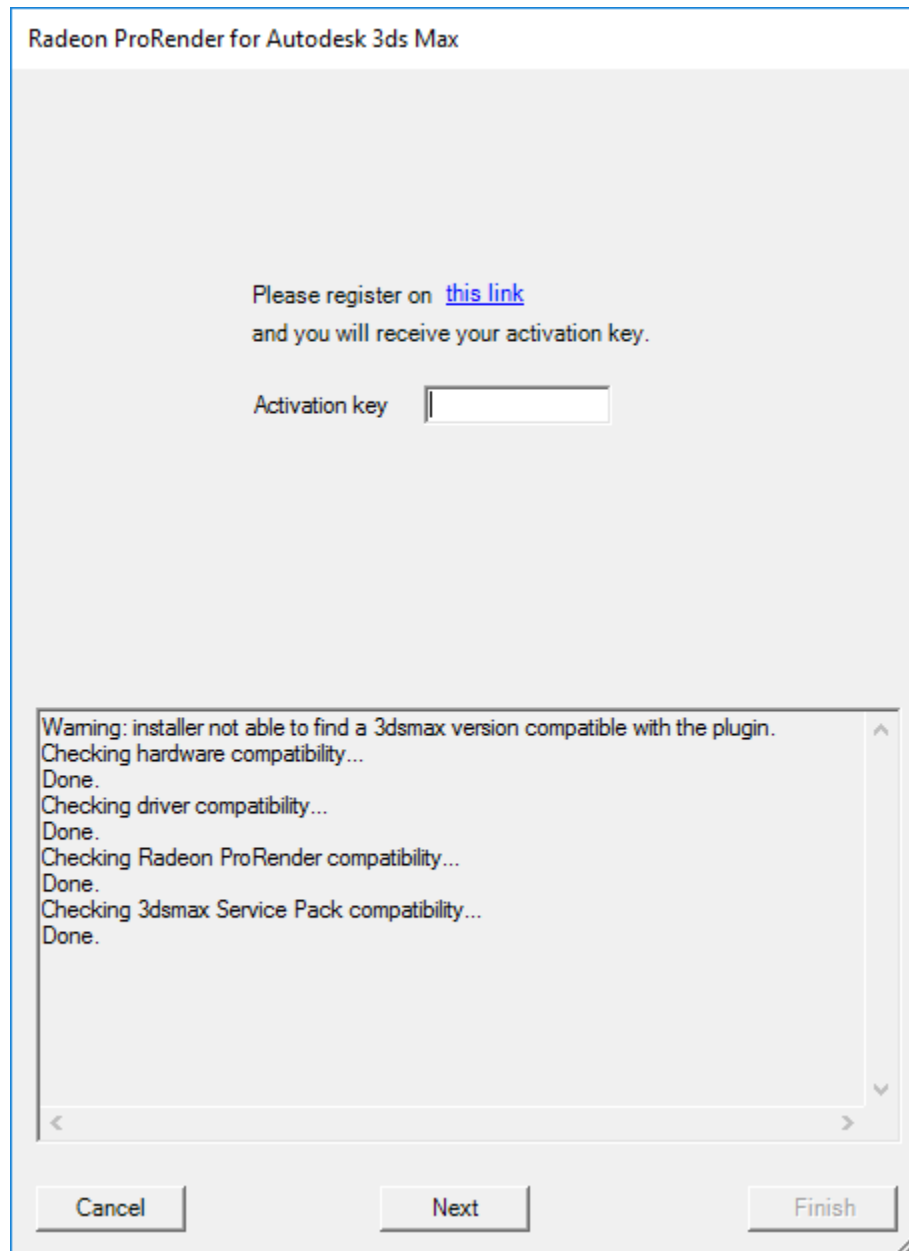


Download the plug-in for the version of 3ds Max you are using.

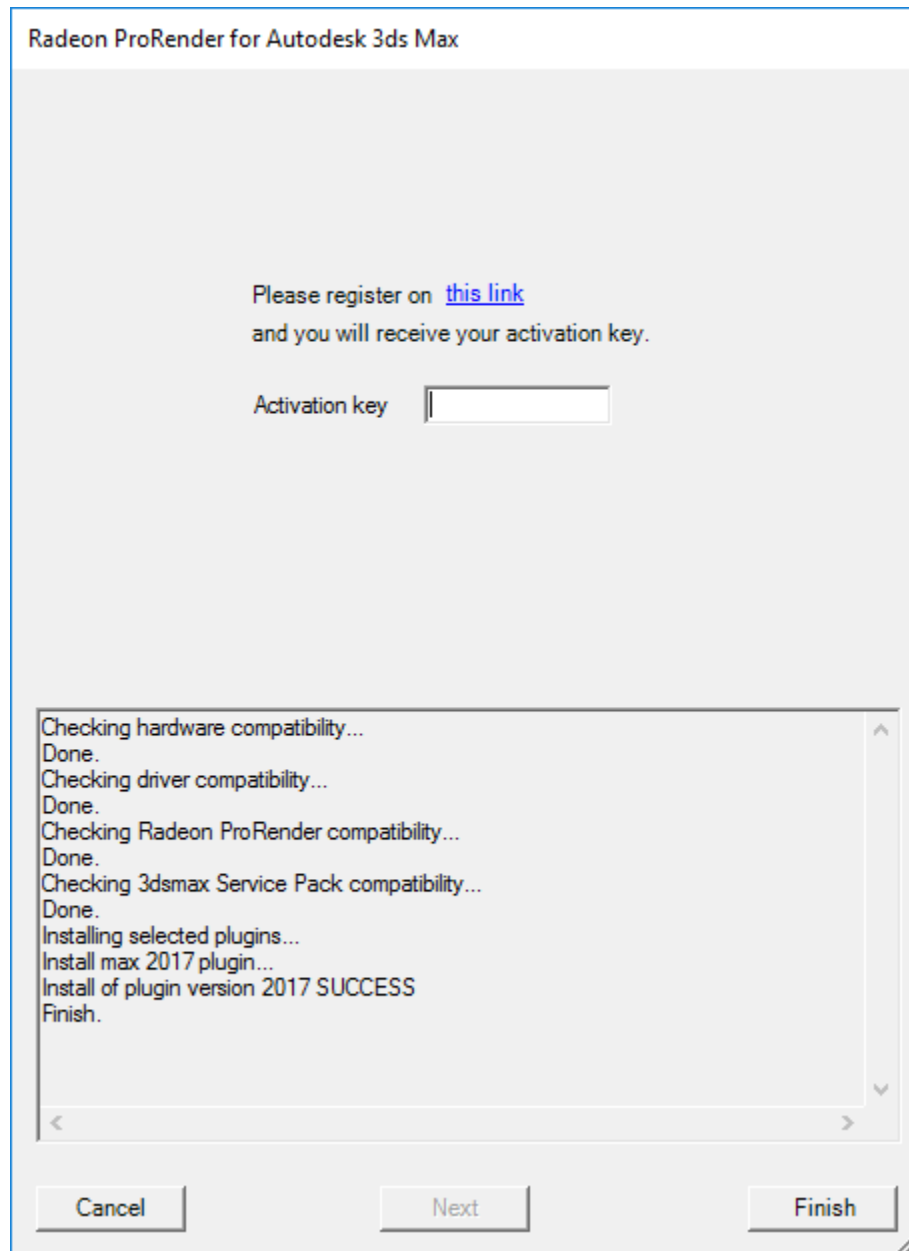




Register your information to receive your activation key.

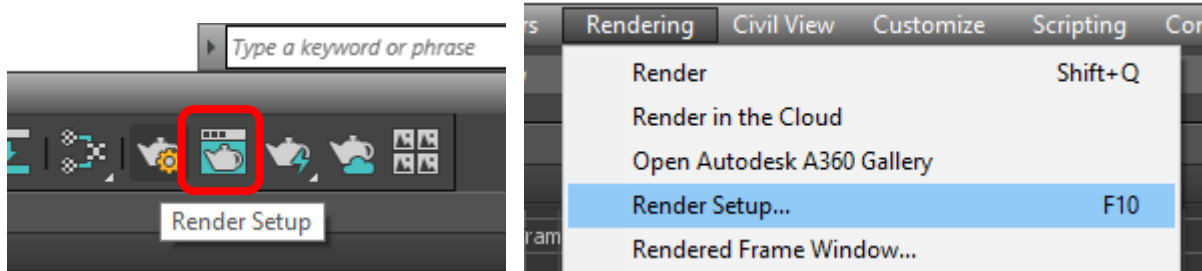


Finish the registration and installation process.

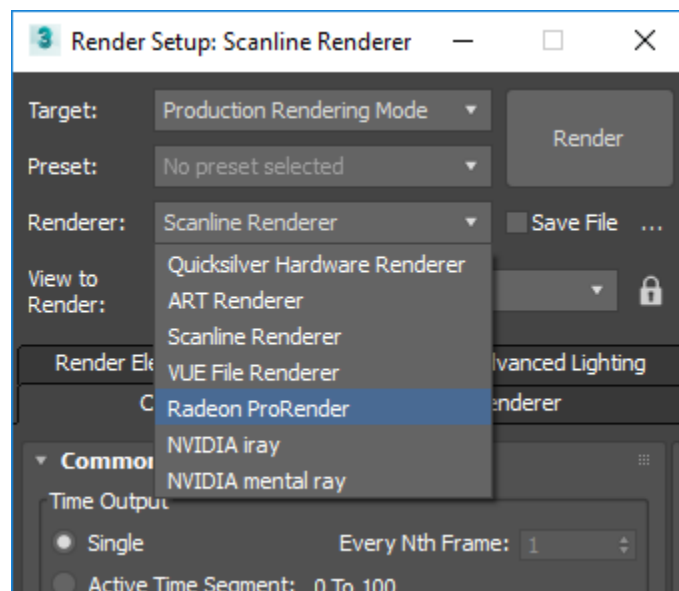


## Switching to Radeon ProRender

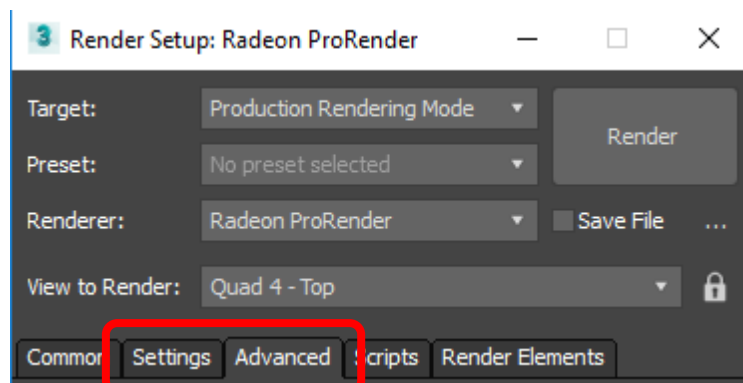
Launch 3ds Max. Select the **Render Setup** button, by going to **Rendering > Render Setup...**, or press the **F10** key.



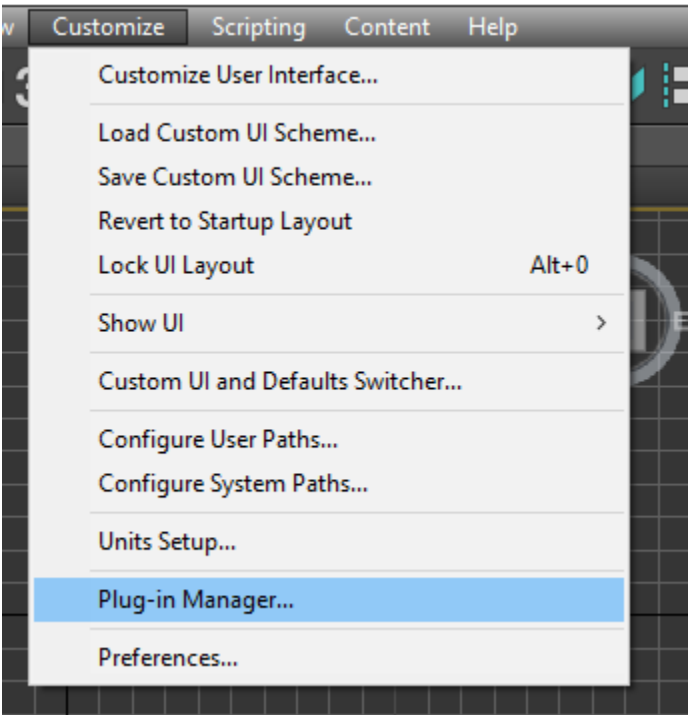
This will display the Render Setup dialog where you can set the default render you want to use for production or final rendering of your scene. Ensure the **Target** drop down is set to **Production Rendering Mode** and then using the **Render** drop down select **Radeon ProRender**.



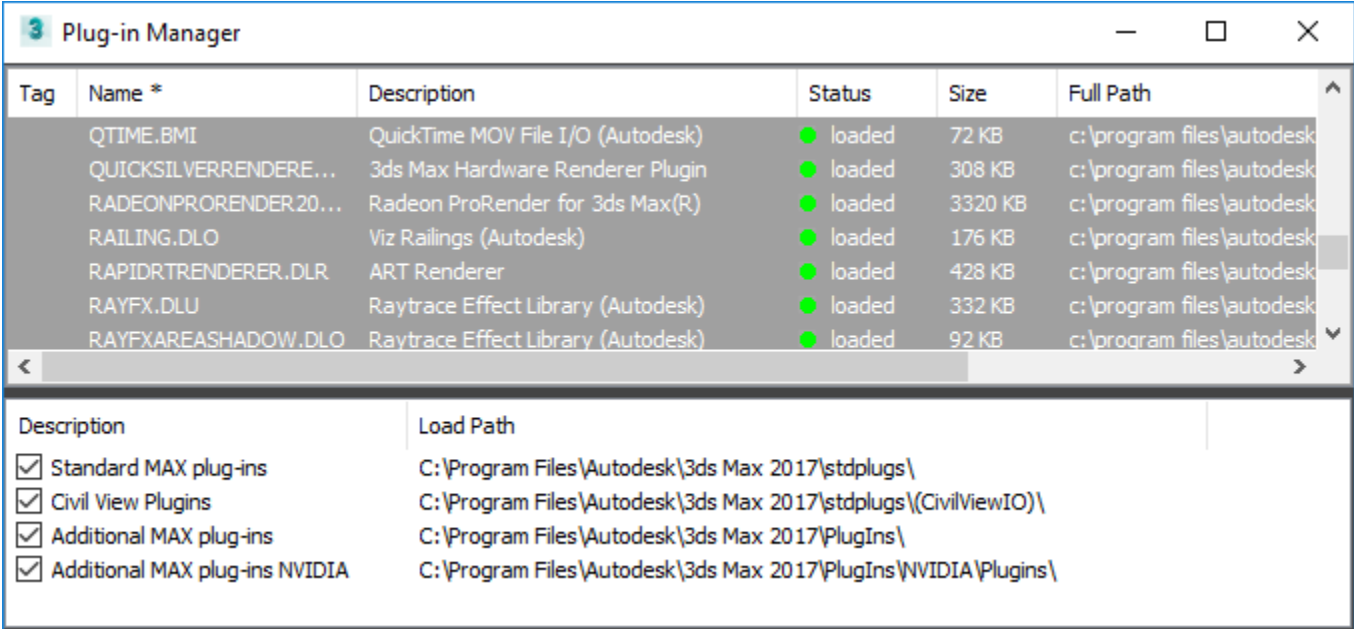
Once you have done this you will see the settings tabs change to include **Settings** and **Advanced**.



Access the **plug-in Manager** through **Customize > Plug-in Manager**.

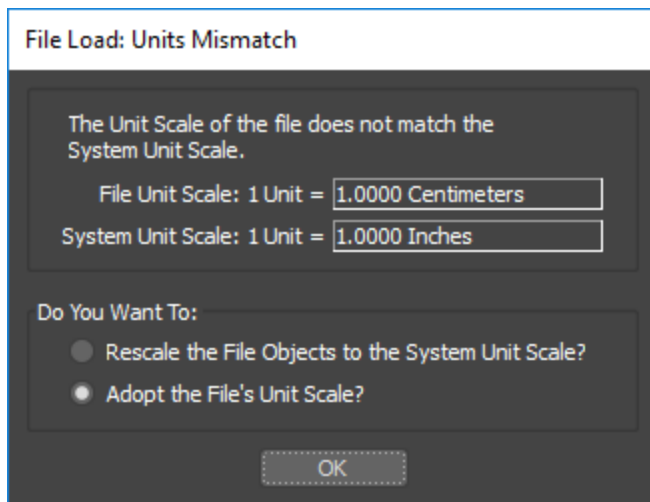


You will see the plug-in status has changed to "loaded" for Radeon™ ProRender for 3ds Max.



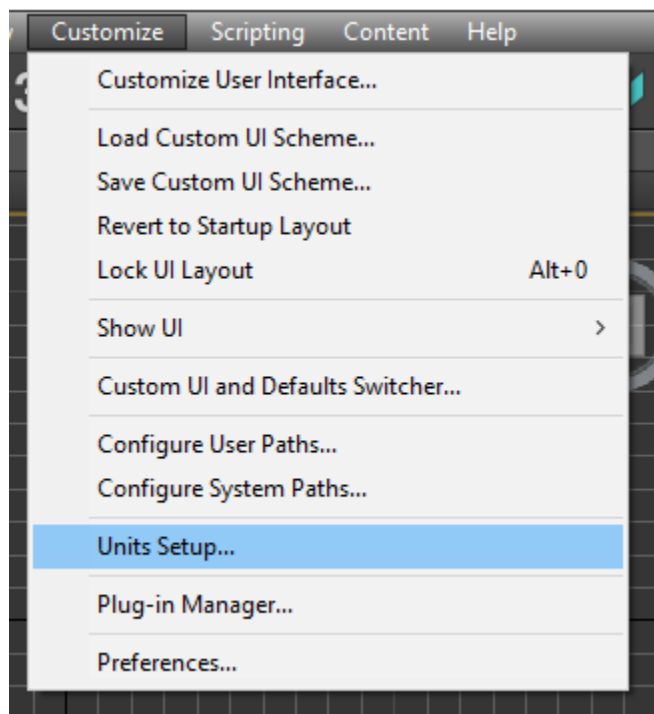
## Setting Units

Make sure units are set up correctly. Setting the units for the scene can affect the focal length of the camera and other rendering parameters. When opening a new file, you should **not** select the **Rescale the File Objects to the System Unit Scale** conversion option on opening and use the scene default units.

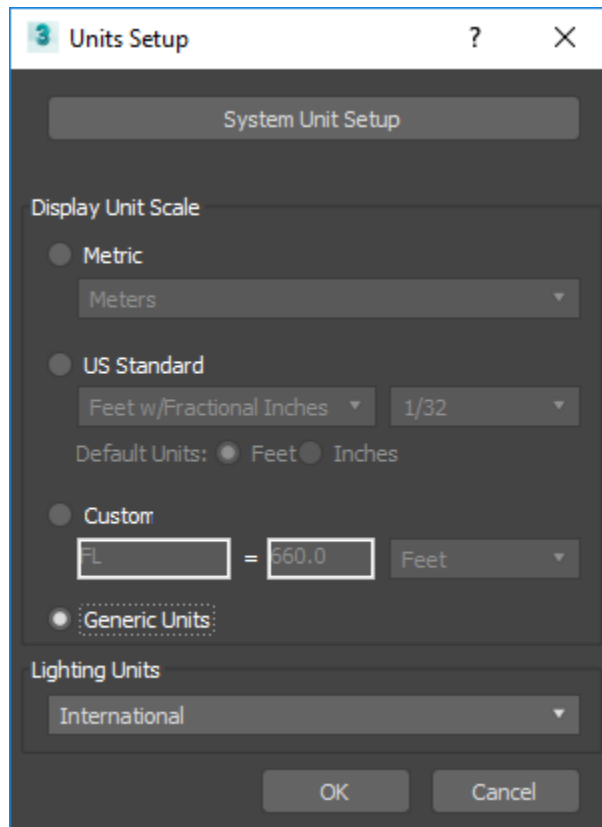


**Note:** It is advisable that you select standard units for your projects e.g. centimeters, meters, inches and stick with them throughout your build. It is not advisable to convert these to different units during a project or to select the convert option when opening a file.

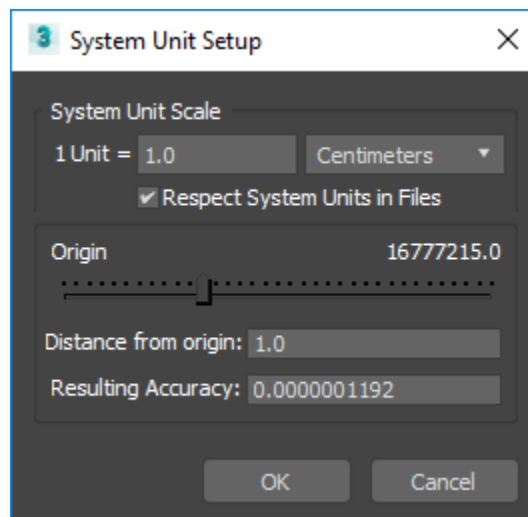
To establish the units for your project select **Customize > Units Setup**.



You can leave the Display Unit Scale as **Generic Units**.



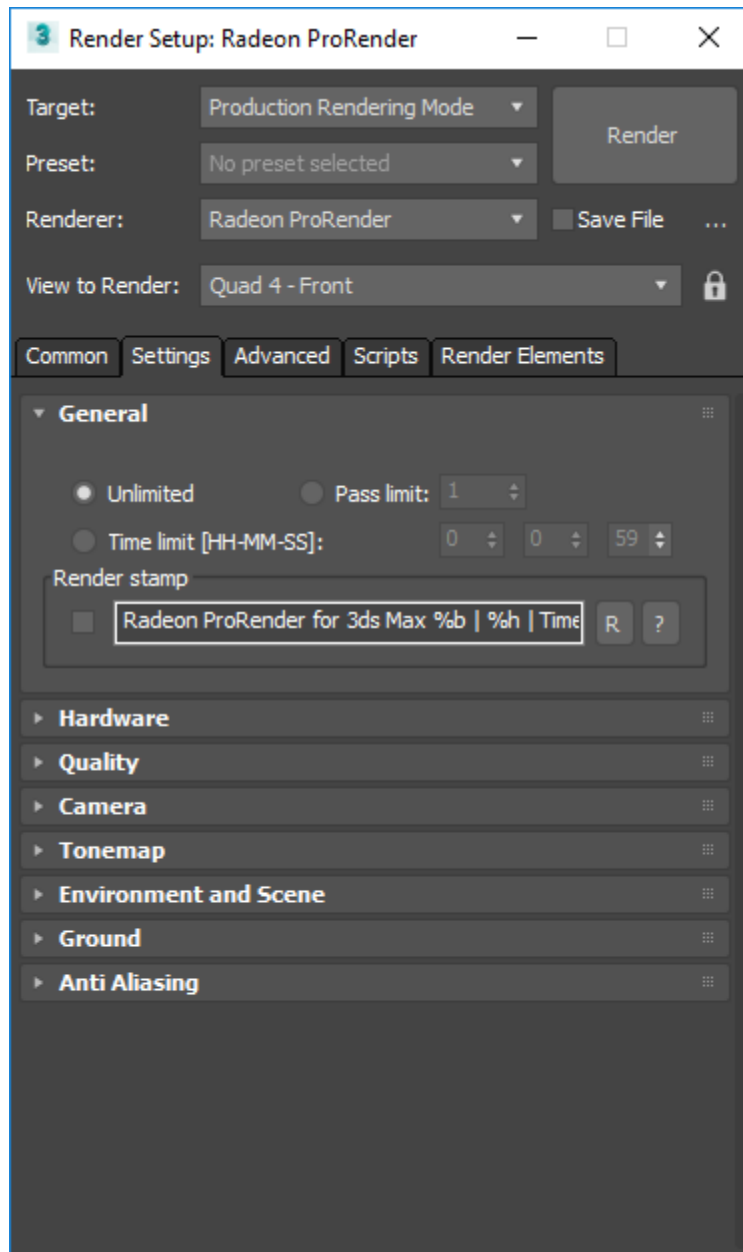
The press **System Unit Setup** and select your measurement for 1 Unit.



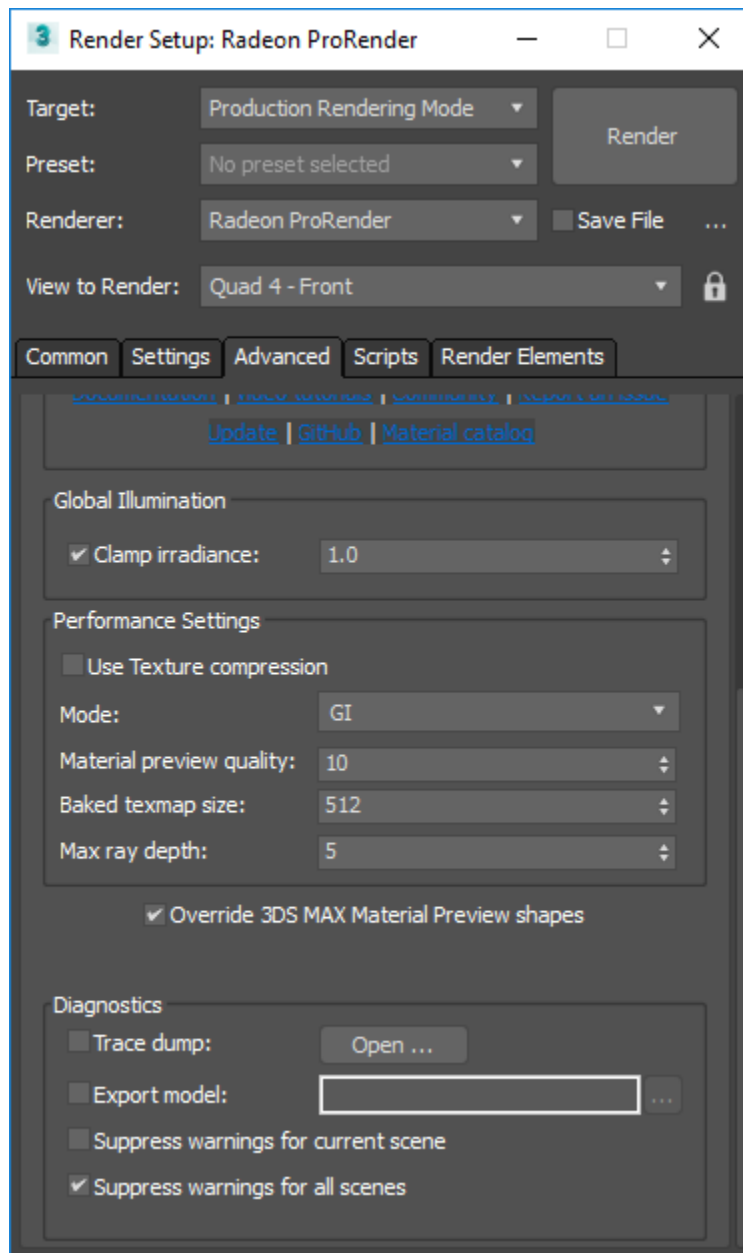
If you try and change this value in a scene after you starting building, you can get some very bad results, so if you do need to update a scene into a new unit size, create a fresh scene, set up the units and then merge the old scene into it and you should be able to avoid the horrible conversions that might occur on some objects. You will still need to change the size of some of your materials if you have used the option to use real world scale, as they will reflect your old condition

# Overview of User Interface

## Render Settings



## Advanced Render Settings



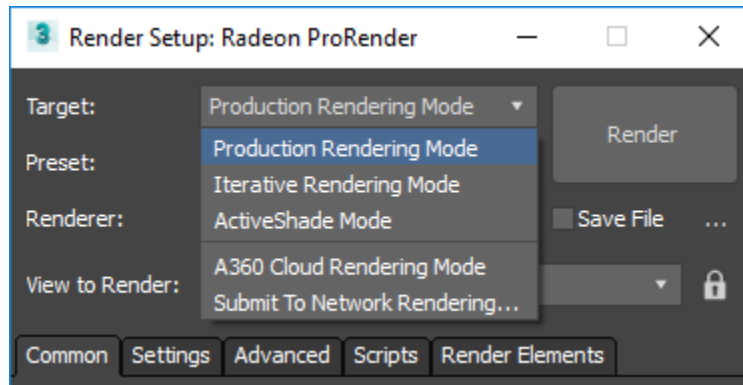


## Render Viewports

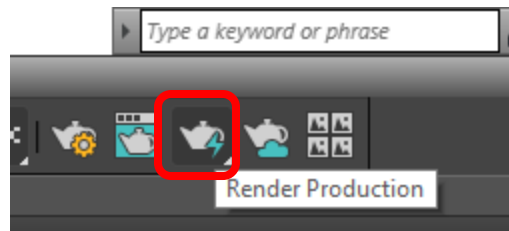
Press **F10** to open **Render Setup**.

### Production Render Window

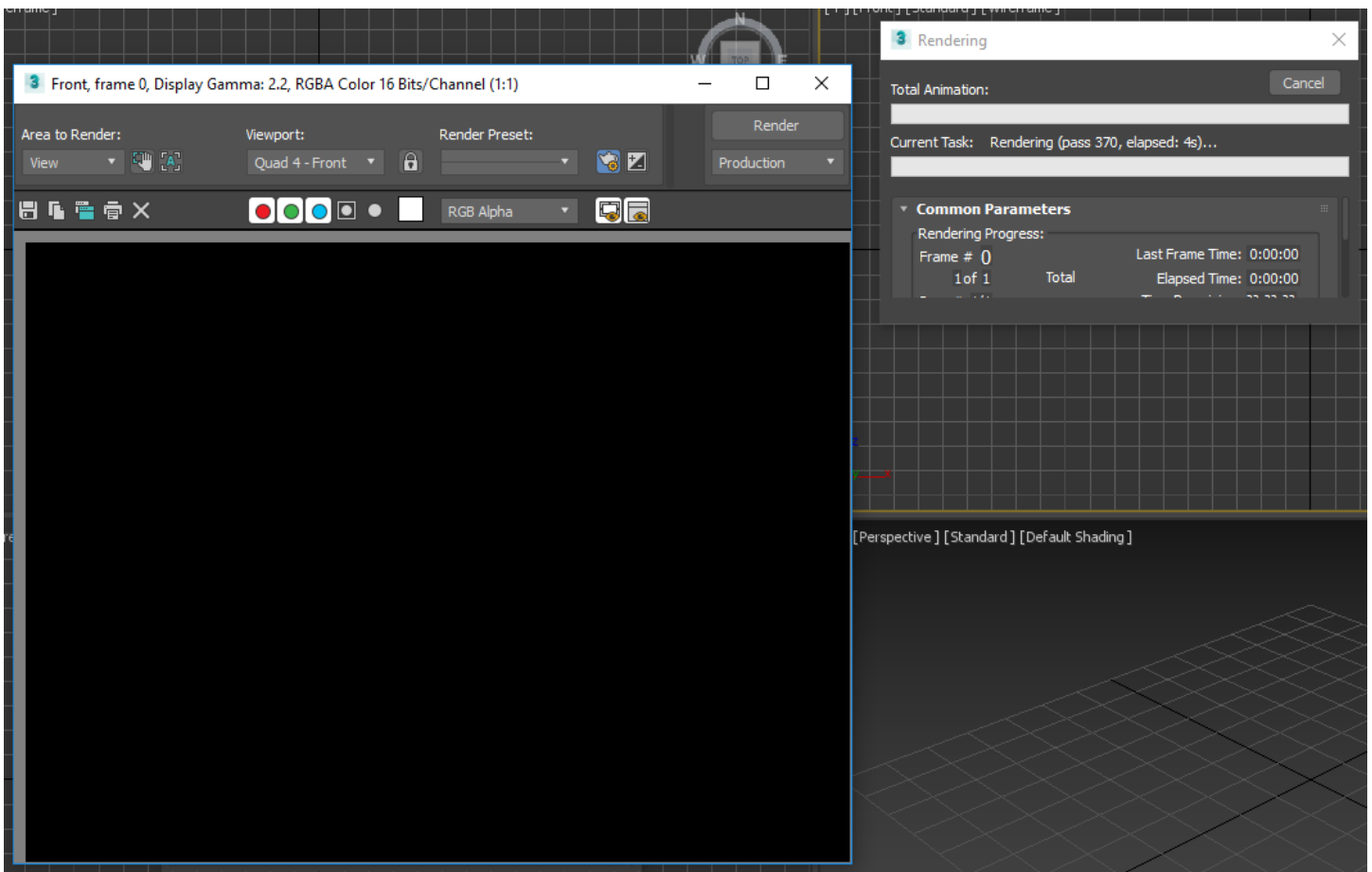
The default mode of rendering for Radeon™ ProRender is the Production Rendering mode.



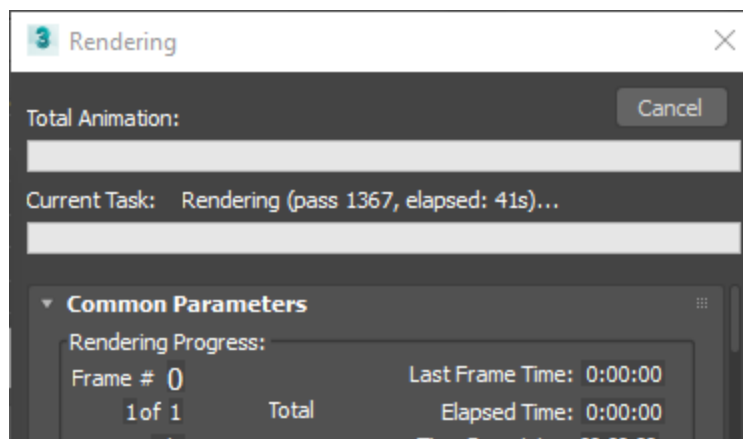
This mode creates a new render from the scene every time a render is requested by either selecting **Rendering > Render** from the main viewport, pressing the **Render Production** button or hitting **Shift+Q**.



A window is displayed alongside the **Production Render** when a **Render** is started. It displays the number of passes and the time elapsed.

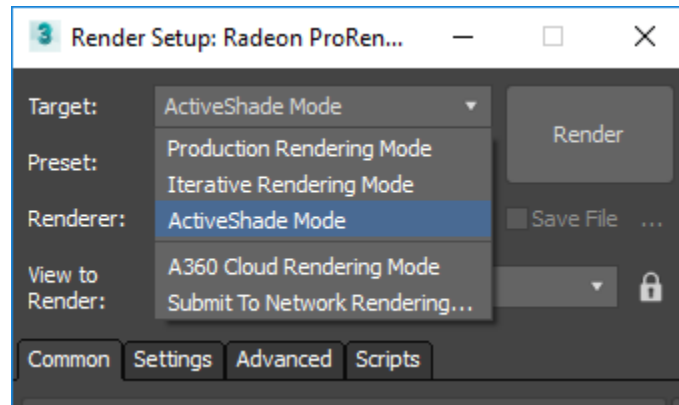


**Tip:** The first render may take longer to initialize. However, successive renders will render faster without the initialization. The render will improve in detail and quality with more passes.

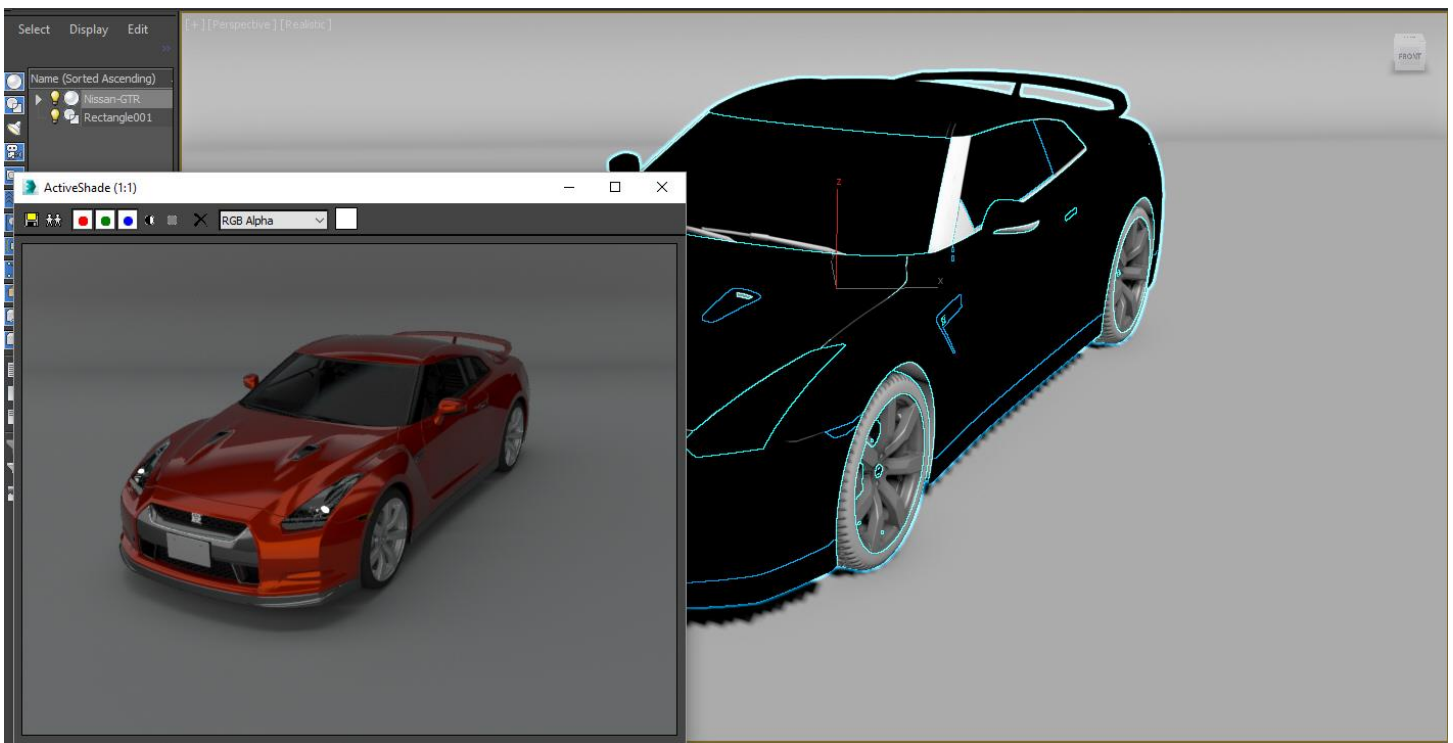


### Activeshade Window

If you want to see the render result as you change your scene you can set the render mode to **ActiveShade** mode. Change the **Target** dropdown in the **Render Setup** to **ActiveShade Mode**.

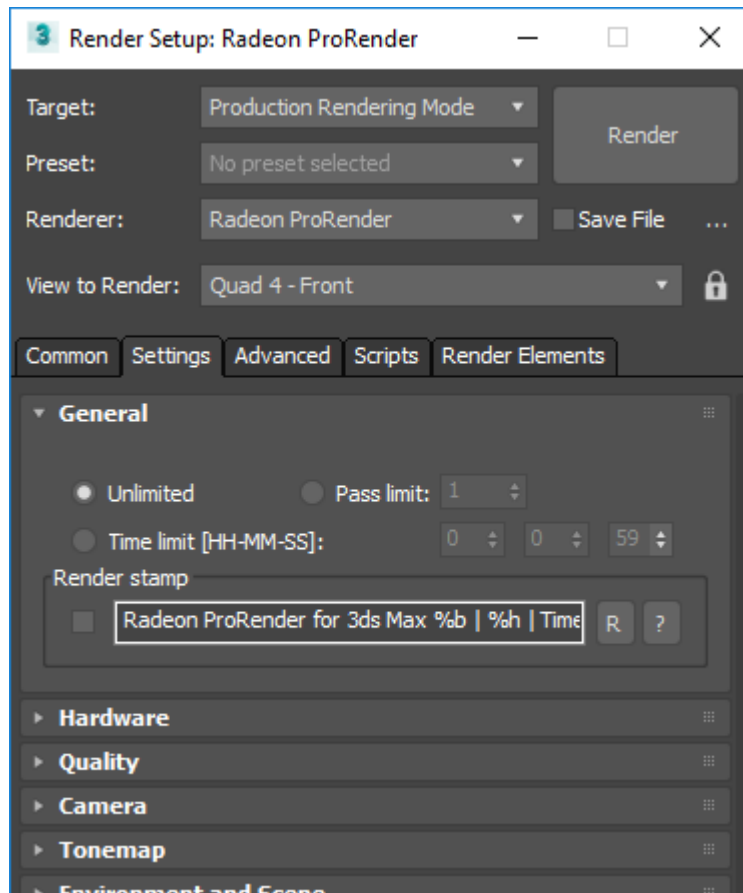


Start a render and you will see as you move around, or move an object in the scene, that the render viewport will be updated with the changes you make.



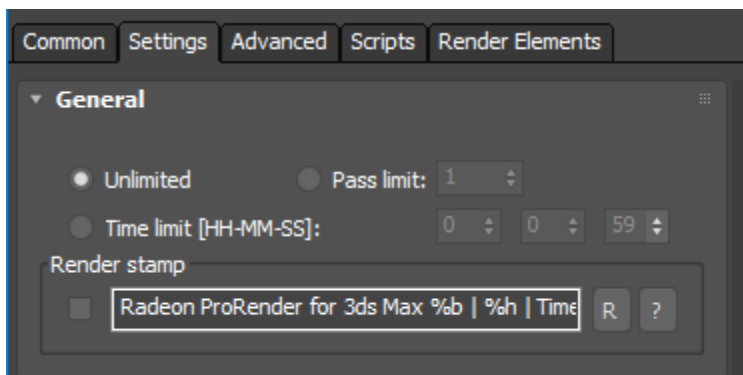
# Radeon ProRender Settings

Press **F10** to open the Render Setup. Go to the **Settings** tab.



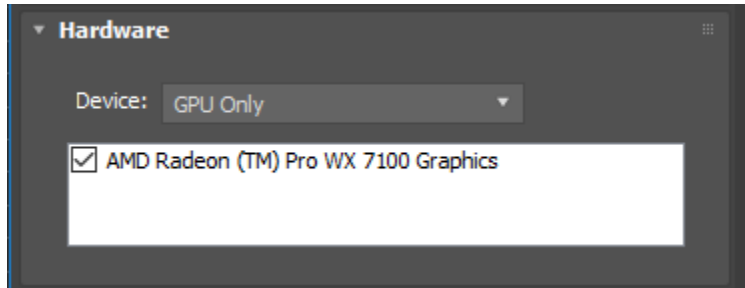
## General

In the **General** set the amount of time you want your render to complete or set the Iterations to the desired number of passes you would like Radeon™ ProRender to render to complete to do before finishing. You can also create stamp on final rendered image showing details of hardware and 3ds Max scene information.



## Hardware

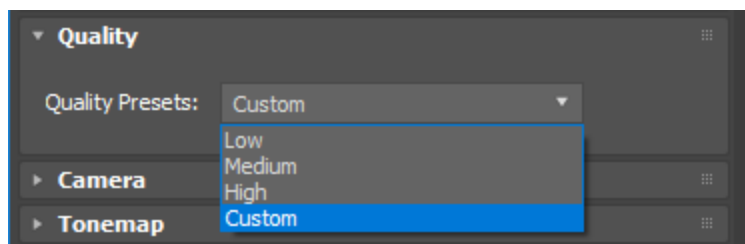
In the **Hardware** section select your hardware to render. There are hardware options like GPU only, CPU only, or CPU and GPU together.



## Quality



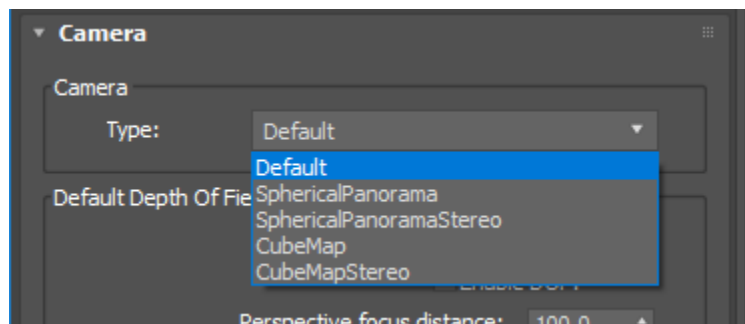
**Tip:** You can tune Radeon™ ProRender to be faster or slower. It is recommended to start using lower quality render settings until it is time to do a final render.



## Camera

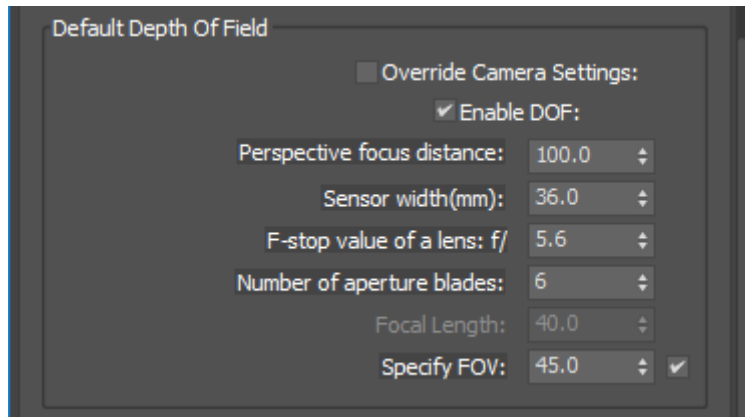
### Camera

Select the camera type for VR displays.



## Depth of Field

The Depth of Field (DOF) can be enabled for all cameras via the **Enable** check box.

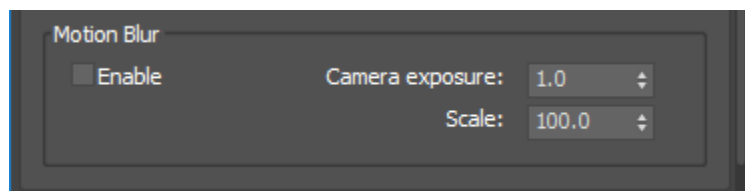


Radeon™ ProRender also supports the DOF settings on the **Physical Camera** which will enable DOF on camera by camera basis.

Set in your focus distance to determine how far you want your camera to focus from the lens to the object. F-stop will determine how much blur will be added to the render. The higher the value the less amount of blur you will see.

## Motion Blur Control

This will make object appear as if it's in motion, in stills as well as animations.



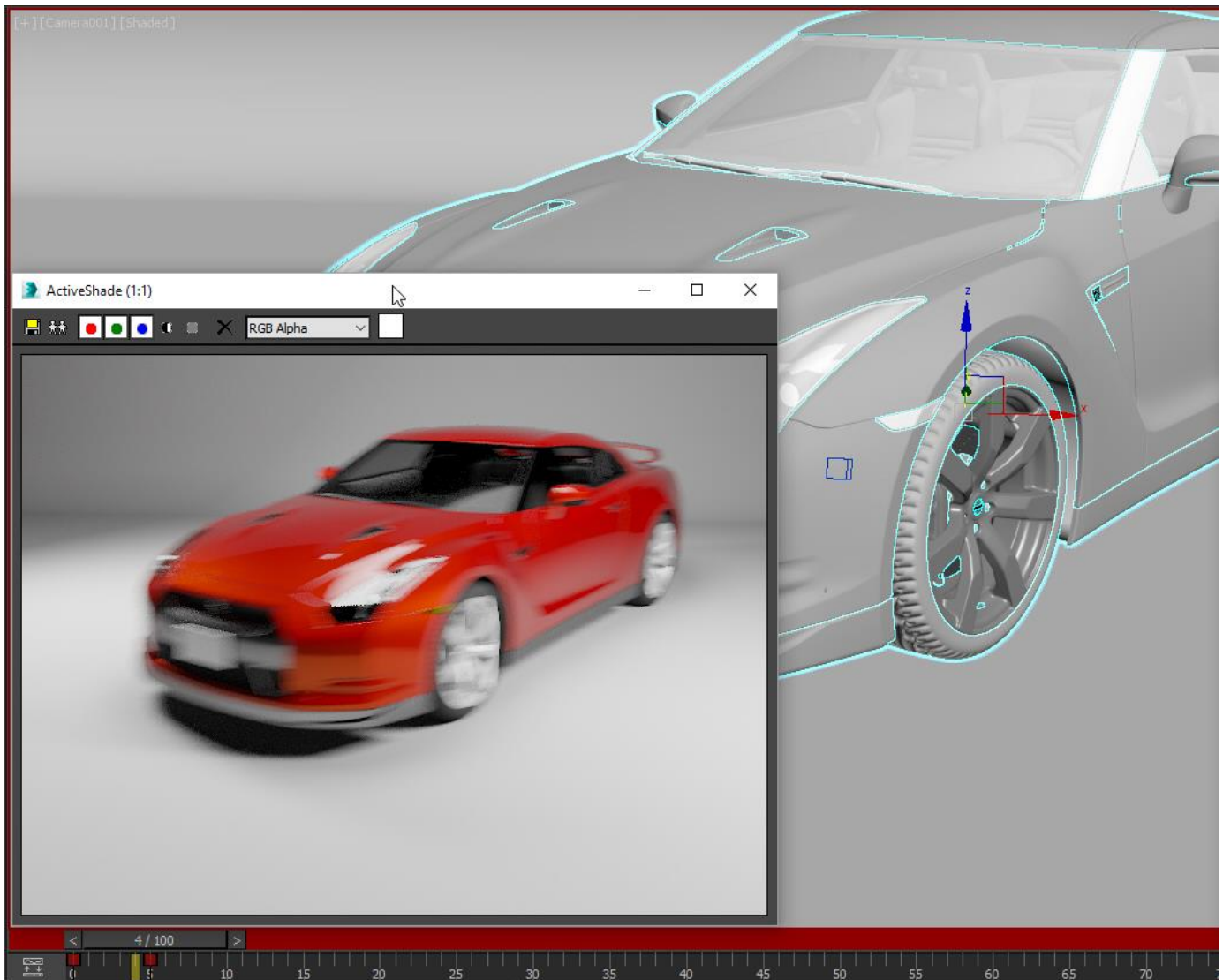
## Camera Exposure

This specifies how long the "virtual shutter" is open. When this is set to 1.0, the virtual shutter is open for the entire duration between one frame and the next. The higher the value, the greater the motion blur effect. Default = 1.0.

## Scale

This is a linear multiplier for objects motion characteristics. Increasing it will make the effect burrier. We calculate linear and angular velocity of objects based on their animation (relative to camera) over time and pass those two velocities multiplied by the scale.

For the car model below, it is moved it back against the wall for frame 0 and set key frame to automatic. On the timeline, it is moved forward to frame 5 and moved the car back to its original position in the shot. If you use ActiveShade to render a frame between 0 and 5 you will see the effect of motion blur.



## Tone Mapping

In **Settings** tab, under **Tonemap**, this is a technique used in image processing.

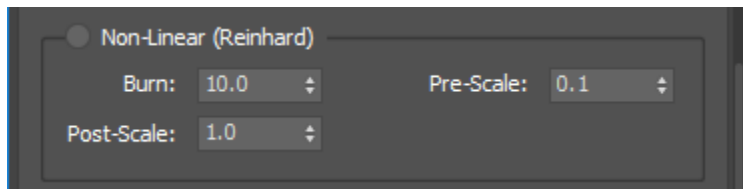
### Non linear (Reinhard)

This is also known as Reinhard which is aimed at adapting the high dynamic range of real world lighting to your screen.



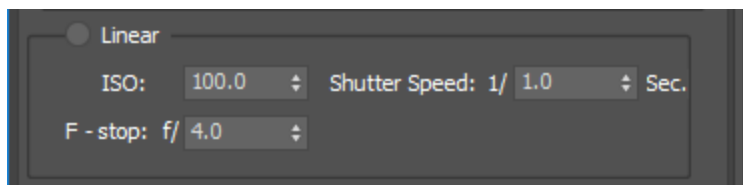
**Note:** It does this by letting you set values for Burn, Post Scale and Pre Scale. Pre Scale and Post Scale work together, this means that if you tweak one, you'll probably have to tweak the others.

Pre-Scale controls the brightness of darker areas (i.e. shadows). Post Scale controls the final brightness of the image and Burn is used to tweak the brightness of highlights in your image based on its darker areas.



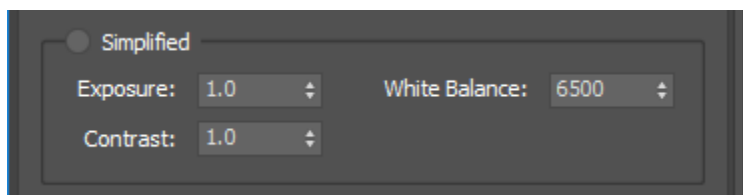
### Linear

This is based on real-life camera settings. ISO is film speed – the higher the value, the more light is let into the image. F-Stop is aperture width, and follows regular camera settings – the smaller the number, the wider the aperture, and the more light will be transmitted to the film. Shutter Speed is how long the shutter stays open to let in light, also known as exposure.



### Simplified

This is a simple exposure tweak and contrast option. You can brighten or darken the image by controlling the exposure, or having brighter or darker contrast.

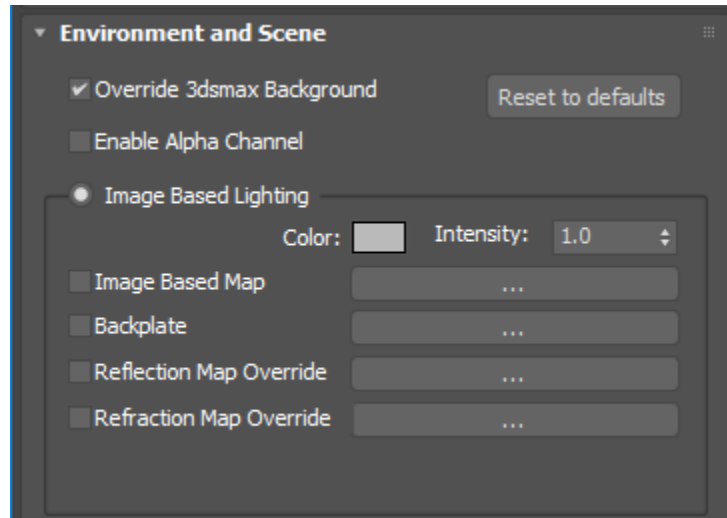




## Environment and Scene

### Image Based Lighting (IBL)

To enable this option, the user should click the checkbox “**Override 3ds max Background**”, this way, Radeon™ ProRender will be going to handle the environment look instead of 3ds Max.



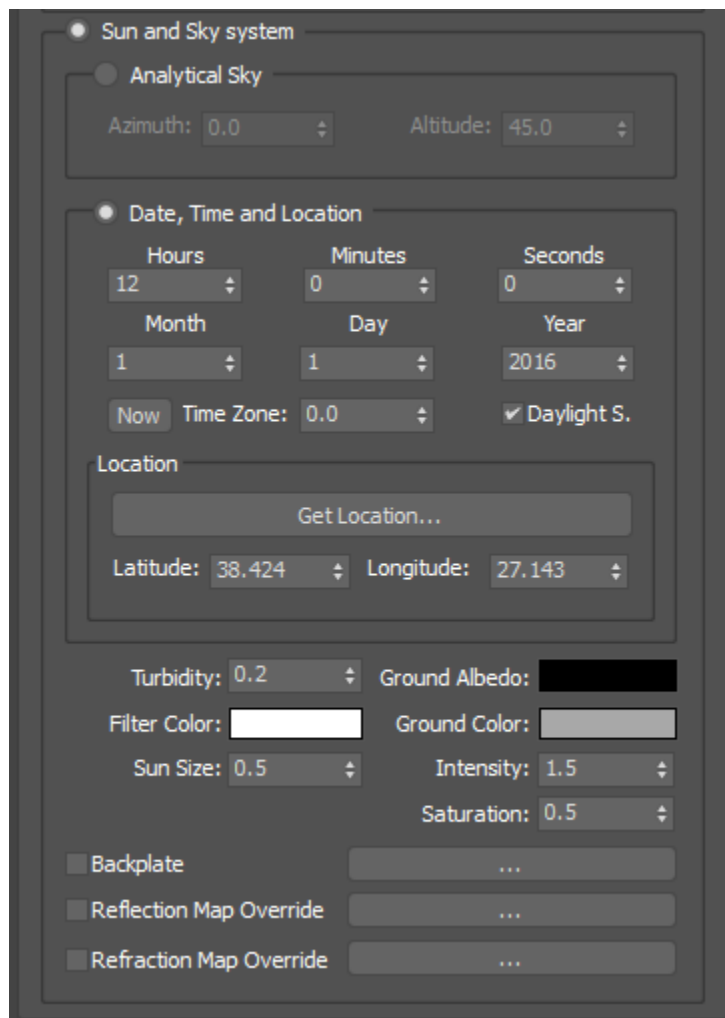
When the user enable the Image Based Lighting option, by default Radeon™ ProRender uses a grey color as environment background and environment light. This color could be changed and the intensity of the lighting could be adjusted too.

### Image Based Map

This option allows the user to select any map as environment light source. It is recommended to use spherical (360 degrees) Images in HDRI or EXR format, but it support LDR Images like JPG, BMP and so on.

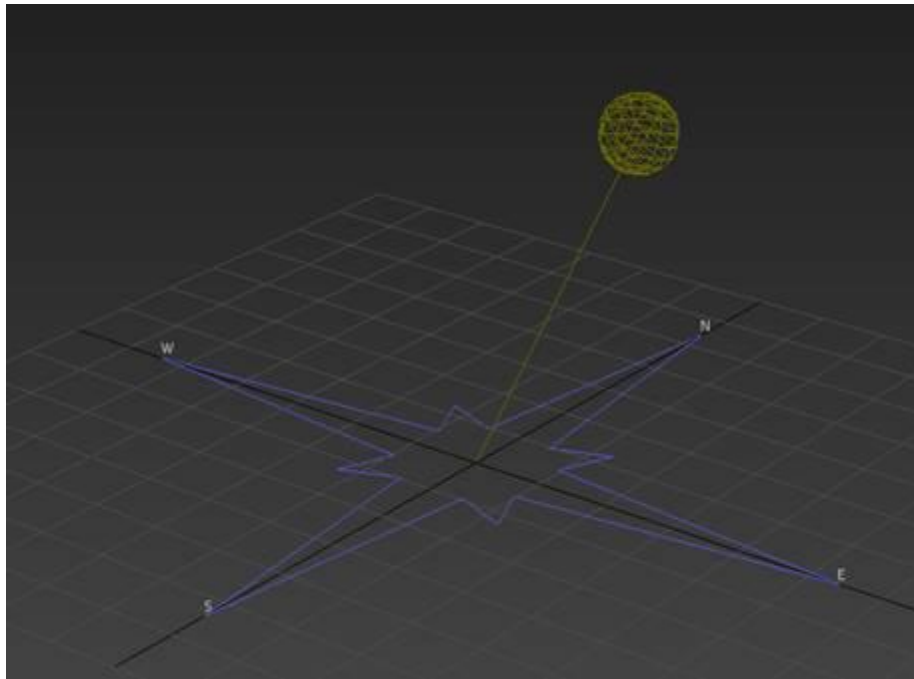
### Sun and Sky System

To enable this system, the user should enable the option “Override 3ds Max Background”, this way, Radeon™ ProRender will going to handle the environment look instead of 3ds Max. Then select the Sun and Sky System.

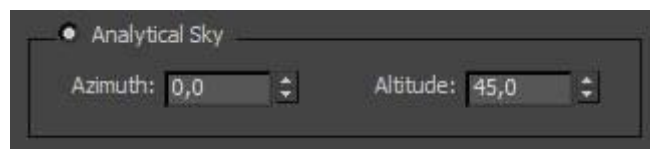


## Analytical Sky

This method creates a “light source” object directly into the center of the scene.



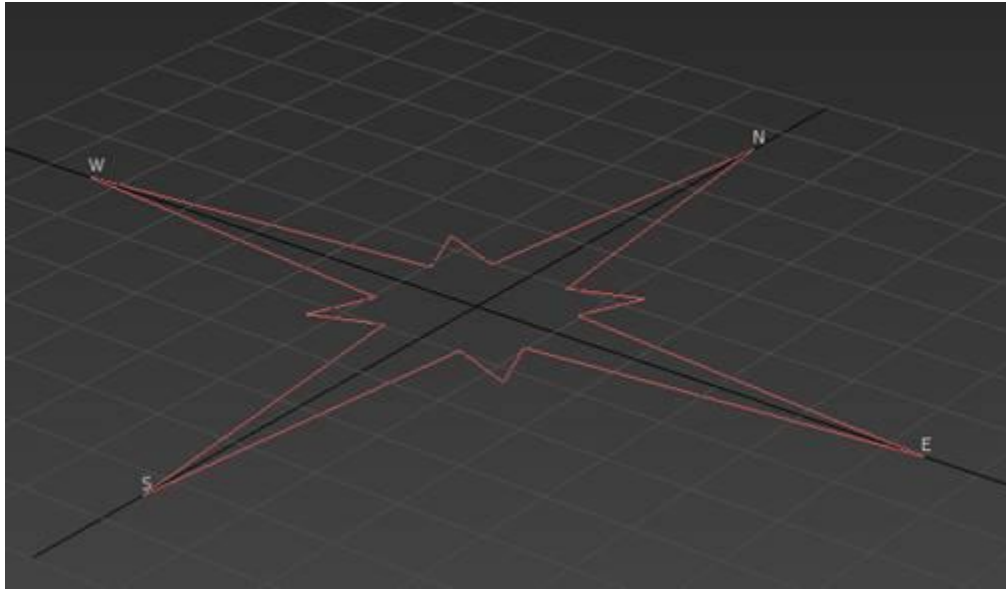
This object will control the sun direction (the scale and distance is not important), so the user can modify the sun position manually or using the Azimuth and Altitude parameters.



**Note:** The angle of the sun will control the shadow softness and the environment color.

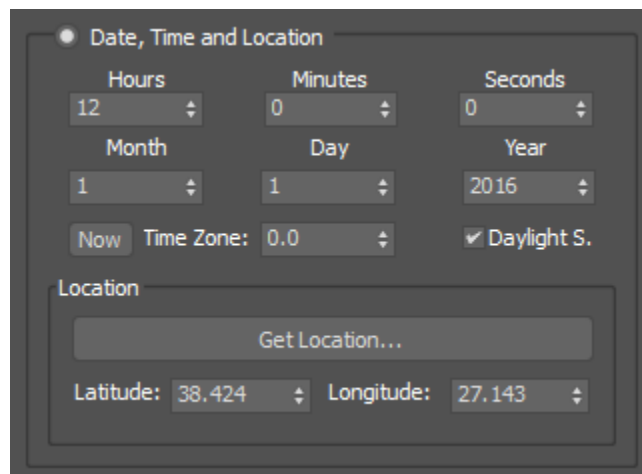
## Date, Time and Location

This method creates a “North locator” only in the center of the scene.



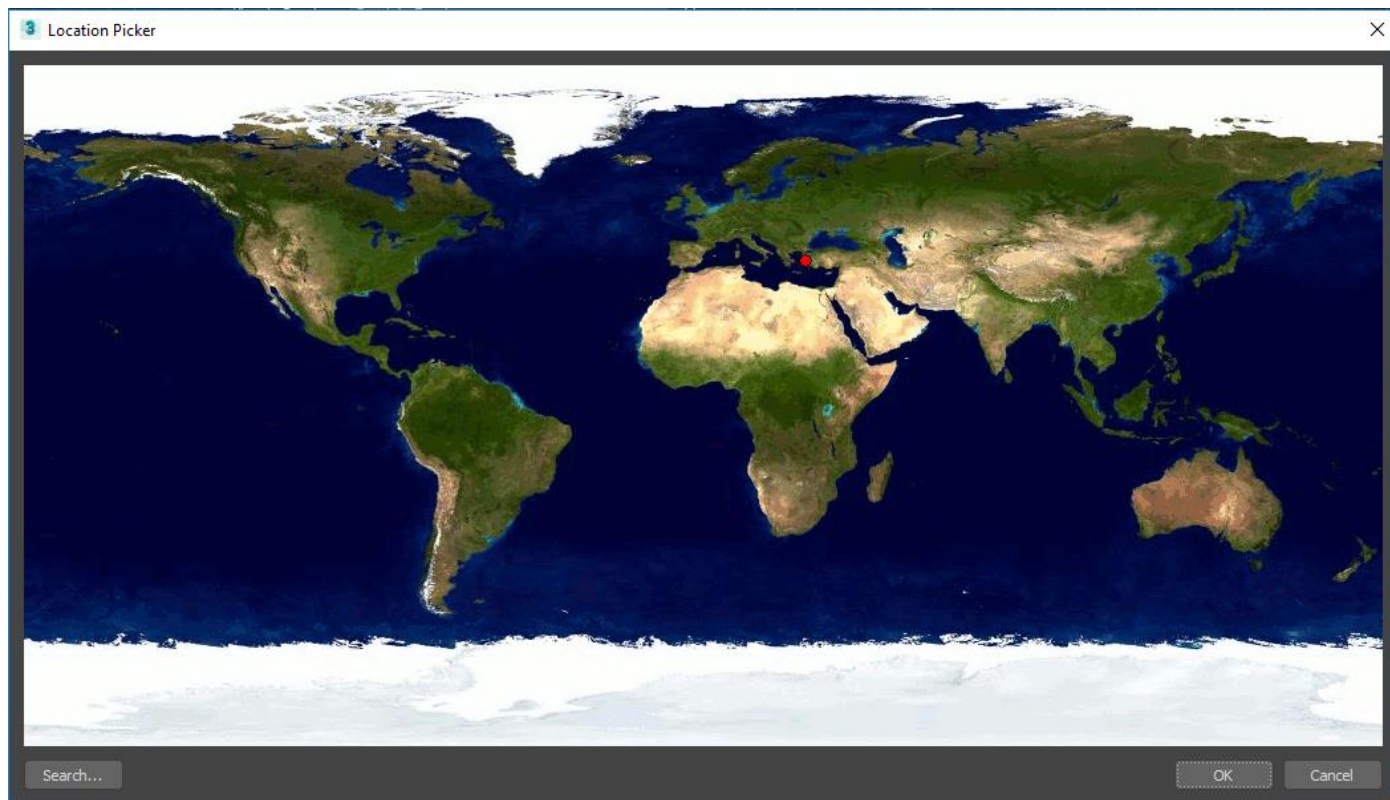
To change the North direction, the user can rotate this object using the transform tools.

This is used to create lighting for any place in the world at any given time. To control the Sun position, the user has a set of options like Hours, Minutes, Seconds, Month, day, year, latitude and longitude, that allow the user to simulate a precise sun position.



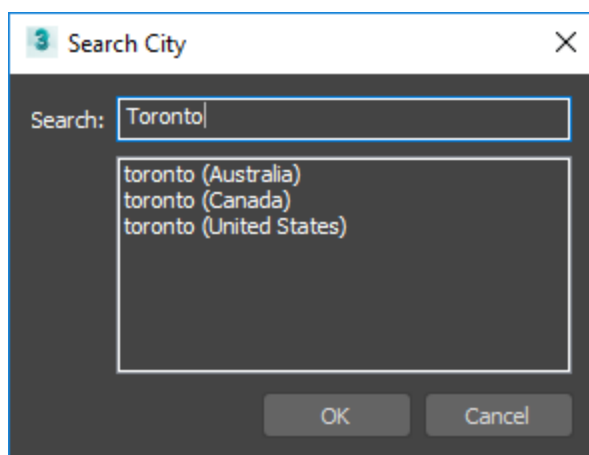
## Get Location

Clicking on the Get Location button will display a map to pick any location on the planet.

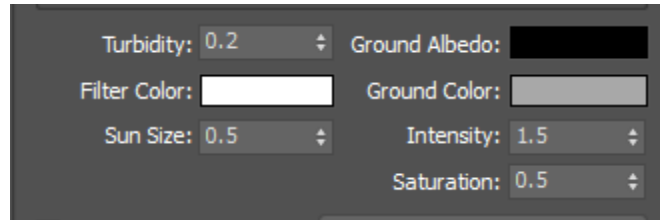


## Search

The "Search..." button allow the user to locate the project location by written the name of the biggest nearby city.

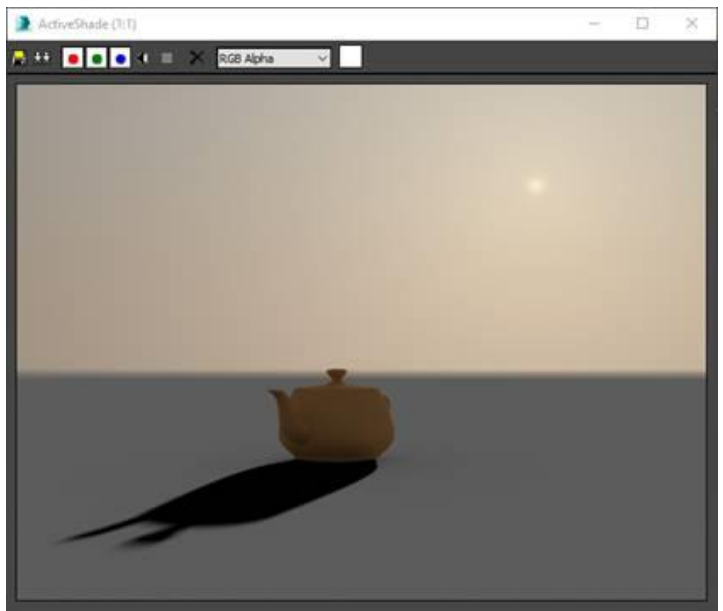
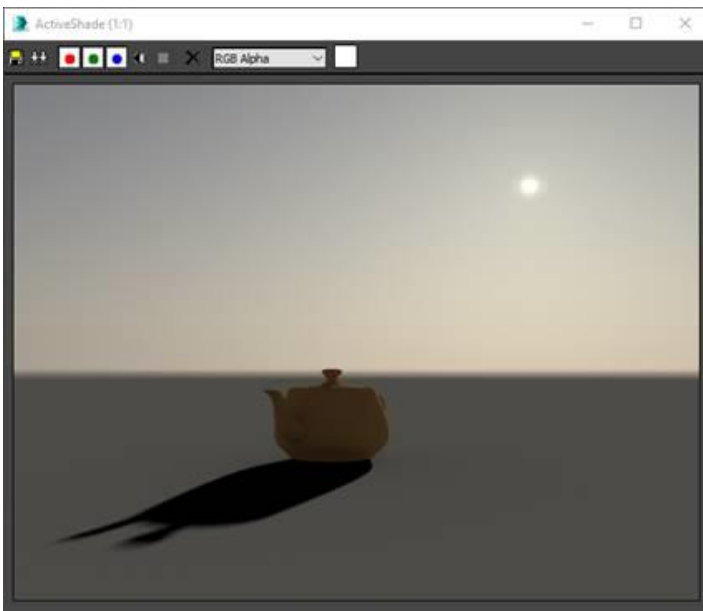


Finally, both methods (**Analytical Sky** and **Date, Time and Location**), share a set of parameters that will go to control the final look of the sky and the sun.



## Turbidity

This parameter controls the amount of “dust” in the air. Lower values will keep the sky clear and bluish and higher values will set the sky to a reddish and the sun will not be visible. Left (0.001) Right (3)

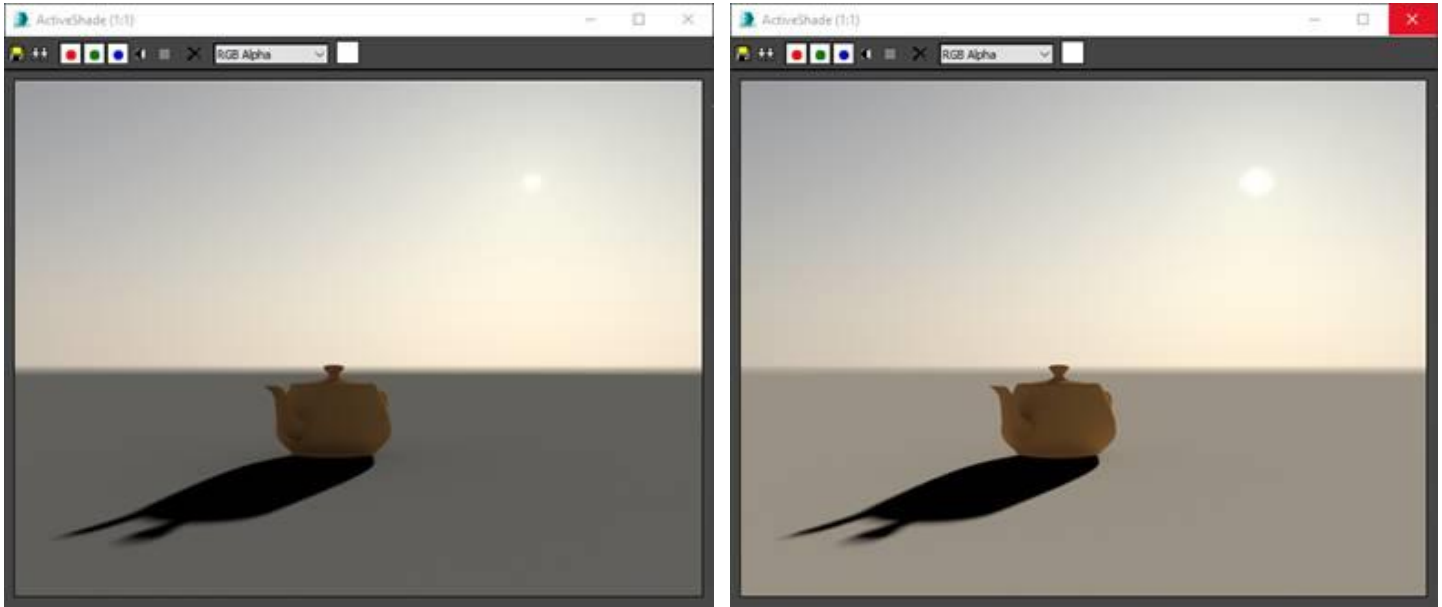


## Glow

This parameter controls how much the sun “glows”. Left (0.2) Right (1.5)

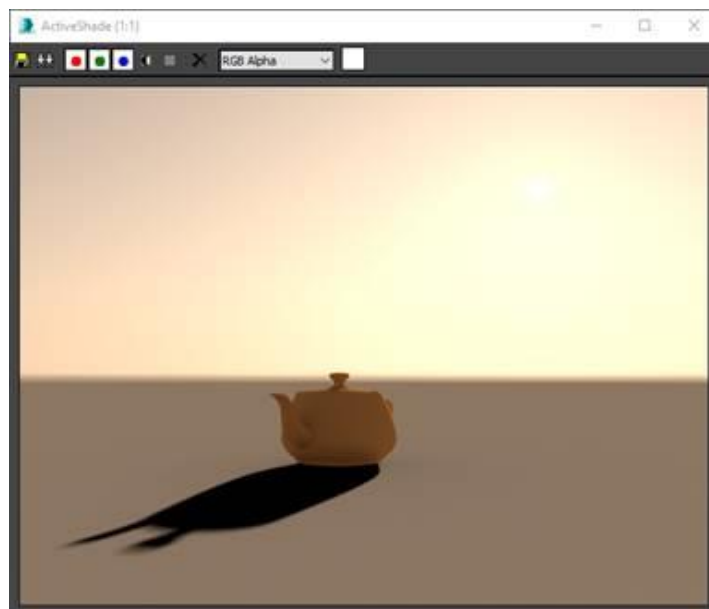


**Note:** It is not recommended to increase this value too much, because the sun start looking pixelated. If you need a bigger sun, consider increasing the sun disk instead. 0.2



## Filter Color

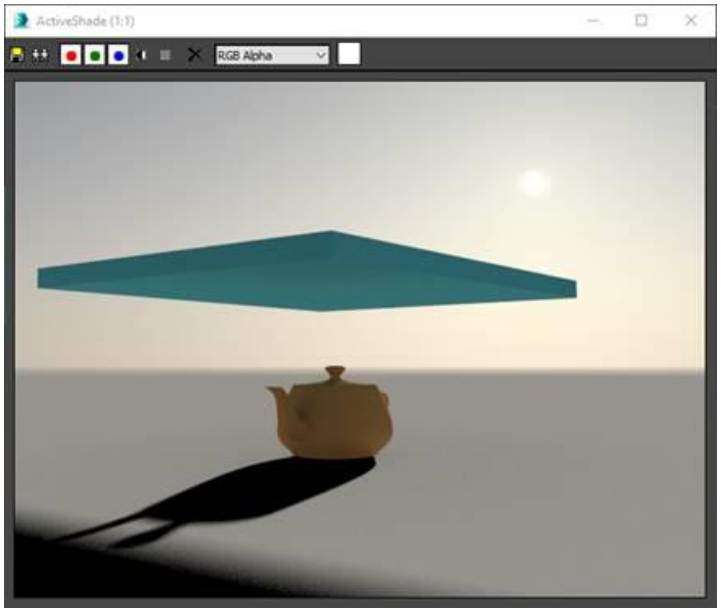
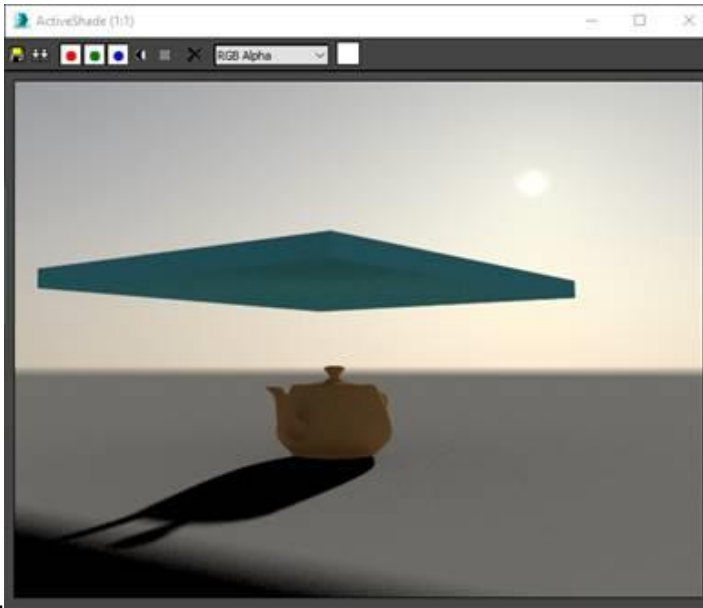
By default, this value is set to Black, this means that the color of the sky will be defined by the sun position and orientation, but in case the user needs to create a more artistic look, he can use the filter to change the sky color using a traditional “color selector”. Filter color changed from black to orange.



**Ground Color:** This parameter controls the color of the ground. This value is quite important, because it will control the amount of light that bounce from the ground to the scene also.

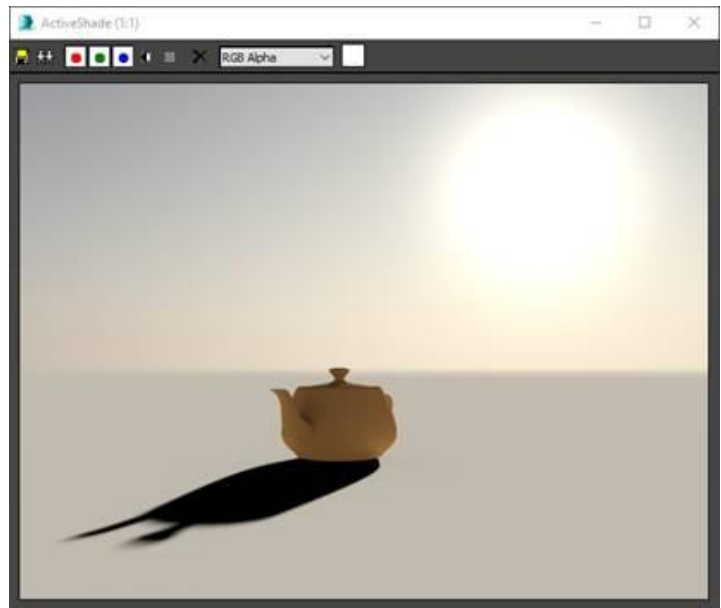
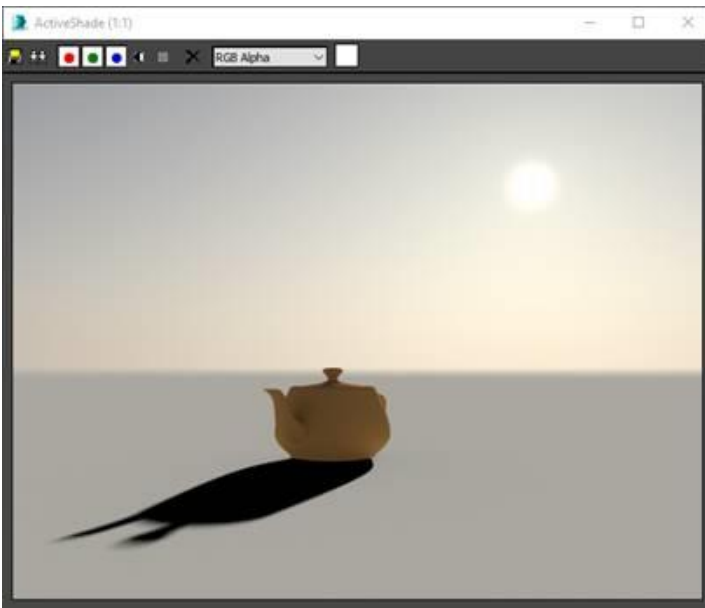
Default Ground Color (Middle Grey)

Ground Color (White)



### Sun disk

This parameter controls the sun size on the screen. Changing this value, the shadows fussiness will not change. Left (1) Right (5)





## Intensity

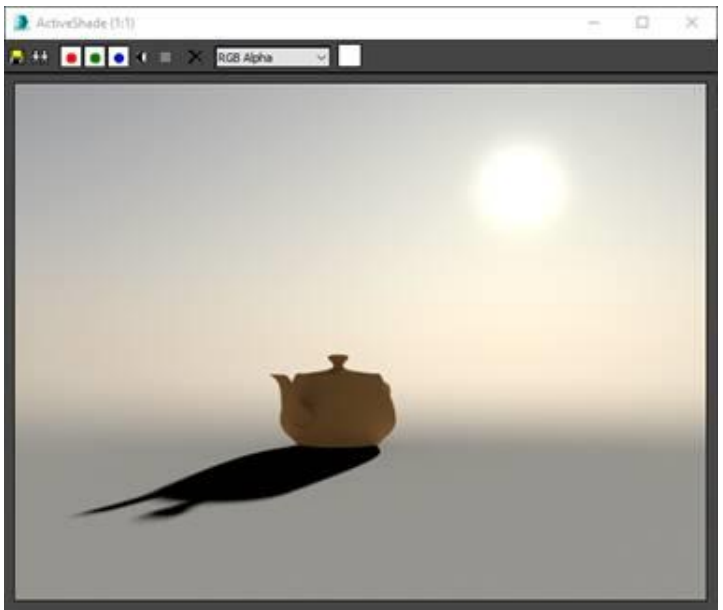
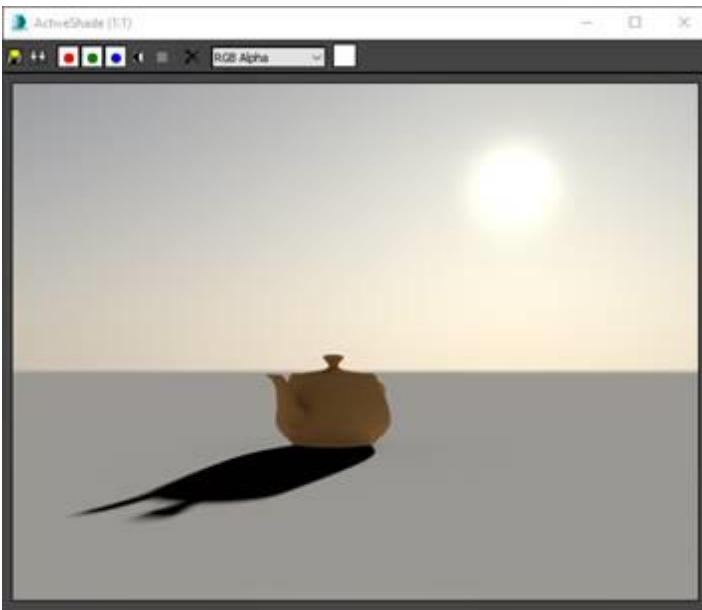
This parameter controls the Sun intensity.

## Horizon Height

This parameter controls the horizon height. This parameter should be kept as default in most cases.

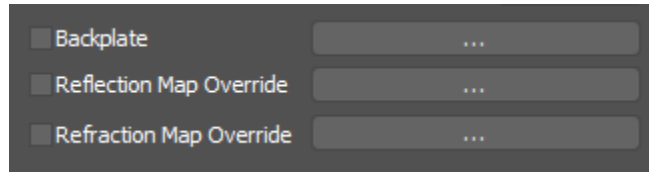
## Horizon Blur

This parameter will control how well defined is the horizontal line. This parameter could simulate the amount of smog in the horizon. Left (0) Right (1)



## Override Parameters

The last sections of the IBL and Sun and Sky systems include a set of override options.



### Backplate

This option allows the user to replace the background image. This image will not affect neither the lighting nor the reflections into the scene. By default, the backplate image should not be a panoramic image, it should be a regular high detailed shoot that the user want to use as render background.

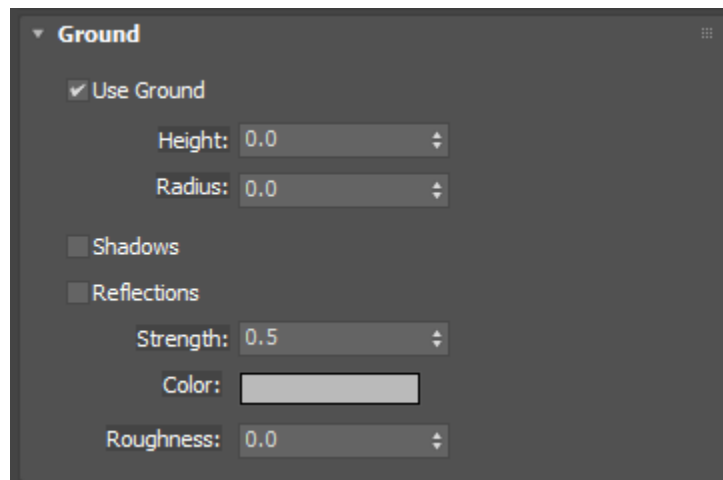
### Reflection Map Override

This option allows the user to replace the reflected environment by any spherical map.

### Refraction Map Override


This option allows the user to replace the refracted environment by any spherical map.

## Ground

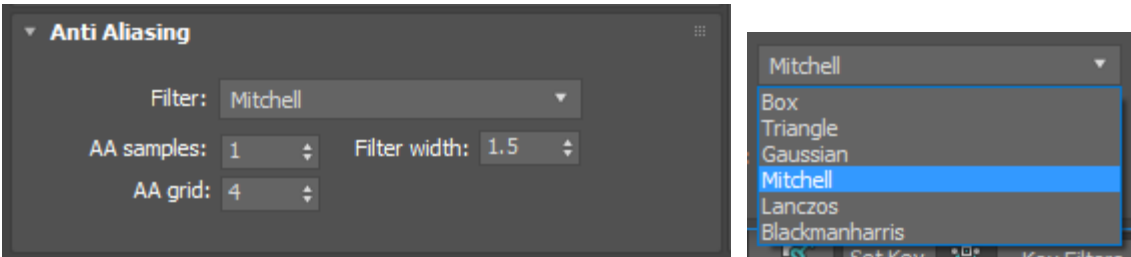


# Anti Aliasing

We can also use the **Anti Aliasing** section to increase the anti-aliasing. Radeon™ ProRender’s anti-aliasing smooths the pixels in an image, by oversampling single pixels as if they were five pixels or more, and calculating the average. This will in many cases get rid of the harsh edges you can see in some renders with no AA set.

 **Tip:** A high number of samples gives you a better render at the cost of render time.

This section is used to add a filter on a sub pixel level. Several post render image filters are also supported.

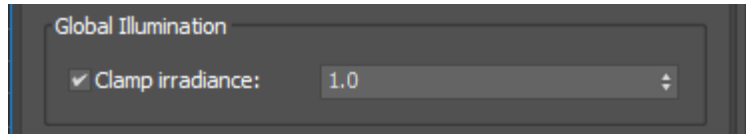


FILTERS	DESCRIPTION
<b>BOX</b>	the lowest quality Anti-Aliasing filter
<b>TRIANGLE</b>	for sharp results
<b>GAUSSIAN</b>	provides blurry Anti-Aliasing
<b>MITCHELL</b>	default filter, good for all-round rendering on images with no major high contrasts
<b>LANCZOS</b>	a second good all-round filter
<b>BLACKMAN HARRIS</b>	complements the Box and Gaussian filters, and is especially effective for Wireframe renders, as it makes edges look smoother

# Advanced Radeon ProRender Settings

## Global Illumination

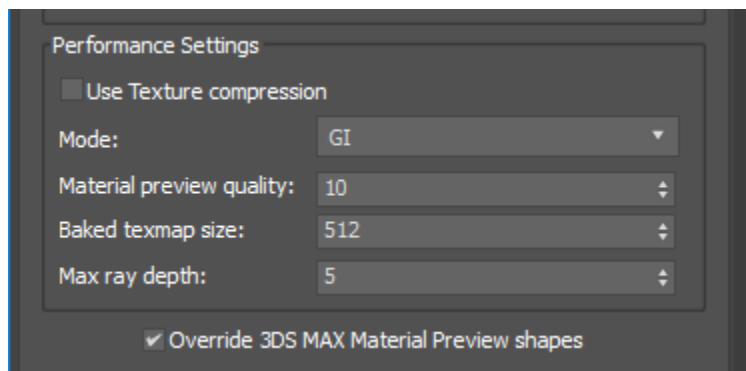
Clamped irradiance is set to 1 by default but can be changed if desired.



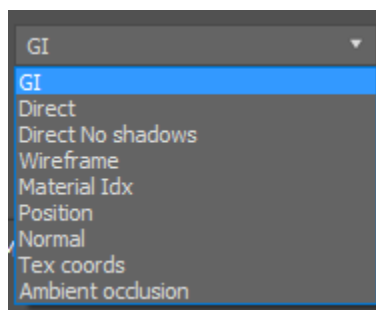
## Performance Settings



**Tip:** Depending on the power of your CPU or GPU, you may want to change the rendering mode to speed up rendering.



This provides you with the option of rendering in different modes. This changes the look of the 3D model in the viewport.



MODE	DESCRIPTION
<b>GLOBAL ILLUMINATION</b>	the full scene with full GI lighting and shadows
<b>DIRECT ILLUMINATION</b>	renders the scene with shadows, but no GI – gives “harsher” renders
<b>DIRECT ILLUMINATION NO SHADOW</b>	direct light, no GI, gives sharper renders without any shadows or semi-shadows
<b>WIREFRAME</b>	shows the wireframe of the mesh
<b>MATERIAL ID</b>	renders the whole scene in non-bordering colors to ease postwork/processing
<b>POSITION</b>	
<b>NORMAL</b>	renders the normals of the scene
<b>TEXCOORD</b>	shows the current texture coordinates UV'd or not
<b>AMBIENT OCCLUSION</b>	standard pass to do anything from showing off your models without textures to using it as an overlay for contact shadows, which GI doesn't always catch

Adjusting **Max Ray Depth** allows a user to set the number of rays that will be cast and bounced around in the scene and is especially necessary for refractive surfaces. This is done by increasing the value of the **Max Ray Depth** input.

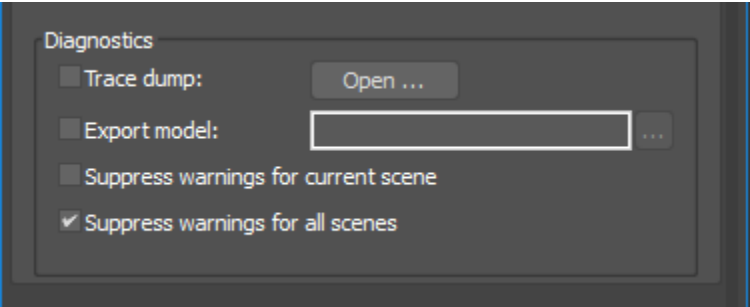


**Tip:** When using glass or other translucent appearances, use a high number of Ray Bounces to fully capture all reflections (generally, a good number is 6 unless there are complex, translucent parts).

The transparency and colour of the object is improved with more ray bounces. Improved image quality comes at a cost to other factors.

# Diagnostics and Trace

To allow developers to track down issues with the plug-in it is often necessary to provide trace files that log what happened to the plug-in and where the plug-in may have had problems.



The 2 files are saved under the <%User%>\AppData\Local\Autodesk\3dsMax\2016 - 64bit\ENU\en-US\plugcfg\Radeon ProRender\trace install directory are:

ie > AppData > Local > Autodesk > 3dsMax > 2017 - 64bit > ENU > en-US > plugcfg > Radeon ProRender > trace				
Name	Date modified	Type	Size	
rprTrace_data.bin	7/4/2017 12:06 PM	BIN File	0 KB	
rprTrace_play1.cpp	7/4/2017 12:06 PM	CPP File	19 KB	
rprTrace_player.cpp	7/4/2017 12:06 PM	CPP File	3 KB	
rprTrace_player.h	7/4/2017 12:06 PM	H File	2 KB	
rprTrace_playList.h	7/4/2017 12:06 PM	H File	1 KB	
rprTrace_variables.h	7/4/2017 12:06 PM	H File	1 KB	

# Working with Lights

## Photometric Lights vs Standard Lights

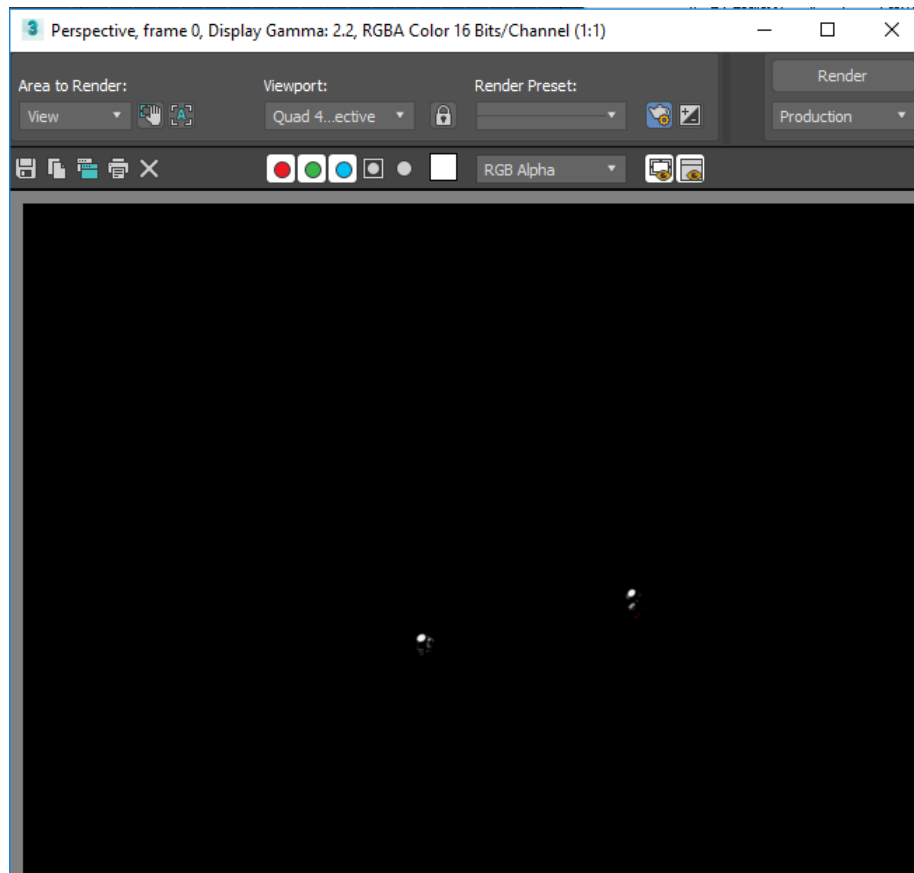
As Radeon™ ProRender is a physical ray tracing renderer, it treats lights differently to a normal renderer. Where a normal renderer simulates the effects of lighting, Radeon™ ProRender treats a light a real source of light and traces the individual beams of light on and around the objects in the scene.

As a result, many of the parameters required for 3ds Max **Standard Lights** are not meaningful in the context of interpreting these lights for a ray traced scene. It is possible to use **Standard Lights** with Radeon™ ProRender, as many scenes that have already been created may have included **Standard Lights**, however, these will effectively be interpreted as physical lights for producing a ray traced render.

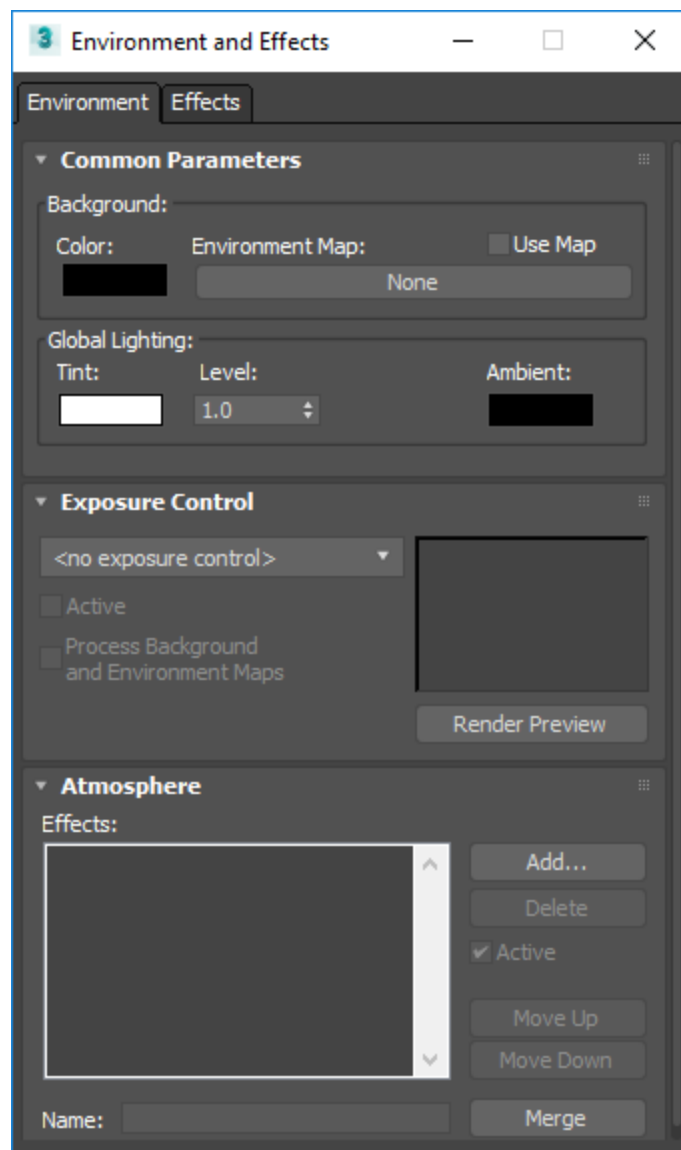
It is recommended that you use **Photometric Lights** if you are creating a new scene or modifying a current scene to work well with Radeon™ ProRender.

## Initial Lighting of a Scene

For example, setting up HDRI Environment for the car model below. Once you render the scene you will see we don't have any lighting. The render is very dark except for the car head lights which have an emissive material assigned so will appear to glow.

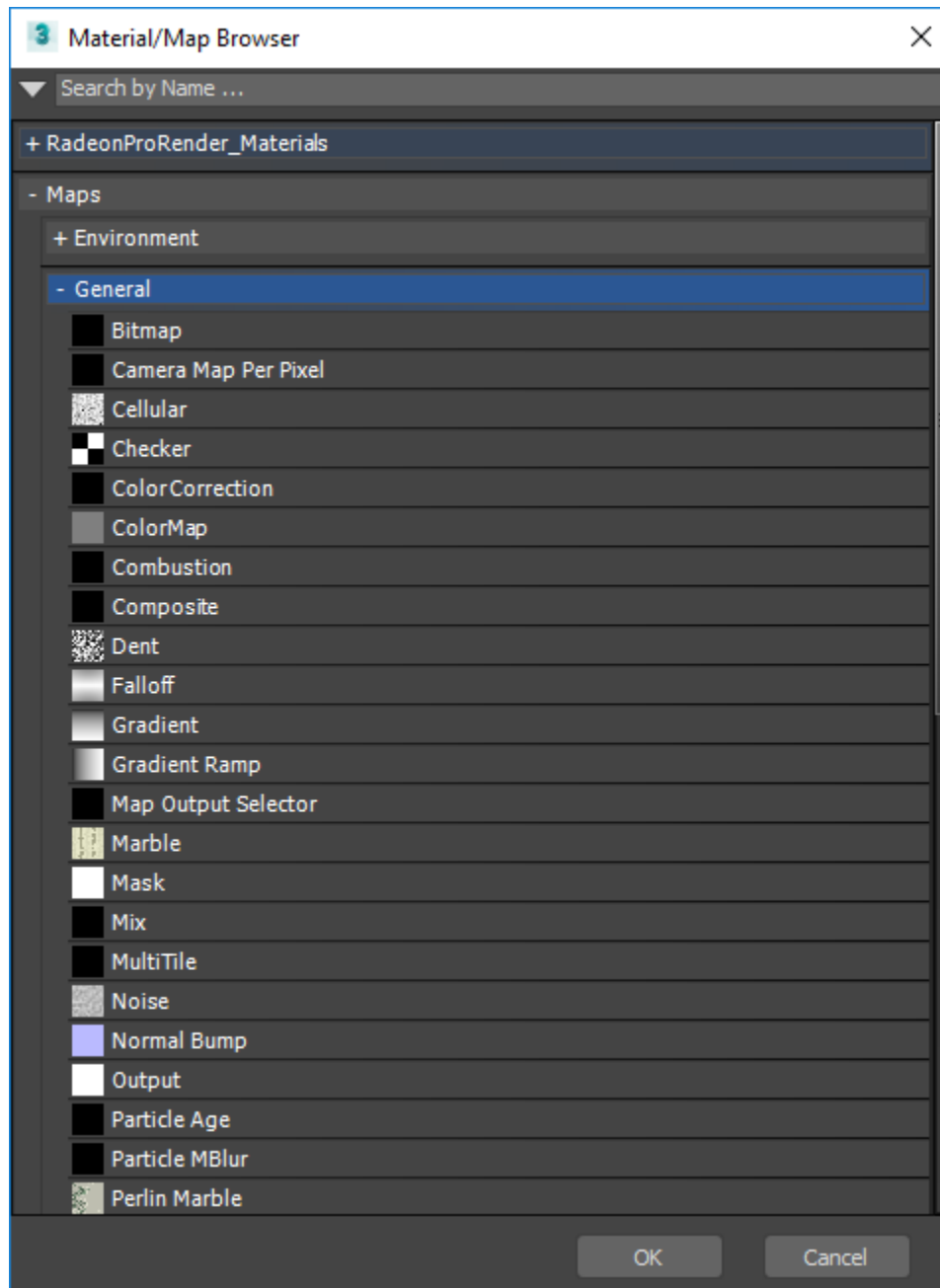


Go to **Rendering > Environment** to set an Environment IBL map to illuminate the model.

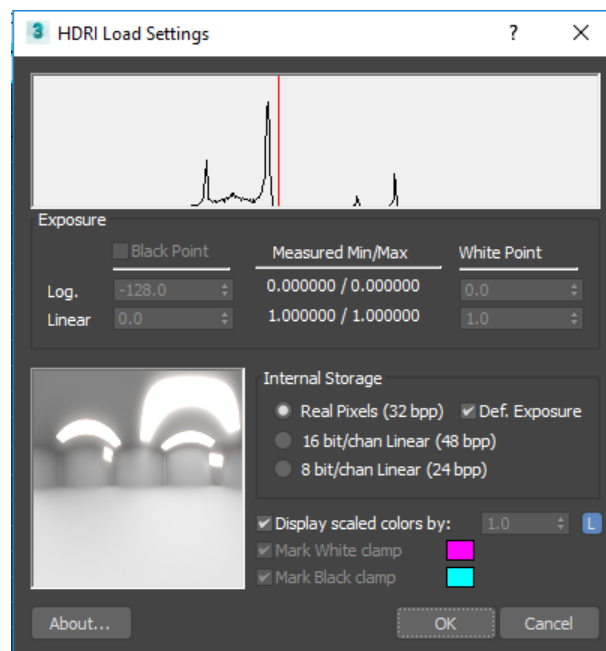
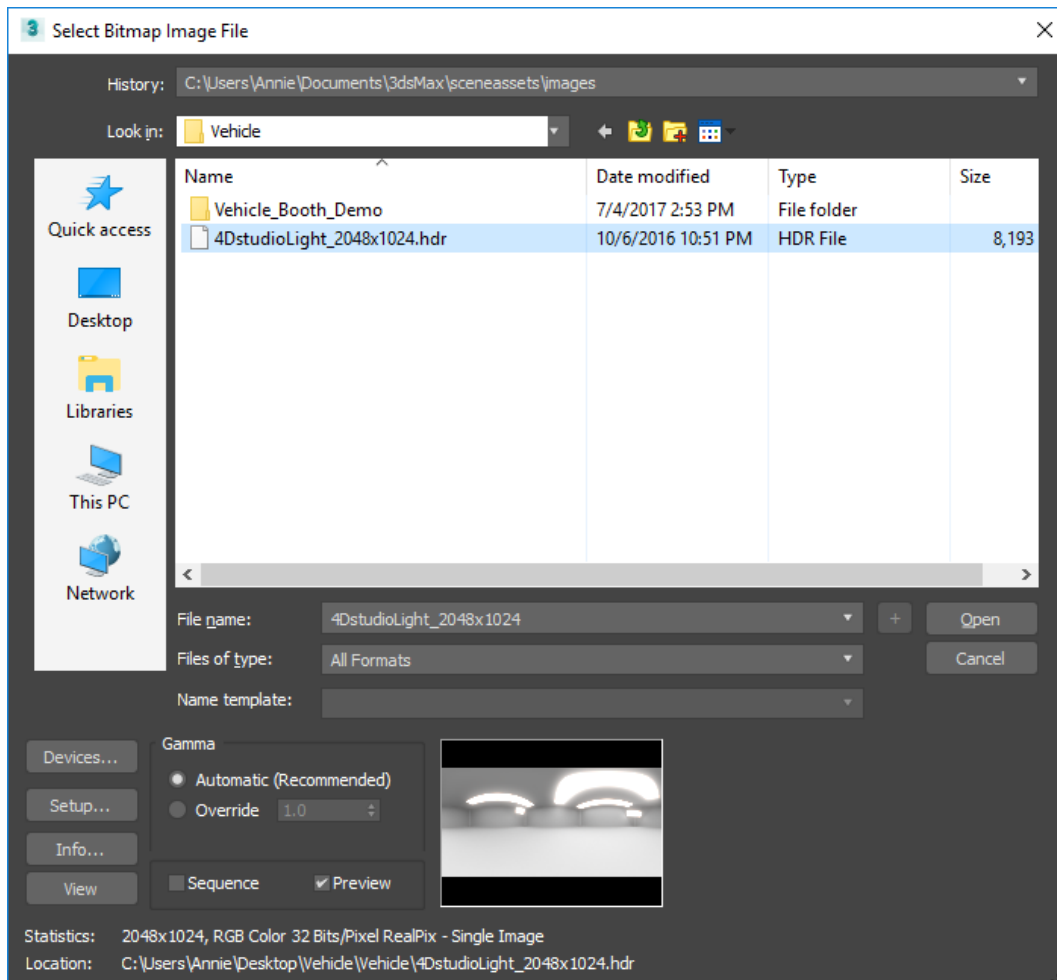




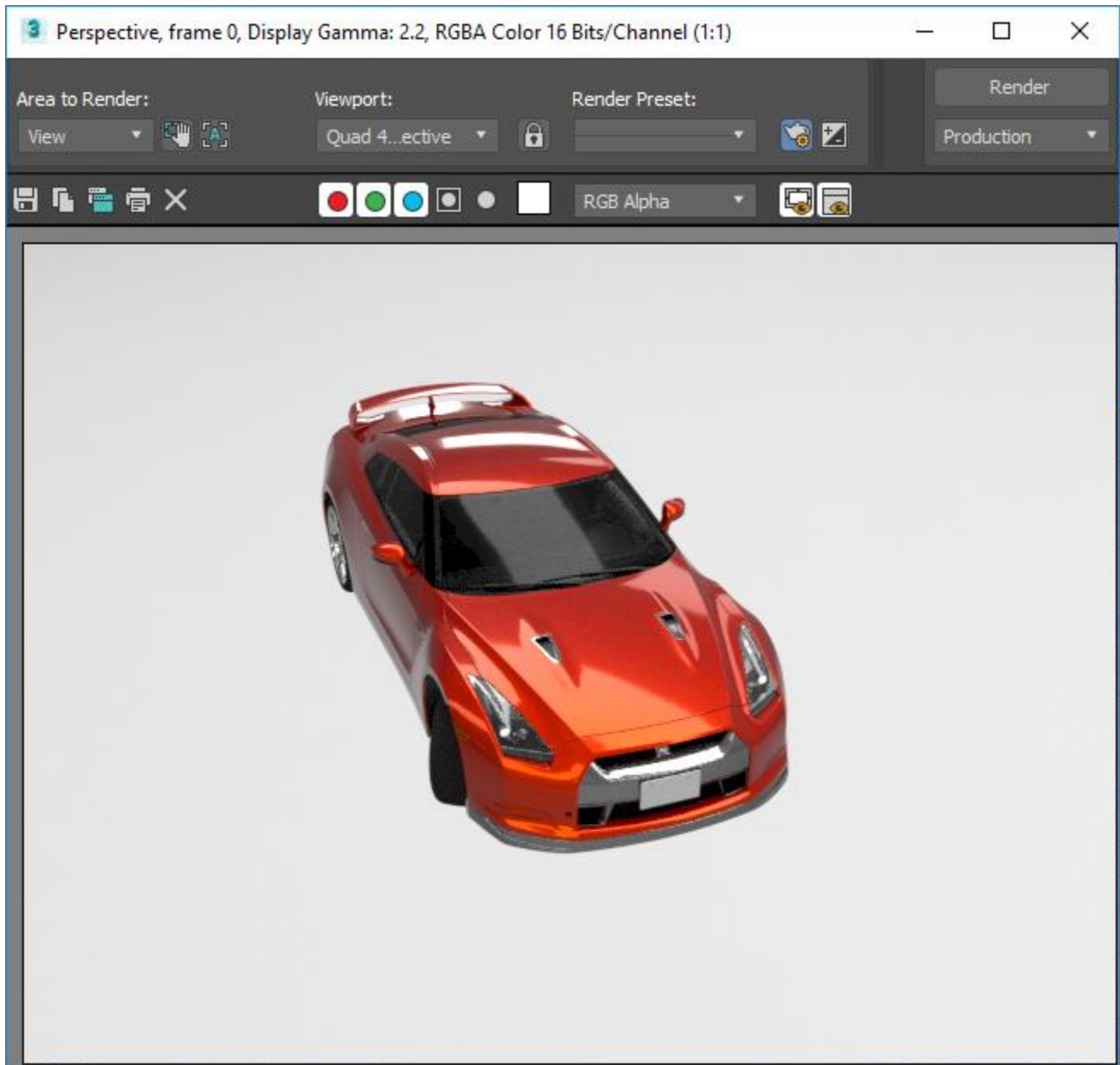
Open the Material Browser by pressing **M**. Go to **Maps > General > Bitmap** to import an image.



Select a background hdr file to be used for the environment lighting.



If you have built a test scene like the teapot above, perform a test render by either selecting **Rendering > Render** from the menu, pressing the Render Production button or hitting **Shift+Q**.



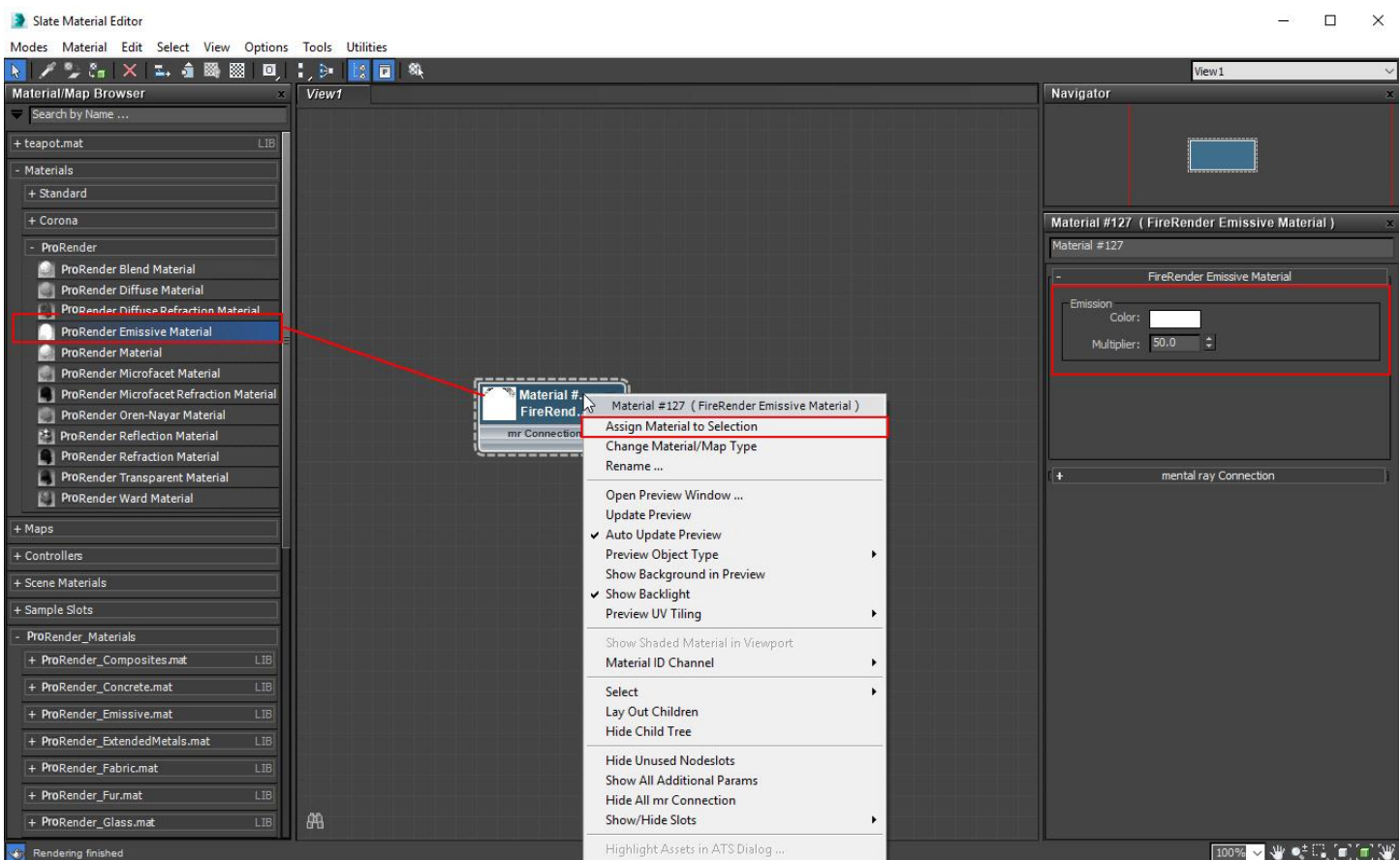
If we now perform another test render we can see that our car has been lit by the HDRI background.

## Emissive Material Lights

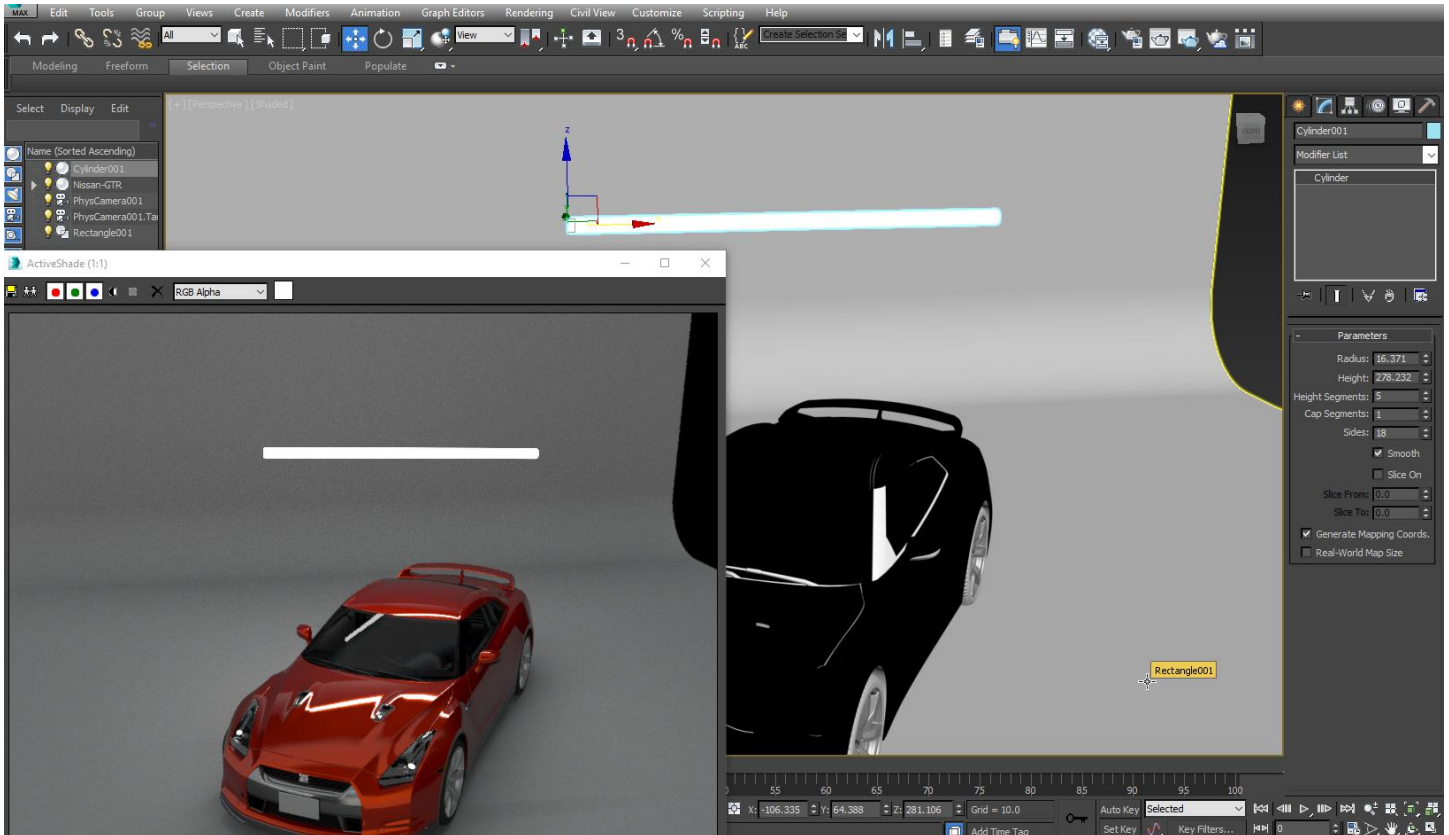
Another technique to create lights for Radeon™ ProRender is to use the **ProRender Emissive Material** to create an object or geometry that is a source of light in itself.

Create a cylinder and move, rotate and scale it so that it becomes a long cylinder "hanging" over the car. This will simulate a large long florescent light once we put the emissive material on.

Open the **Slate Material Editor** and drag the **ProRender Emissive Material** from the **Materials > ProRender** tab in the **Materials/Maps Browser** onto the editor panel. Click on the material and adjust the **Multiplier** to be around **50.0**. After selecting the cylinder, right click the material and select **Assign Material to Selection**.



If you have the **ActiveShade** render window open you will see the result immediately, otherwise start a Render to see the emissive lighting.



# Working with Cameras

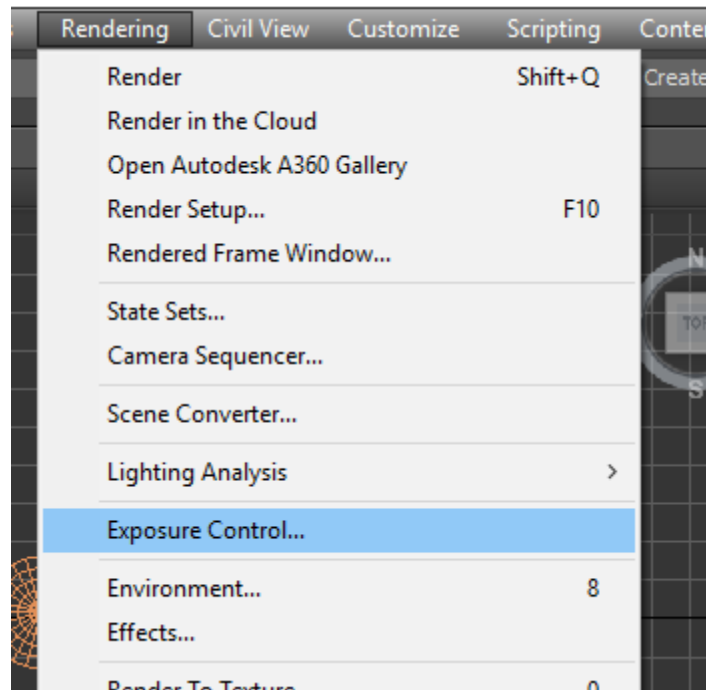
It is recommended that we use the **Physical** camera when working with Radeon™ ProRender. To create a Physical camera, you can place a camera in the scene by hand or you can create a Physical camera from your current perspective view.

## Exposure Controls or Tone Mapping

### Assessing Exposure Controls

One of the advantages of Radeon™ ProRender is that the exposure controls or tone mapping have now been integrated into the standard 3ds Max workflow and are not a separate function. This means that artists do not have to learn any new processes or techniques for adding tone mapping effects. They can just use the approach they are familiar with and the results will be rendered with Radeon™ ProRender.

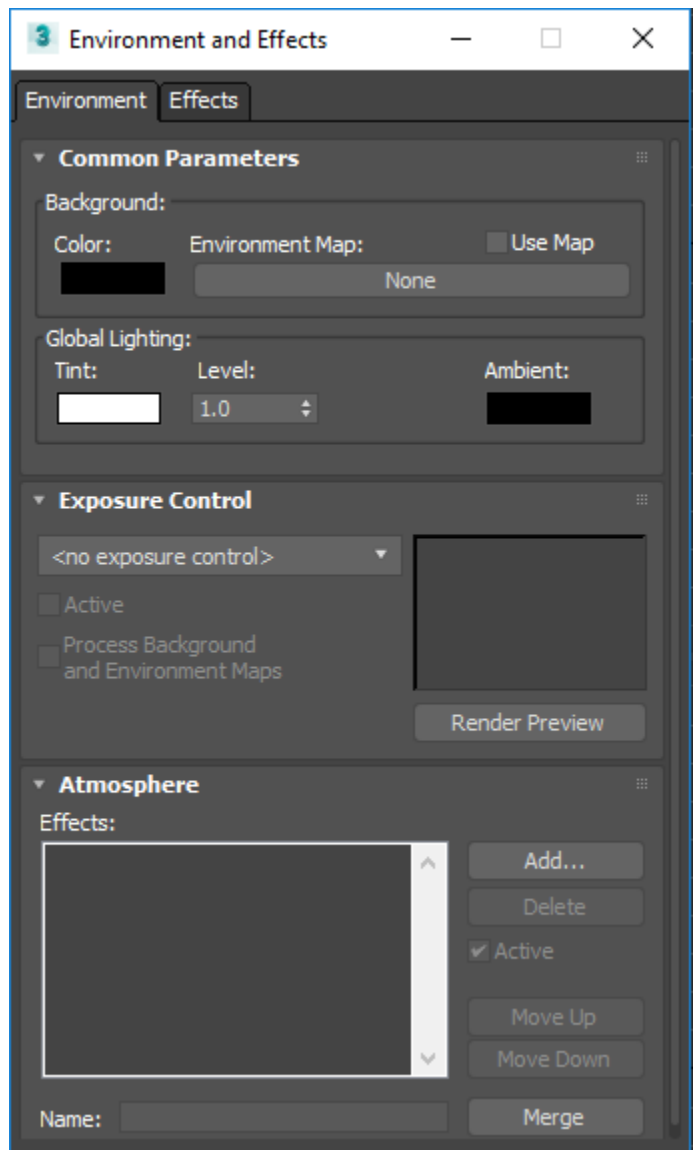
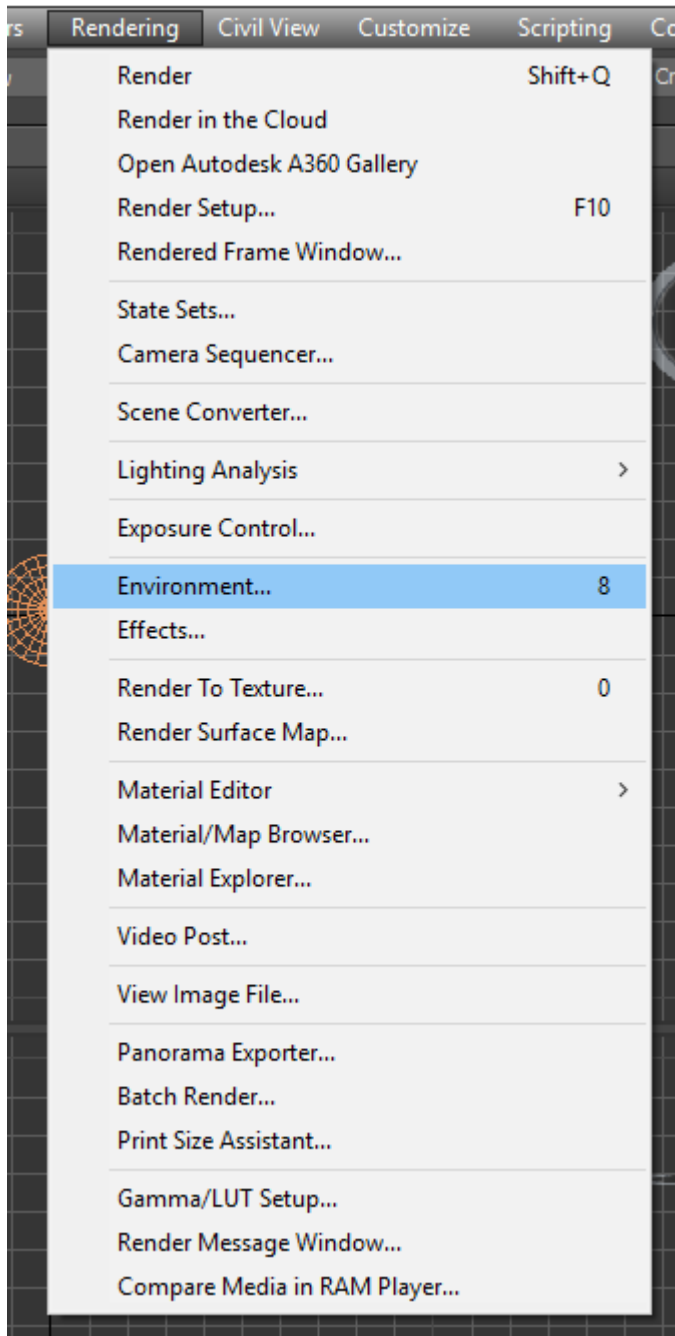
Exposure controls are post processing rendering features that simulate the effects of the aperture, shutter speed and film speed etc. or the output levels and color range of a rendering, just like adjusting film exposure and setting on a camera. They can be found under **Rendering > Exposure Control...**



The **Exposure Control** process may also be familiar to you under the topic of **Tone Mapping**. Many renderers have special menu items for **Tone Mapping** under their **Render Settings** dialog however Radeon™ ProRender uses the 3ds Max workflow and features to achieve the same result.

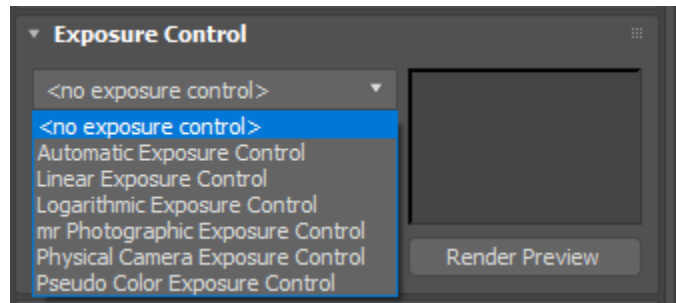
As you change these settings within the 3ds Max dialogs the results can be viewed immediately through the 3ds Max **Active Shade** window or via the **Render Preview** panel within the **Exposure Control** settings.

To access the exposure controls dialog either go to the main menu and select **Rendering menu > Environment** or press **8**. The **Exposure Controls** are under the **Environment** tab and are defaulted to the **Physical Camera Exposure Control** setting.



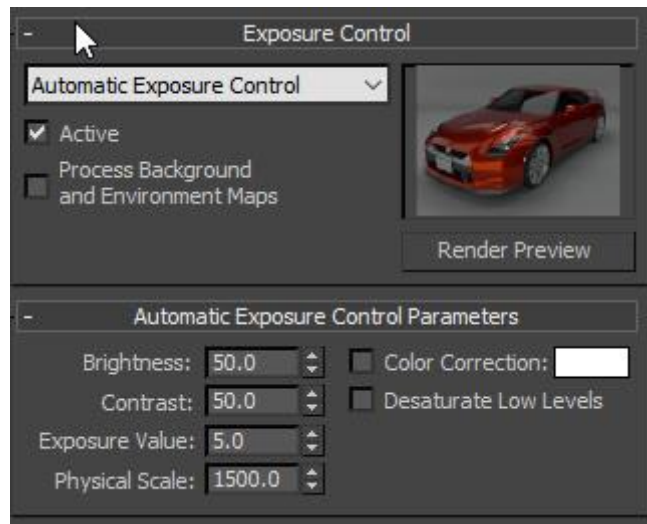
## Setting Exposure Controls

The **Exposure Control** panel has a drop down from which you can select different exposure algorithms:



## Automatic Exposure Control

**Automatic Exposure Control.** The algorithm samples your render and builds a histogram to provide improved color separation across the dynamic range of the rendering. This is very useful for enhancing lighting effects that would normally be too dim to see.



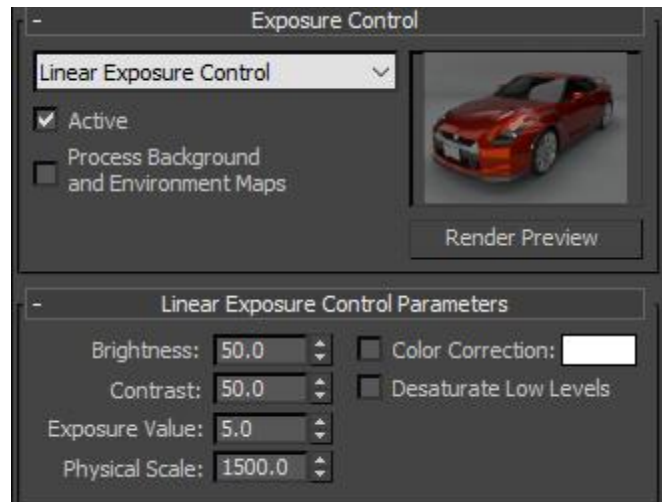
- **Brightness:** Changes the brightness of the converted colors.
- **Contrast:** Changes the contrast of the converted colors.
- **Exposure Value:** Changes the overall brightness of the rendering. Negative values darken the image, and positive values brighten the image.
- **Physical Scale:**
  - Is a physical scale for improving the exposure control for lights that are not physically lights. The resulting rendering approximates the human eye and how it would response to the scene in the real world.
  - Each standard light's Multiplier is multiplied by the **Physical Scale** value to give a light intensity value in candelas. Physical Scale is also factored into reflections, refractions, and self-illumination.
  - Photometric lights, which are the recommended lights to use Radeon™ ProRender, will be unaffected by the **Physical Scale** value.
- **Color correction check-box and color selector:**



- Turning the check-box on shifts all colors so that the color swatch will appear as white.
- The **Color Selector** allows you to choose any other color to adapt to.
- These controls are useful in simulating how the eye naturally changes to lighting.
- **De-saturate Low Levels:** Setting this renders dimly lit colors that are too dim for the eye to distinguish. The rendering of dimly lit colors that the eye can not normally see is improved.

### Linear Exposure Control

**Linear Exposure Control.** Uses the average brightness of the rendered scene to map physical values to RGB values. This is useful for scenes with low dynamic range.



The parameters are the same as for **Automatic Exposure Control**.

## Logarithmic Exposure Control

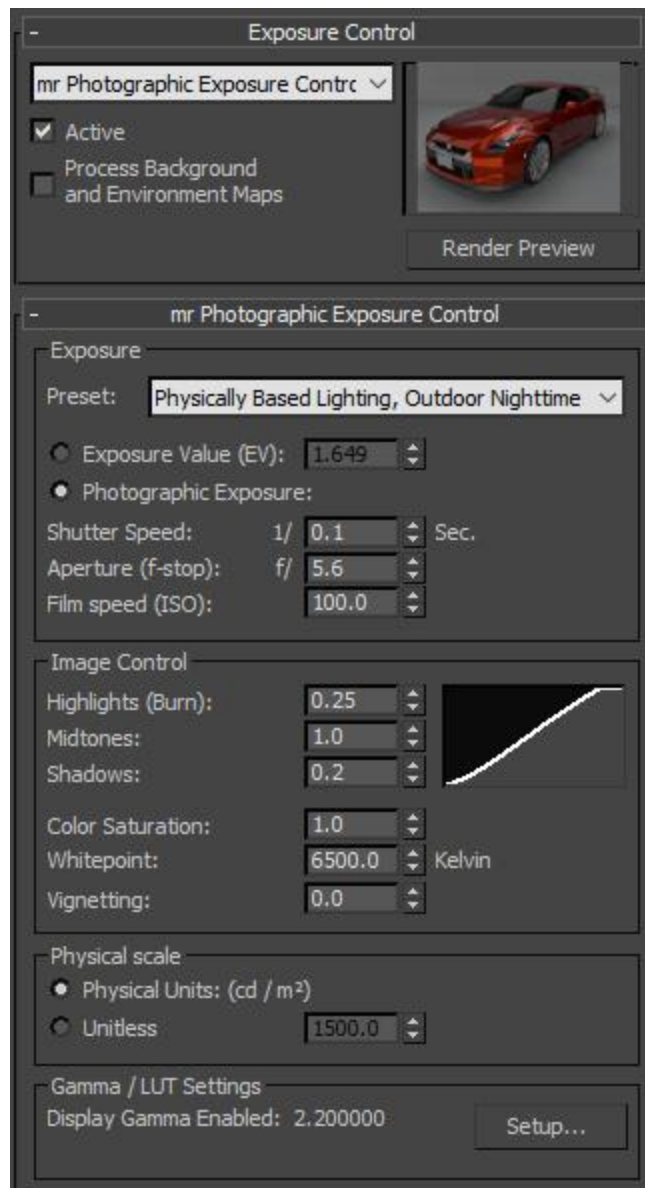
**Logarithmic Exposure Control.** Inspects brightness, contrast, and daylight intensity to map physical values to RGB values. This improves scene lighting where there is a very high dynamic range.



- **Brightness:** Changes the converted color's brightness.
- **Contrast:** Changes the converted color's contrast.
- **Mid Tones:** Changes the converted color's mid-tone values.
- **Physical Scale:** Provides the same result as **Automatic Exposure Control**. See **Automatic Exposure Control** above for description.
- **Color Correction check-box and color swatch:** Provides the same result as **Automatic Exposure Control**. See **Automatic Exposure Control** above for description.
- **De-saturate Low Levels:** Provides the same result as **Automatic Exposure Control**. See **Automatic Exposure Control** above for description.
- **Affect Indirect Only:**
  - Setting this applies a **Logarithmic Exposure** to the areas of indirect lighting.
  - This is valuable when the primary lighting for your scene comes from standard lights.
  - Affect Indirect Only is essentially redundant when the primary lighting for your scene comes from photometric lights.
- **Exterior daylight:** Converts an outdoor scene color compensating for the extreme intensity of IES sun light.

## mr Photographic Exposure Control

This simulates camera settings like exposure, shutter speed, aperture, and film speed. It is also valuable for improving high-dynamic-range scenes.



### Exposure:

Exposure provides a Preset as well as a choice of Exposure Value or Photographic Exposure. Selecting one makes the other settings unavailable, however, the values will still change depending on adjustments you make to your method of choice.

- **Preset drop-down list:** Allows you to choose from the available presets.
- **Exposure Value (EV):** The Exposure Value provides a single value that corresponds to a combination of the three Photographic Exposure values Shutter Speed, Aperture and Film Speed below.

- **Photographic Exposure:** This allows you to independently set the exposure using camera like controls.
- **Shutter Speed:** Provides the duration that the “camera shutter” is open. The higher this value, the longer the eye of the camera will be open, and therefore the greater the exposure.
- **Aperture:** This represents the size of the opening of the “camera lens”, and is expressed as a ratio. The higher this value, the smaller the opening in the camera's iris, and therefore the lower the exposure.
- **Film Speed (ISO):** This represents how quickly the “camera film” will react to light, and is expressed as an index. The higher the value, the quicker the film will react and therefore the greater the exposure.

### Image Control:

The brightness or highlights, mid-tones, and shadows in a rendering can be managed with these controls. The graph on the right side show the result of changing the 3 settings. Color saturation, white-point, and vignetting are also available

- **Highlights (Burn):** Manages the level of the brightest areas in a render, increasing the brighter highlights with higher values, while darkening the highlights with lower values.
- **Mid-tones:** This changes the level of a render where the brightness lies between highlights and shadow and yields brighter mid-tones while lowering the values of darker mid-tones.
- **Shadows:** Manages the level of darker areas within a render lightening shadows for lower values while, while darkening shadows for higher values.
- **Color Saturation:** Changes the intensity of the colors within an image, making colors more intense with increasing value.
- **White-point:** Defines the scene's light sources main temperature.
- **Vignetting:** The brightness in the centre of a render is increased compared to the edges. This results in a circle of fully exposed light in the centre, with darker areas at the edges.

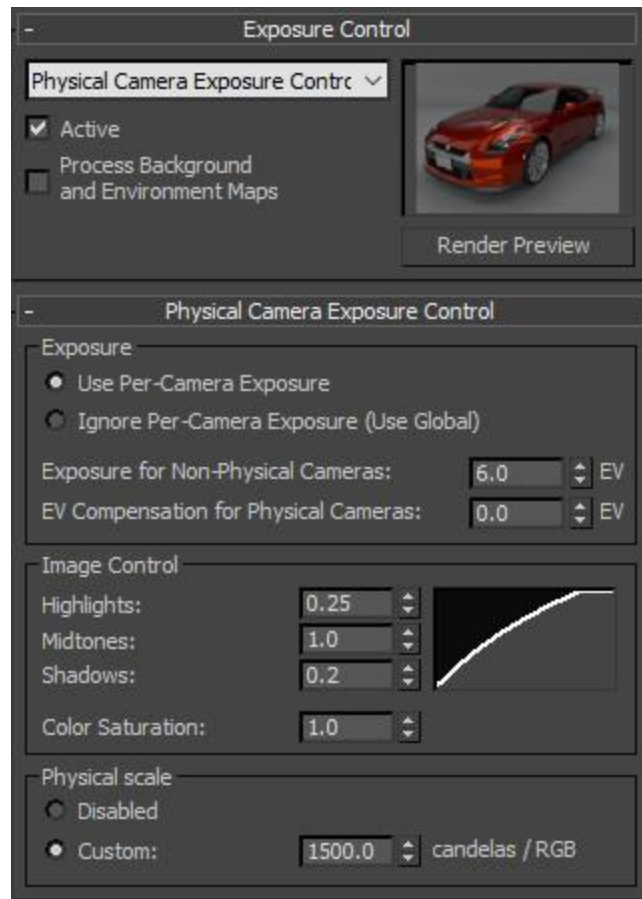
### Physical Scale:

When outputting HDR (high-dynamic-range) images you can use the physical scale inherent within the scene, or establish a Physical Scale for non-physically-based lighting.

- **Physical Units (cd/m2):** Outputs physically correct HDR pixel values when lighting the scene with photometric light sources.
- **Unitless:** Allows you define how the illumination from standard lights is interpreted.
- **Gamma/LUT Settings:** The status of the current Gamma/LUT settings is displayed here along with a Setupbutton that opens a Preference Settings dialog to allow you to can change the settings.

## Physical Camera Exposure Control

Provides exposure settings for **Physical Cameras**, using the **Exposure Value** and a color-response curve. Radeon™ ProRender provides the best results when using **Physical Cameras**.



## Exposure

- **Use Per-Camera Exposure:** The **Use Per-Camera Exposure** implies the controls will be set on each physical camera's **Exposure** which will adjust the effect of the exposure on a camera by camera basis.
- **Ignore Per-Camera Exposure (Use Global):** Implies that the controls on each camera's **Exposure** are ignored, and the settings effect all physical cameras.
- **Exposure for Non-Physical Cameras:** Provides an **Exposure Value** for legacy cameras.
- **EV Compensation for Physical Cameras:** Provides an **Exposure Value** for physical cameras.

## Image Control

- **Highlights, Mid-tones, and Shadows:** These spinners allow you to adjust a color-response curve.
- **Color Saturation:** Changes color saturation of an image.

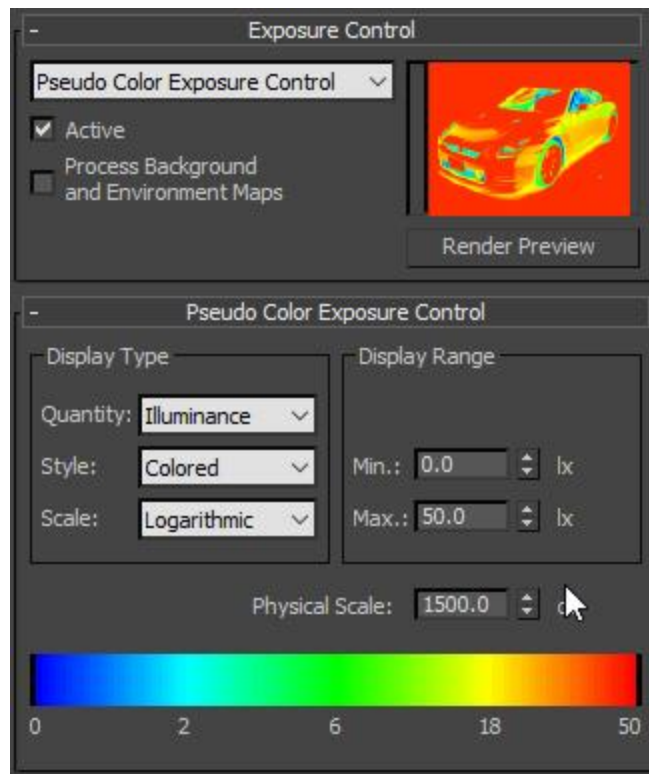
## Physical Scale

This provides a physical scale for exposure control for lights that are not physically based and will approximate the human eye's response to a scene.

- **Disabled:** When the scene uses non-photometric lights the result will likely be dim.
- **Custom:** Multiplies each standard light's by an intensity value in candelas.

## Pseudo Color Exposure Control

Maps luminance or illuminance values to replacement colors showing you the brightness of the values being converted.



## Display Type group

- **Quantity:** Allows you to choose the value being measured.
  - **Illuminance** highlights values of light incident on surfaces.
  - **Luminance** highlights values of light reflected from surfaces.
- **Style:** Allow you to choose the way to display the values.
  - **Colored** shows the spectrum.
  - **Grayscale** shows you the range in white to black.
- **Scale:** Chooses the technique used to map values.
- **Logarithmic** uses the logarithmic scale.
- **Linear** uses the linear scale.

## Display Range

- **Min:** Allows you to change the lowest value to measure in the image.
- **Max:** Allows you to change the highest value to measure in the rendering.

## Physical Scale

Allows you to set a **Physical Scale** for **Exposure Control** to use with lights that are not physically based.

The **Spectrum Bar** ranges from the Minimum to the Maximum settings and shows the spectrum/intensity relationship.

## Previewing the Results

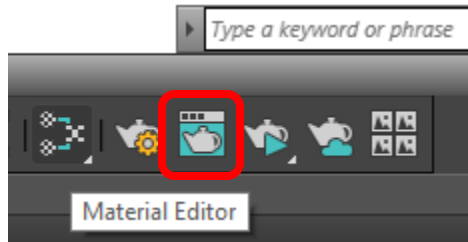
There are 2 options for previewing the results of changes to the Exposure Controls. You can either:

- Press the **Preview Button** which will display a sample thumbnail of the render in the small preview area or
- Change the render settings so that the renderer uses the **ActiveShade** window. Once the **ActiveShade** render is opened and changes you make to the exposure controls will be immediately reflected in the render.

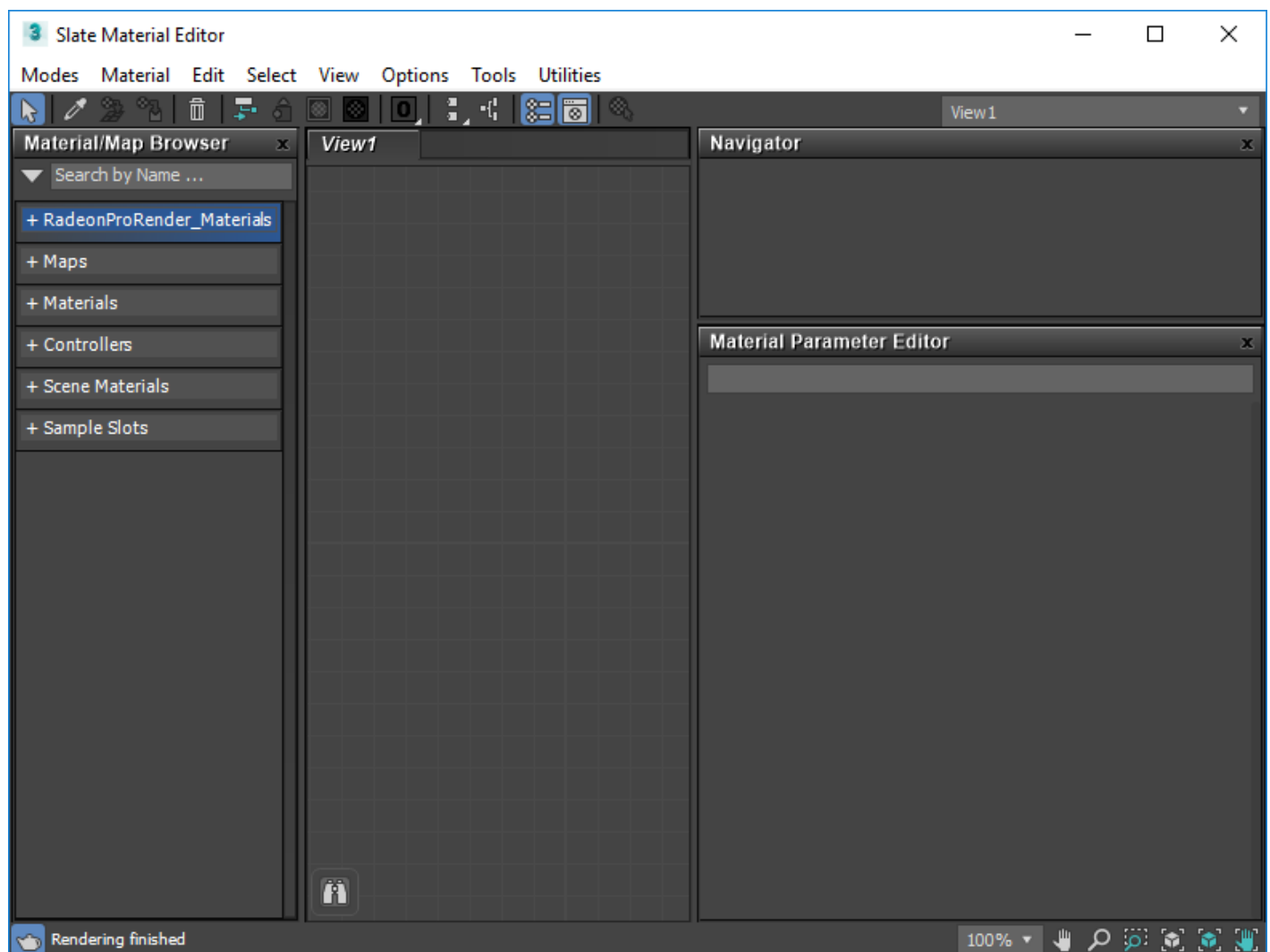
# Working with Materials

## Display the Material Editor

To display the Materials Library, open the **Slate Material Editor** either by using the **Rendering > Material Editor > Slate Material Editor** menu option, clicking the **Material Editor** button or hitting the **M** key.



After the Material Editor opens, navigate to the Radeon™ ProRender menu set within the **Material/Map Browser** on the left-hand side of the **Material Editor**.





Included within the Radeon™ ProRender install is the addition of Radeon™ ProRender materials to the 3ds Max Material Library for you to use.

## Radeon ProRender Material Library

Radeon™ ProRender Materials Breakdown:

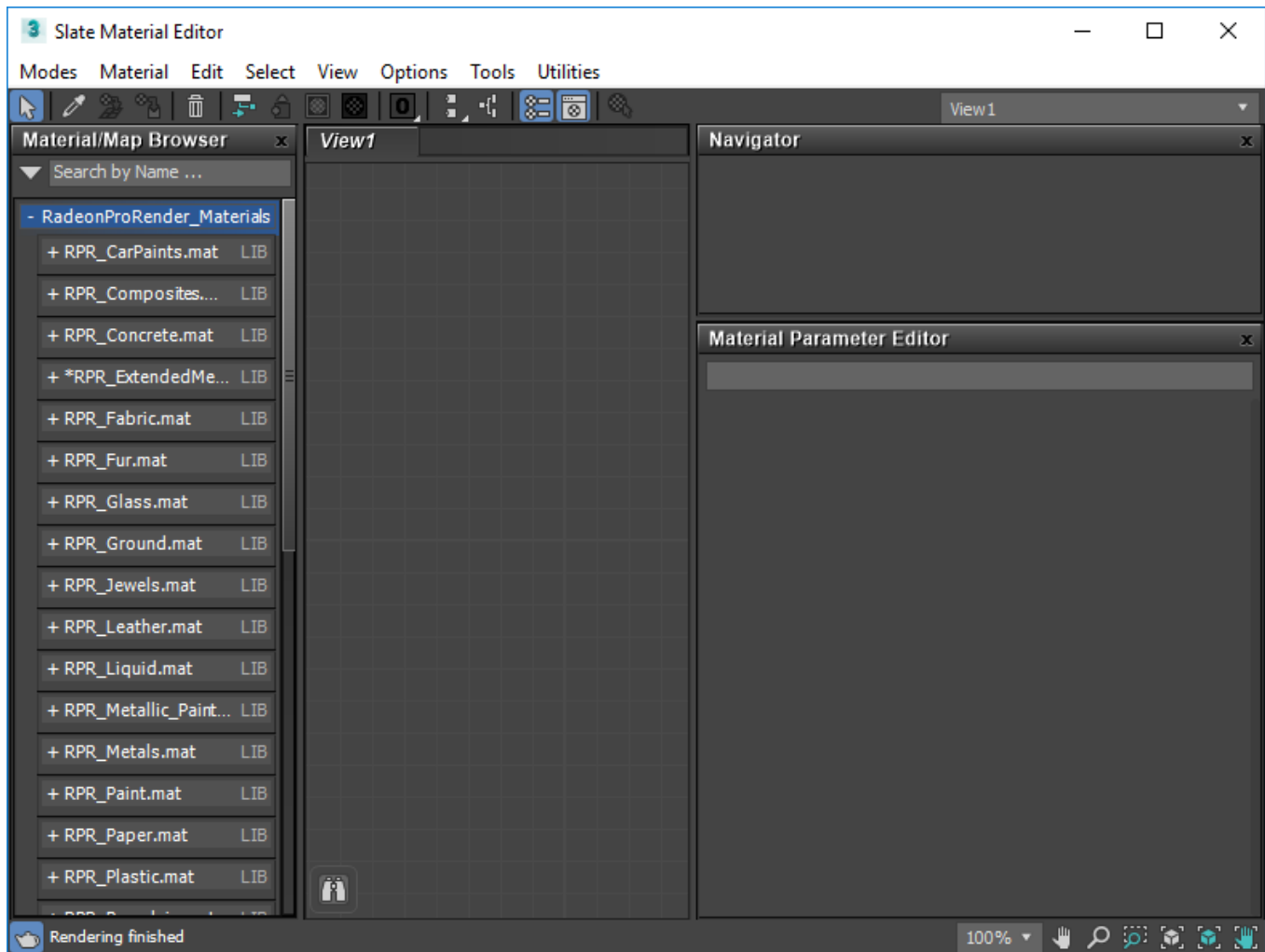
MATERIALS	DESCRIPTION
<b>RPR BLEND</b>	used to blend 2 or more materials together
<b>RPR DIFFUSE</b>	either be a solid color, blends or texture map inputs
<b>RPR DIFFUSE REFRACTION</b>	for light that goes through an object and bends at an angle. Diffuse refraction will scatter light in many angles
<b>RPR EMISSIVE</b>	used to emit glow or lighting cast on surrounding objects
<b>RPR MATERIAL</b>	
<b>RPR MICROFACET</b>	used for metals and glossy surfaces
<b>RPR MICROFACET REFRACTION</b>	same as <b>RPR Microfacet</b> but has refractive option.
<b>RPR OREN NAYAR</b>	used for diffuse reflections on rough surfaces, like sand, rocks, cloth or plaster
<b>RPR REFLECTION</b>	used to generate only reflection. Will be used with Blend material to make more advanced materials such as glass and water
<b>RPR REFRACTION</b>	
<b>RPR TRANSPARENT</b>	used to generate only transparency. Will be used with Blend material to make more advanced materials such as meshes and layered shaders
<b>RPR UBER</b>	combines several inputs to generate one big shader, alleviating the need to combine and group many shader-nodes together
<b>RPR VOLUME</b>	used for streetlights at night, fog or mist
<b>RPR WARD</b>	used for plastic and metal

The installer also adds the following Maps:

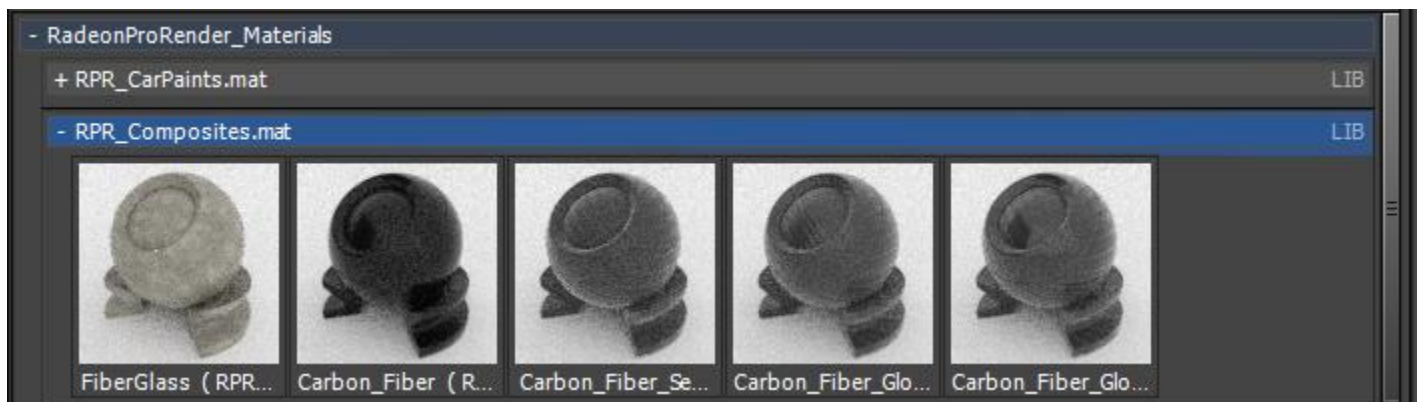
MAPS	DESCRIPTION
RPR ARITHMETIC	
RPR AVERAGE	
RPR BLEND VALUE	
RPR COLOR VALUE	
RPR DISPLACEMENT	
RPR FRESNEL	
RPR FESNEL-SCHLICK	
RPR INPUT LOOKUP	
RPR NORMAL	

## Radeon ProRender Material Browser

The installer package adds complex materials that uses the materials above in conjunction with maps and node connections to create a large library of pre-configured materials for you to use.

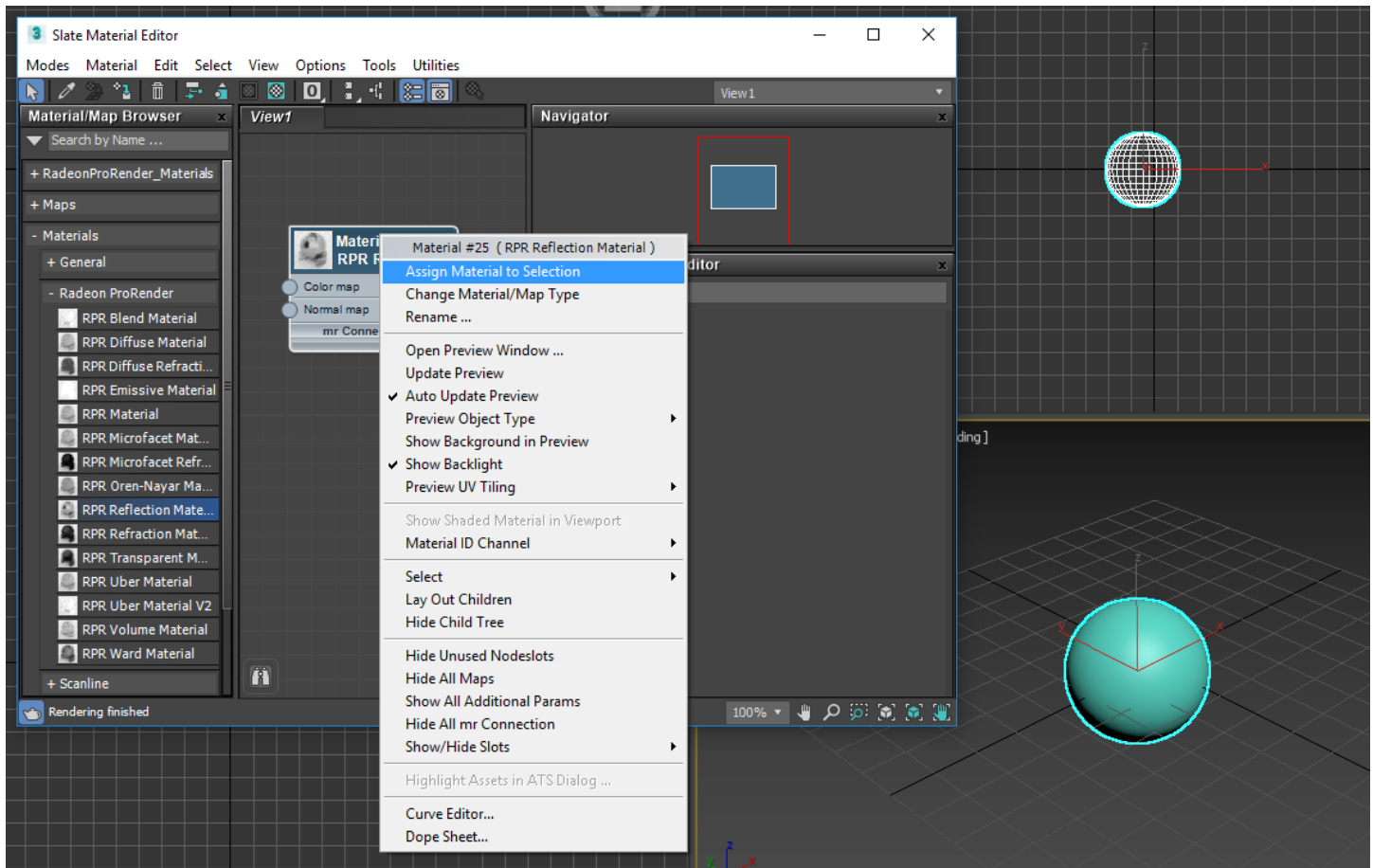


You can preview any of the materials within the **Slate Material Editor Material/Map Browser** by expanding the + sign under each Material category.

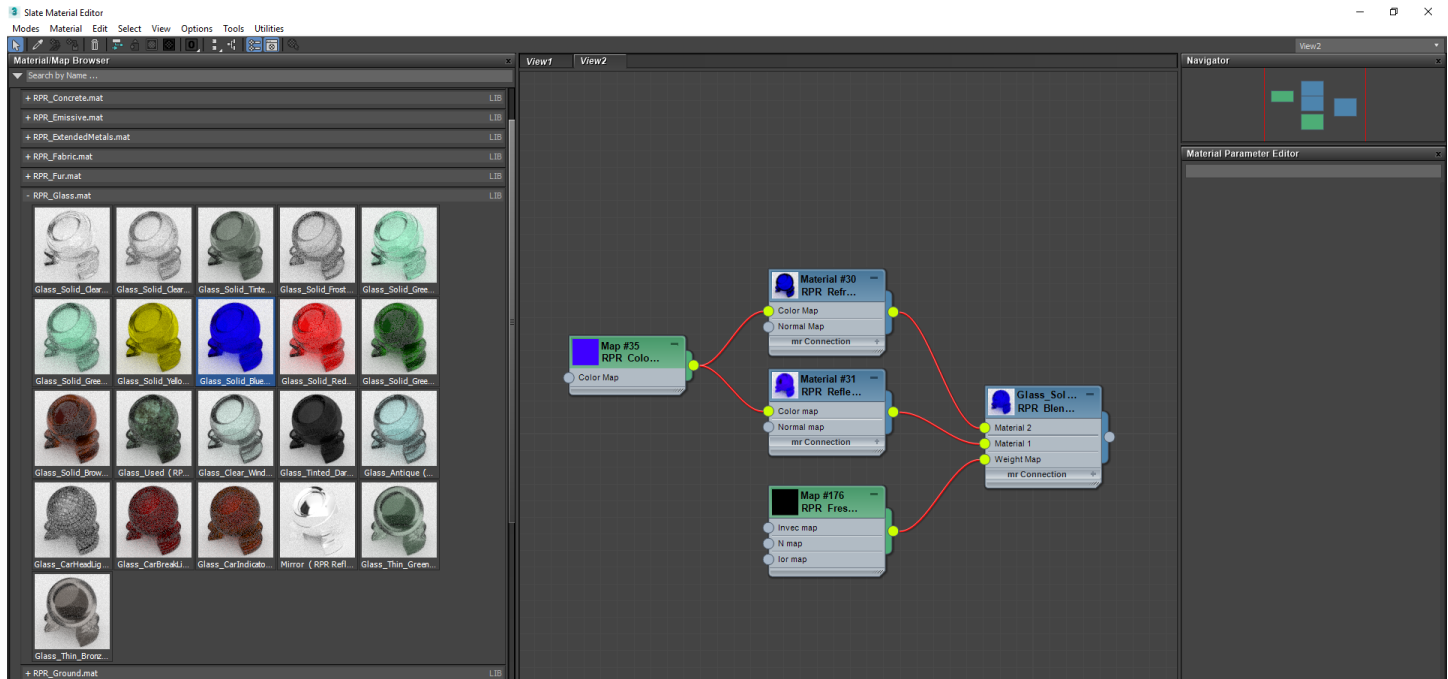


## Assigning Basic Materials

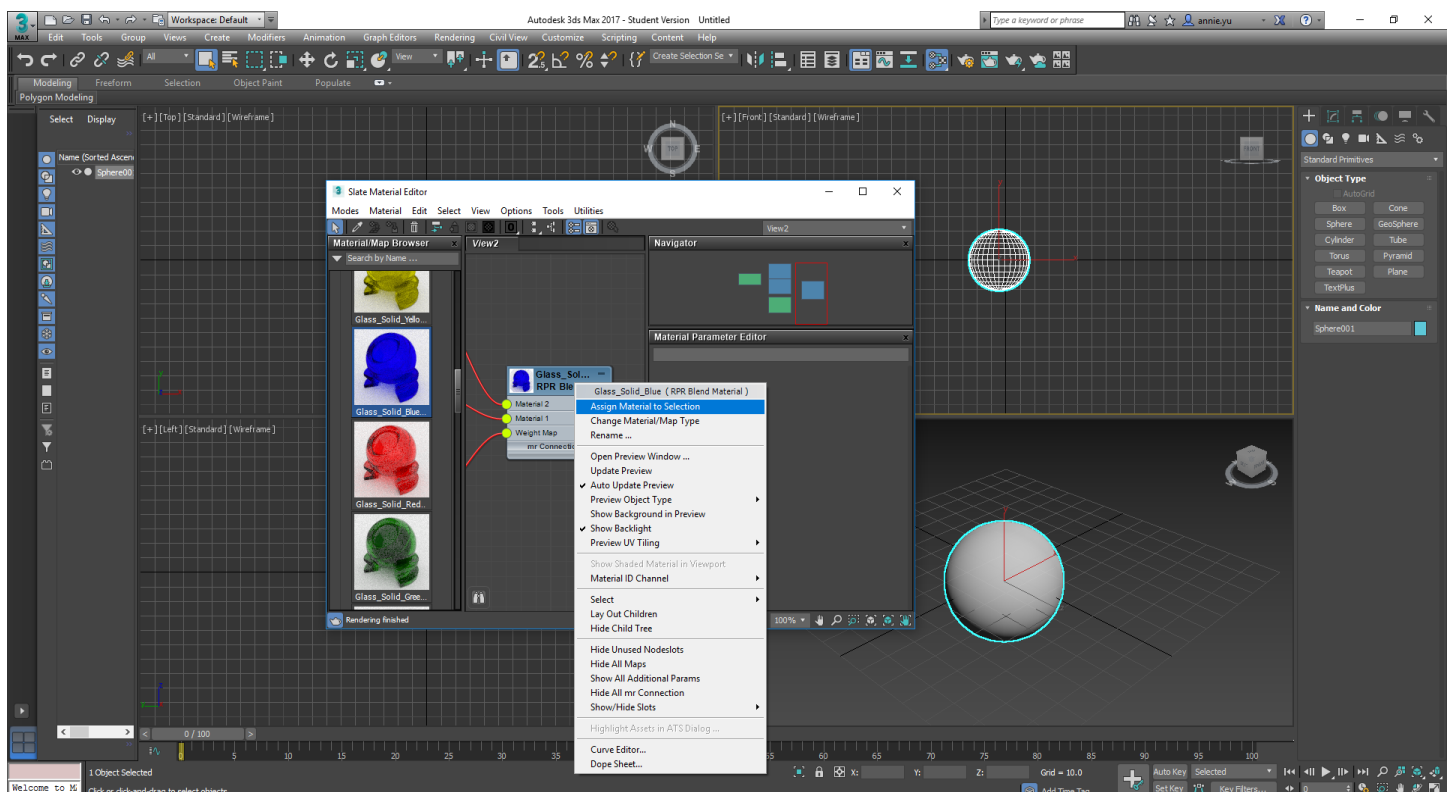
To assign a material to an object from the **Material Editor** select your object or models in the scene then right click over **RPR Material** you have previously dragged into the **Material Editor** workspace and select **Assign Material to Selection** to your selection.



You can also assign the pre-configured materials that combine maps and node connections to create a large library of different materials that you can use or modify to create just about any surface you desire.



Select the object in the scene then right click the right most material box. Select the **Assign Material to Selection** from the popup menu that appears.



## Using 3dsmax Materials

Like the Standard Lights many of the Standard Materials are not supported by Radeon™ ProRender. Many of these materials simulate a physical effect on the surface of an object which is not required when using a physically based material and ray-tracing renderer.

The specific models supported by Radeon™ ProRender include:

- Blinn
- Metallic
- MultiLayer
- Oren-Nayar-Blinn
- Phong
- Strauss
- Translucent

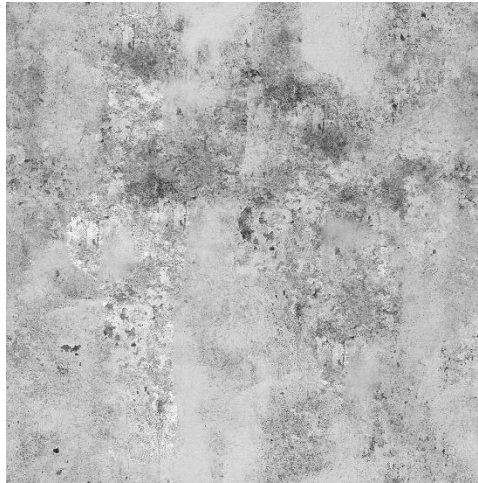
## Creating New Materials Using the 3dsmax Material Editor

To create realistic looking materials, we must first use our observation of surfaces in the real world to get an understanding of the different variations of color, reflection, bumps and imperfections that make objects stand out as having realistic looking surfaces.

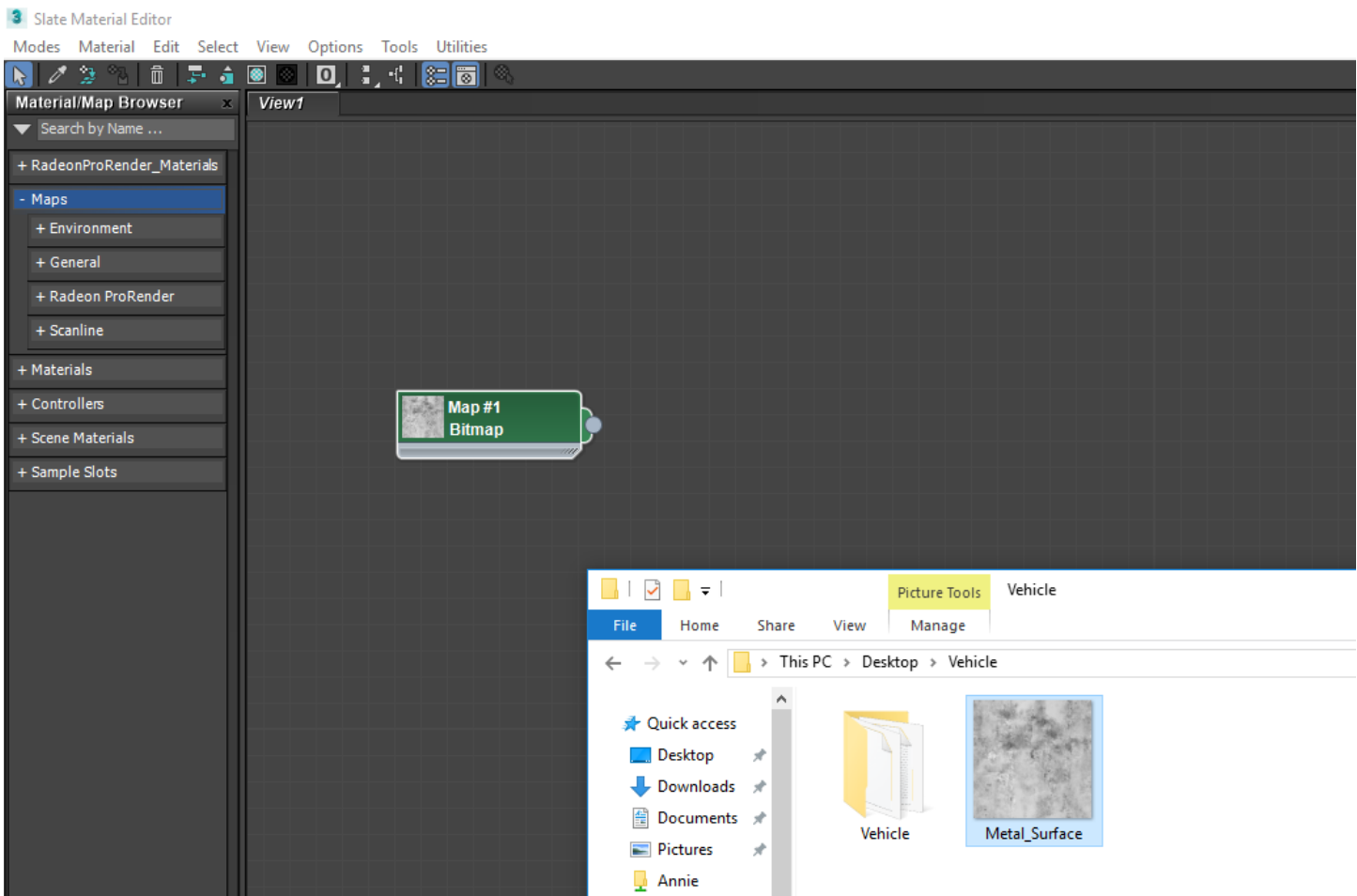
Often real object surfaces have imperfections are effected by weather, use or even by their manufacturing process. To make believable materials we need to add scratches and stains. Most importantly, we need to provide a physical texture and rendering attributes which will affect the way light is reflected off the surface.



First, we should select a surface we would like to use and add it to the Material Editor. Below is an image of a metallic surface. Right click the image and save it on your disk.



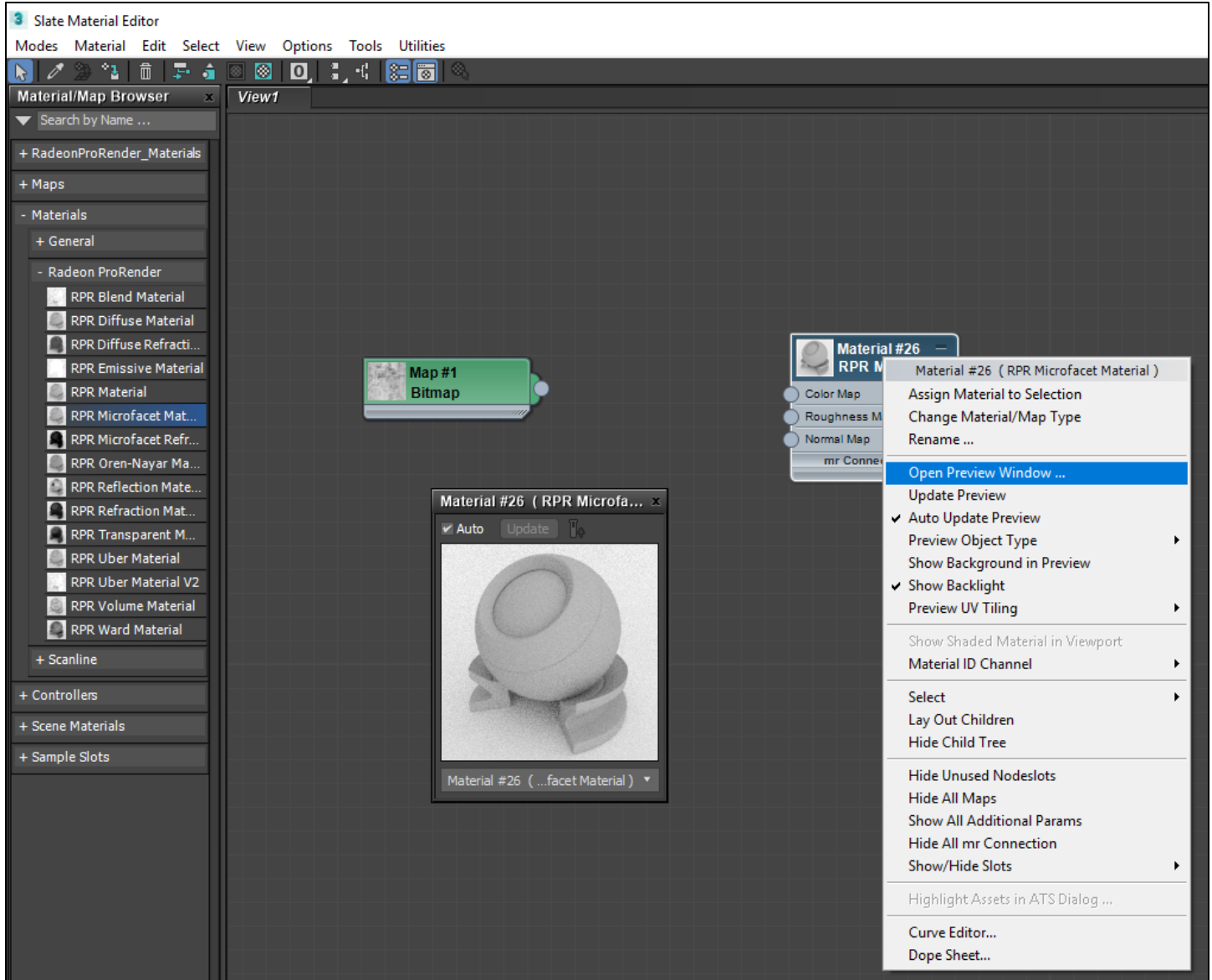
Once you have saved the file in a convenient place, locate the file with your file explorer and drag it onto the **3ds Max Material Editor**.





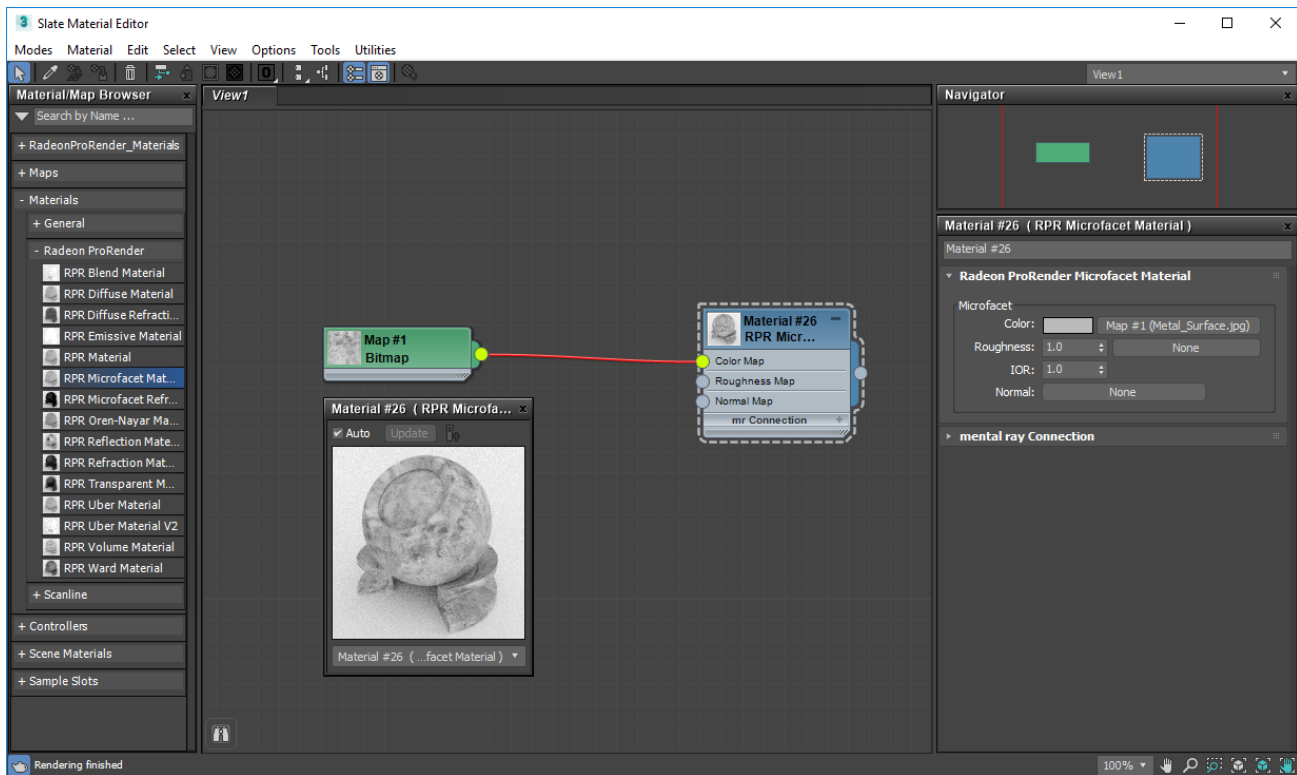
For a metallic surface, we need a combination of roughness and shininess so we'll use the **RPR ProRender Microfacet Material**. Open the **Radeon ProRender** materials under the **Materials** tab in the **Material/Map Browser**. Select the **RPR Microfacet Material** and drag it onto the **Material Editor** panel next to the **Bitmap** that you have already placed previously.

Right click the **RPR Microfacet Material** node/box and select **Open Preview Window**. This will allow you to view the material as you make changes to it. Or you can double click the material box and size it to make the icon image larger.

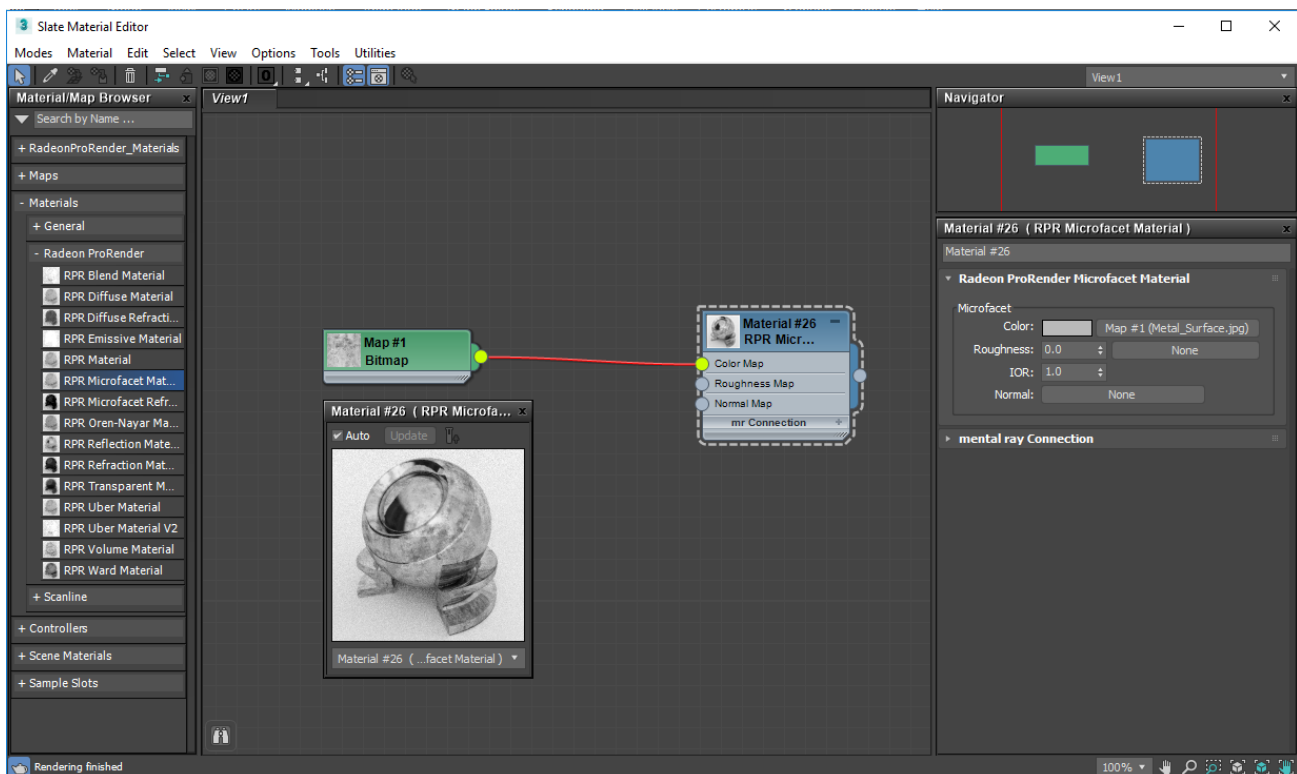




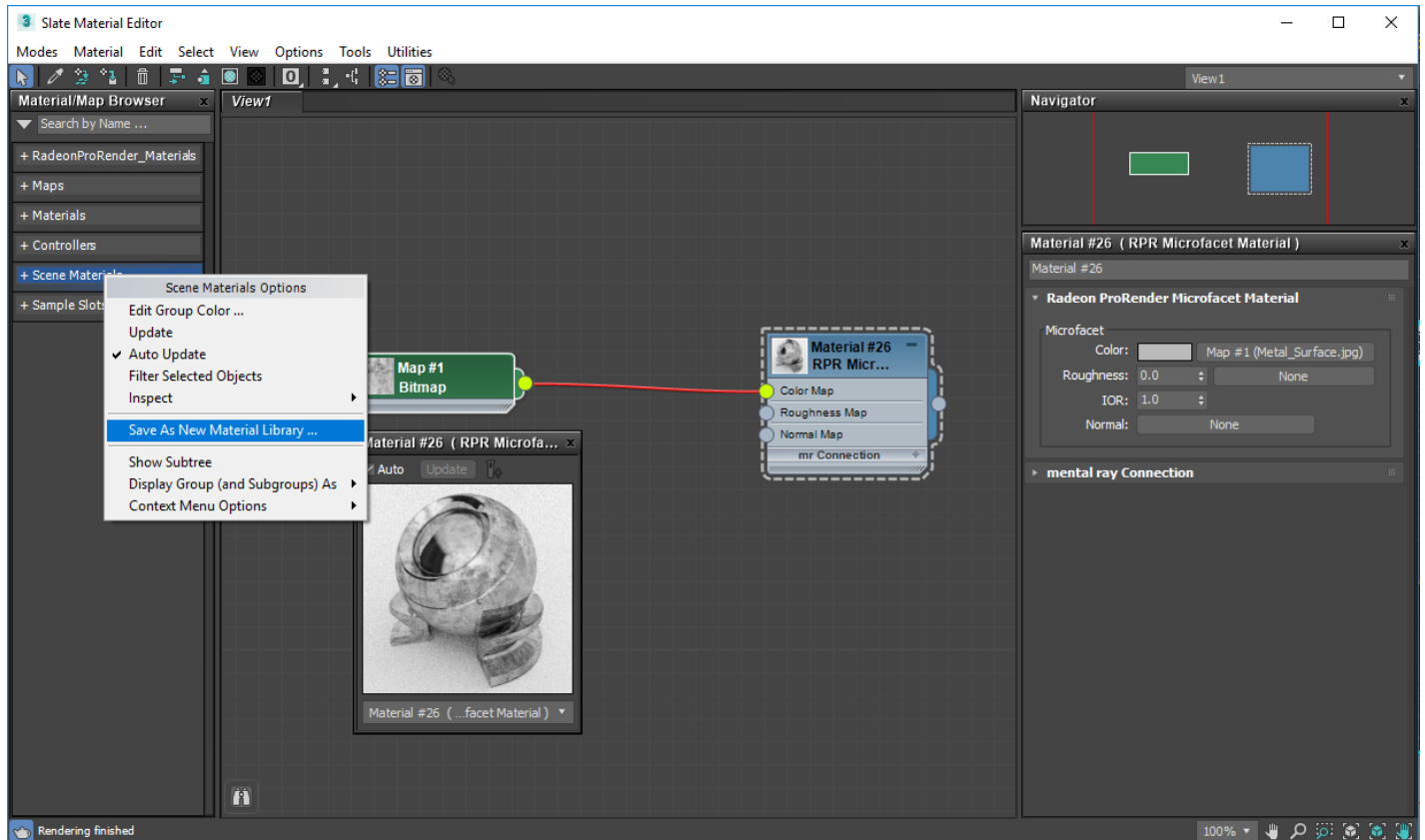
Connect the two nodes together. In the material preview, the image is not overlaid on the object.



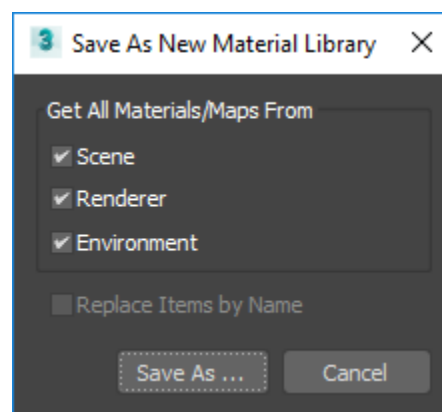
Click on the Material node and on the right-hand side, you are able to adjust properties of that material. For example, decreasing the roughness to 0 will make the surface appear shiny.

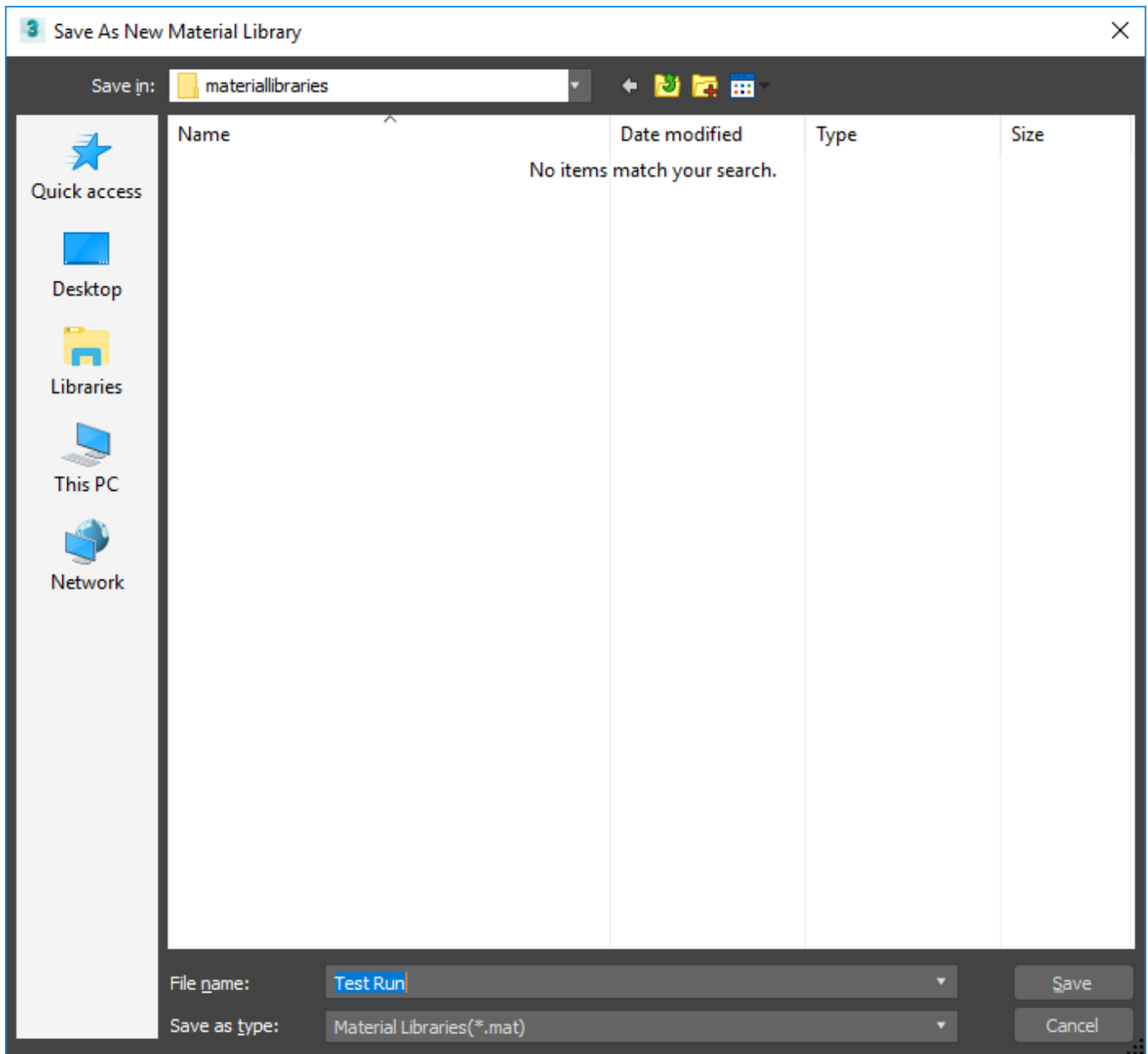


To save this new material you can view all the materials used in a scene and either save all the materials into a new library or select a single material and save that into a separate library. Open the **Material Editor** and scroll down to the Scene Materials tab in the **Material/Map Browser** and expand the **+** to show the materials underneath. Right click the tab or one of the materials and select **Save As New Material Library**.



You will then be presented with a dialog to select which parts of your scene you want to extract the materials. Select all of them for now. Then choose the filename and where you want to save the library.





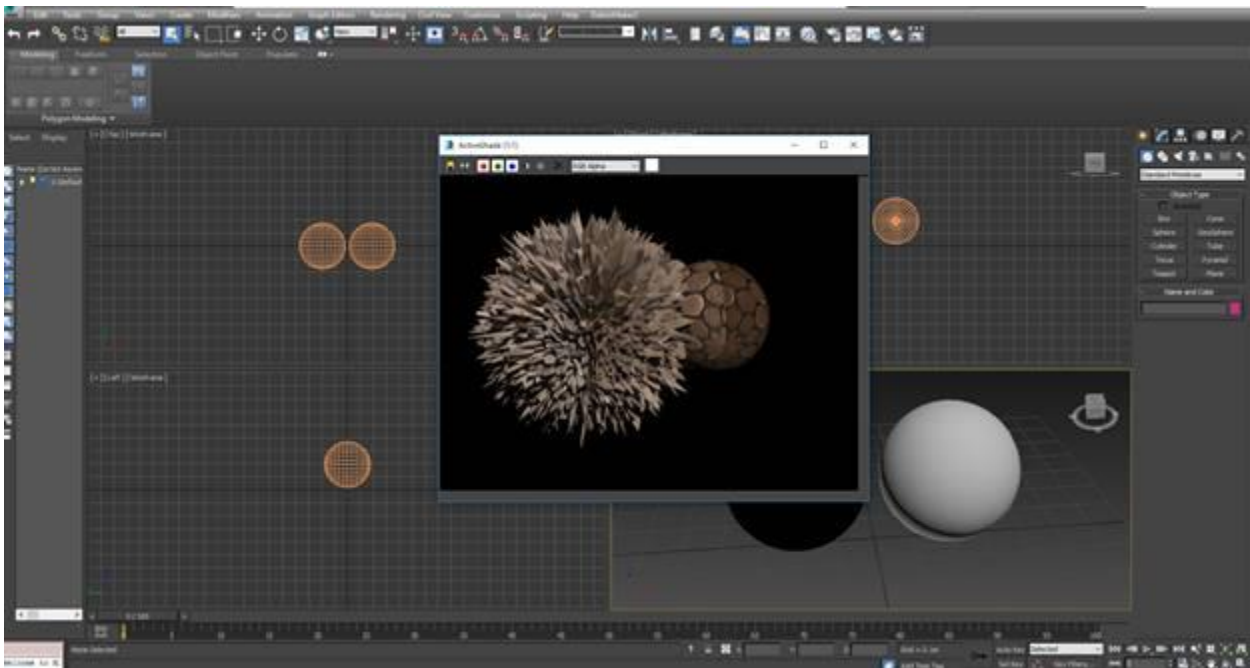
Your library will then appear in the **Material/Map Browser** for you to use whenever you want. Even if you open or create a new scene, the new material will be displayed in the **Material/Map Browser** for you to use.

## Displacement

Displacement maps could be used inside Radeon™ ProRender when the user need to increase the geometry details on any object that have a material applied on it. Similar as the Bump and Normal maps, the displacement will improve the realism of any material, but compared to the Bump and Normal maps that only create a visual effect (simulating geometry details), the Displacement maps will subdivide the geometry during rendering time to improve details in a more precise and realistic way.



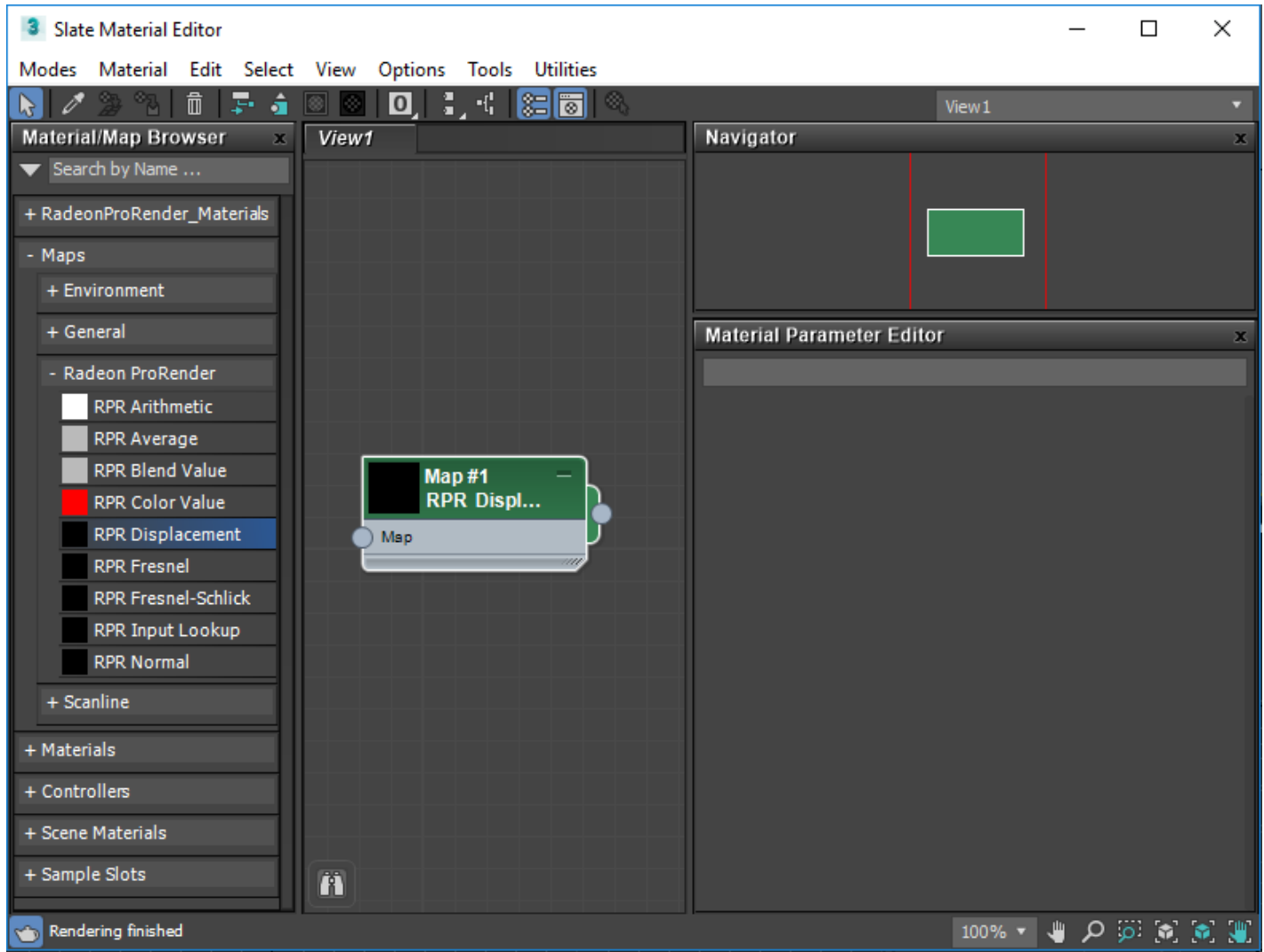
**Note:** In order to have the displacement effect working on a geometry, this one must be an Editable Mesh or Editable poly or in case it is a basic 3d primitive, it must have applied a tessellation or turbosmooth modifier on it.



**Warning:** Since Displacement maps will subdivide and increase the polycount of any geometry, it could cost a lot in terms of computational power and system memory, so you should use this map with caution.

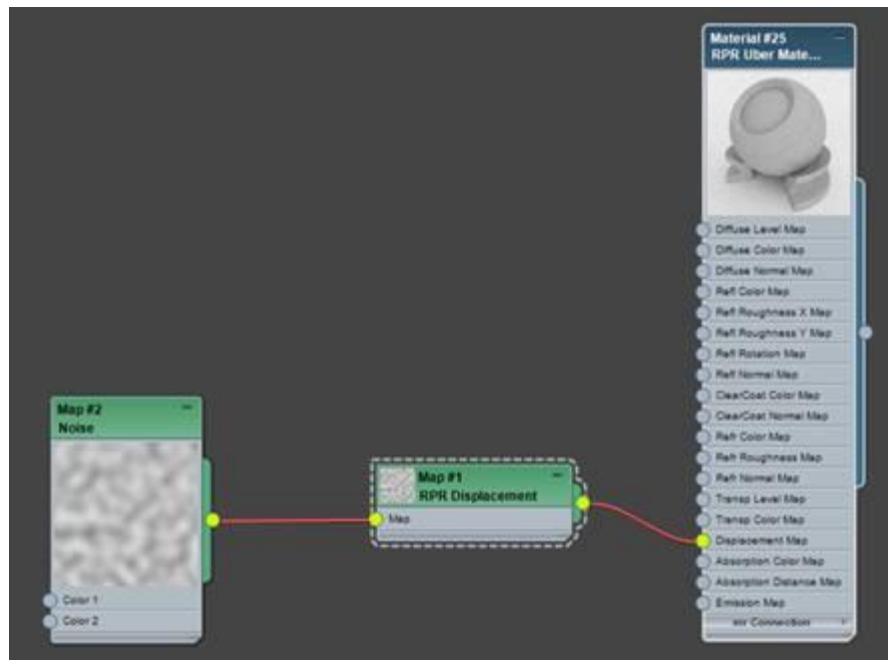
## Procedure

In Radeon™ ProRender, you will find a proprietary map called **RPR Displacement** when press Right Click over an empty space into the material editor, then you will find it inside **Maps / Radeon ProRender / RPR Displacement**.

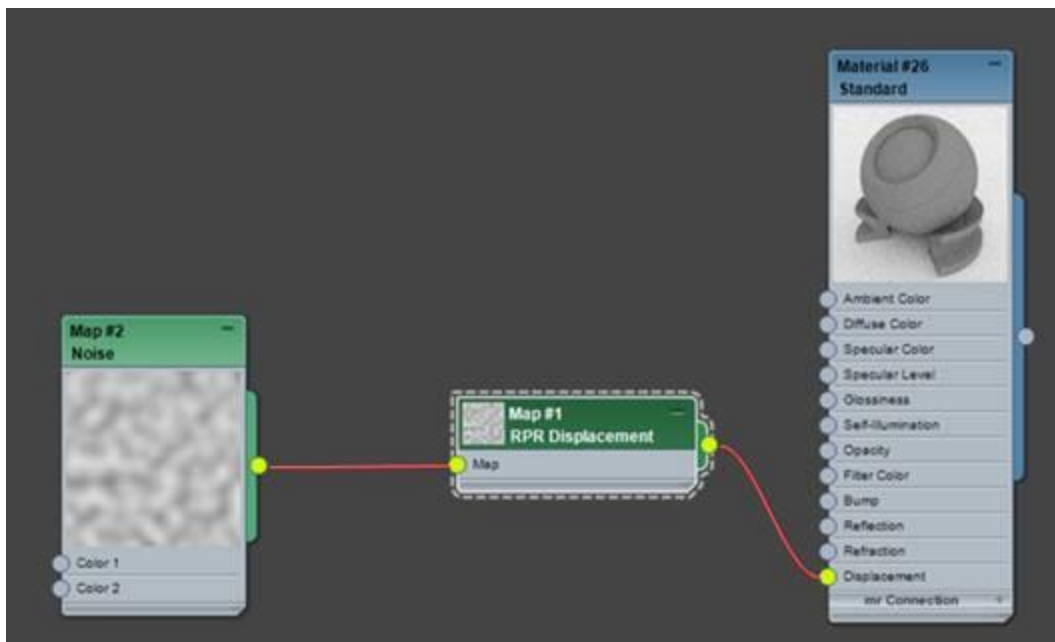


This map should be linked to a Material Displacement Channel and it will work as intermediary that translate any height map to the Radeon™ ProRender Renderer and this way, enable the desired effect.

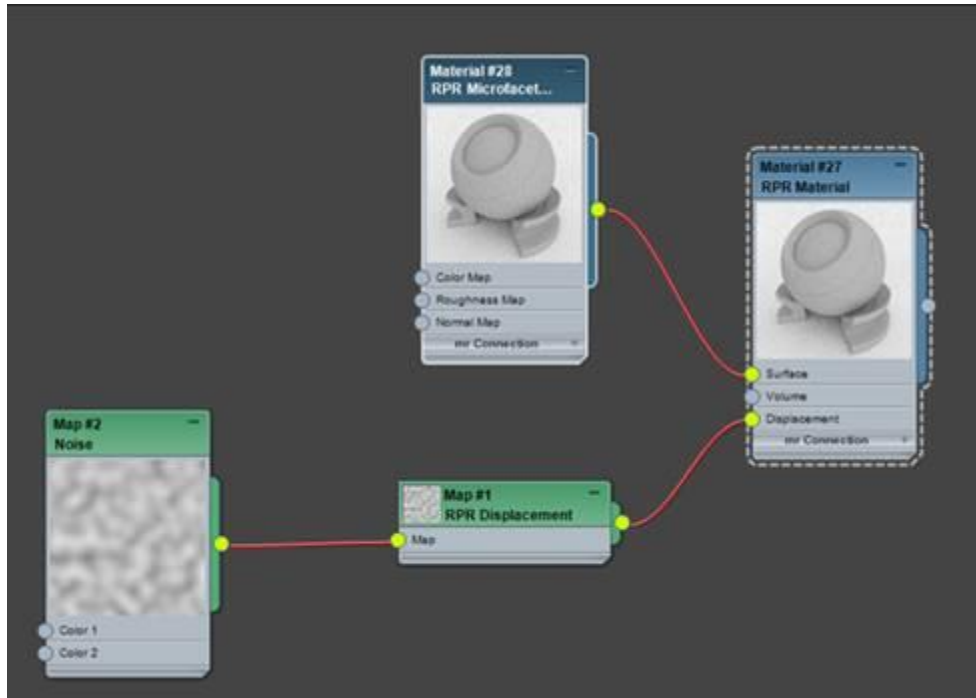
This image shows the **RPR Displacement** map used into a **RPR Uber** material.



This image shows the **RPR Displacement** map used into a Standard material.

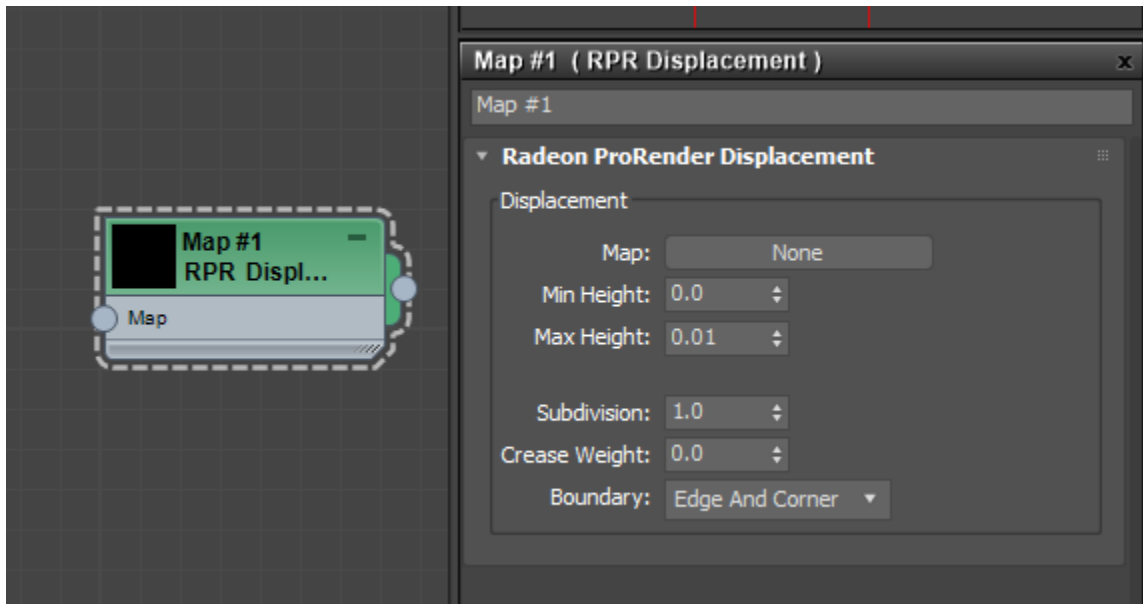


This image shows the **RPR Displacement** map used into a **RPR Material**. This material adds additional options (like displacement in this case) to any material.



## Properties

The **RPR Displacement** map has the following properties:

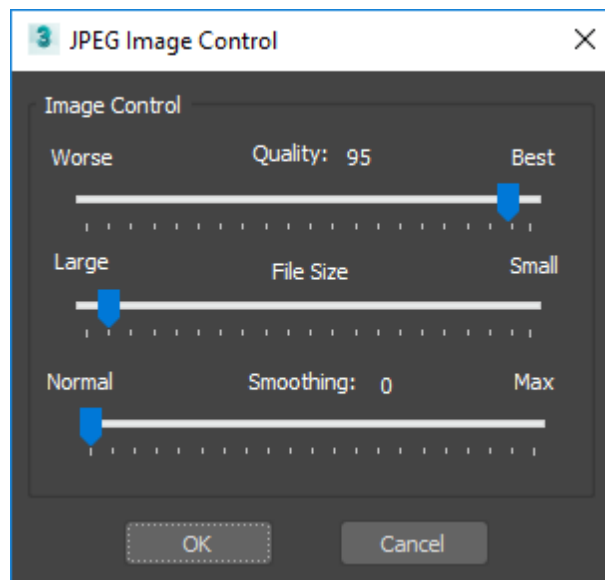
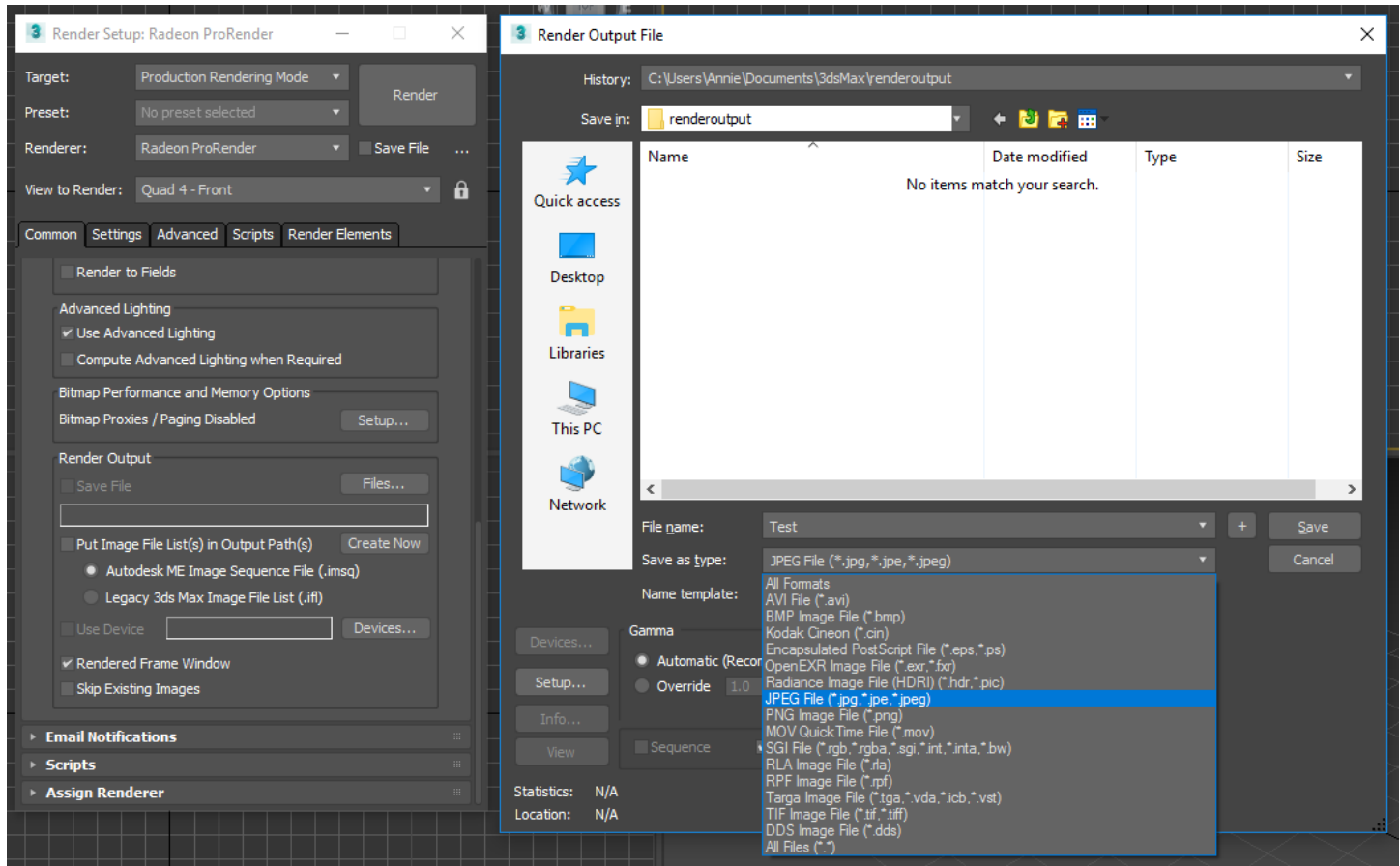


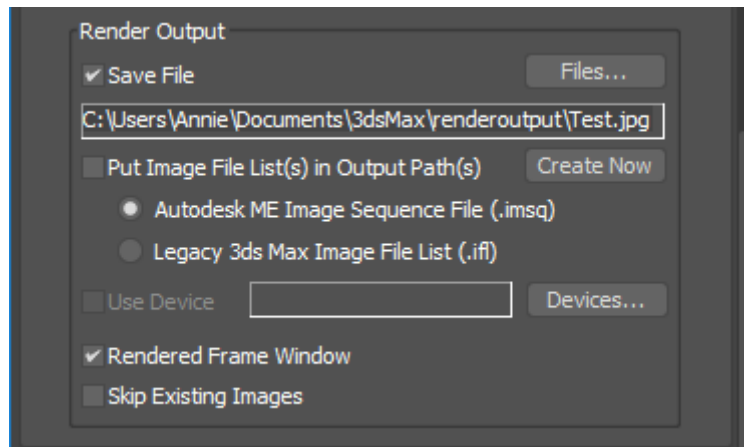
- **Map:** Here is where the user should add a height map in order to enable the displacement effect.
- **Min Height:** This value represents the minimum height that the effect will going to display at render time. This value corresponds to the darker areas of the selected height map.
- **Max Height:** This value represents the maximum height that the effect will going to display at render time. This value corresponds to the brighter areas of the selected height map.
- **Note:** If this value is set to zero (0.0), there will not going to be any visible displacement effect.
- **Subdivision:** This value represents the amount of additional subdivisions that will going to be added at rendering time to improve the Displacement effect.
- **Warning:** Increase this value one by one verifying if there is a real need to go any further, because increasing this value a lot, could affect the overall render performance.



# Saving

Press F10. In the **Common** tab, under the Render Output, click on **Files...** Select the directory to where you would like to save the file, name it and add an extension manually into the name (.jpg, .png, etc). We will be using the render output directory of the project.





Hit render button. Once the render has completed find the folder that you have saved the file in.





# **Radeon ProRender plug-in for 3ds Max**

**User Guide v1.0**

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