TRAILWAY LEARNING CENTER

BUILDING
REALISTIC
TEXTURES
IN BLENDER

Tutorial by irrie Ember • Questions or comments? Contact me at **irrie.net** or in-world

Step 7: Setup PBR Material

Step 8: Add Lighting

Step 9: Bake & Export Texture

Step 10: Edit Texture in PS

Step 11: Upload to SL

Step 1: Download Reseources

Step 2: Setup Blender Scene

Step 3: Model Object

Step 4: Unwrap Object

Step 5: Assign Material(s)

Step 6: Install HDRI

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• The first thing to do is find a **PBR** material and an **HDRI** environment image that you would like to work with in Blender. There are some websites where you can download these types of files for free, but always check terms of use before you do. I used cgbookcase.com for this tutorial. I will be creating a log holder, so I downloaded metal, bark, and tree stump PBRs for my mesh.

*Note: Unzip the PBR file into a folder on your computer. In this package, you should see multiple maps such as Base Color, Normal, etc.

• Next, download an HDRI environment image if you would like to use this as indirect lighting in your blender scene. You could also use your own image as an HDRI, or you could skip this option. For this tutorial, I used an HDRI image from hdrihaven.com.

*Note: Any resolution such as 1k, 2k, or 4k should work fine for both the PBR and HDRI files you download.

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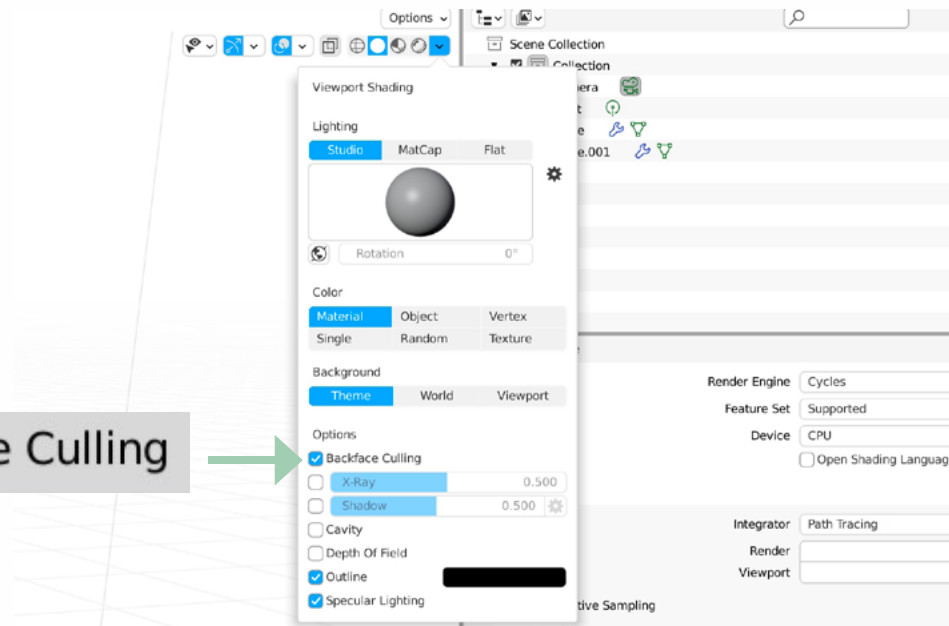TEXTURES
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• Next, set up your Blender scene. Make sure you are in **Cycles** mode so that you can use **Nodes** to build your material and bake your UV map in the end. Go to the **Render Tab** 🗋 and at the top where it says "Render Engine", click the drop down menu and choose "Cycles".

Render Engine | Cycles

• The next thing to do is to check that we have **backface culling** on so that we can see the invisible side of faces and fix any issues there with normals. At the top right of your screen, go to **Viewport Shading** drop down and look towards the bottom to check on "Backface Culling". Don't worry about lighting or the HDRI environment at this point, we will set that up later.

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• Since the focus of this tutorial is not how to create mesh, I won't give all of the details of creating my log holder for this project. If you would like to see how I created it step by step, please view the video (here) that corresponds with this tutorial.
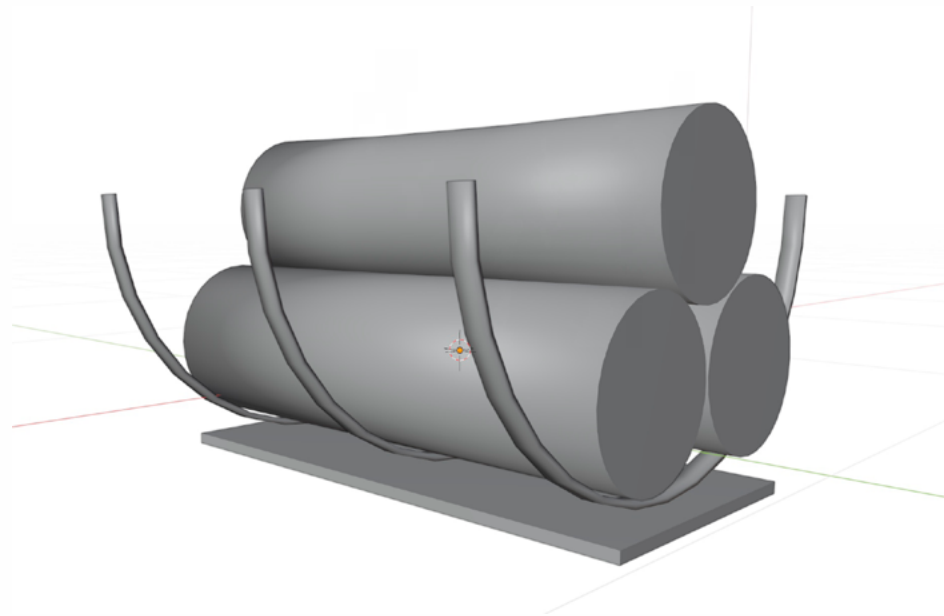
• In basic terms, what I did to create my log holder was create 3 cylinders, set the side faces to Shade Smooth, and the caps to Triangle Fan which I set to Shade Flat. I then created the metal rack by cutting a cylinder in half, scaling the sides down to a narrow strap shape and I then used Solidify (space bar search "solidify") to add some thickness to the straps. Lastly, to create a base, I added a mesh plane, shaped it into a rectangle and then pressed **E** for Extrude to add some thickness.

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• The first step to unwrapping the mesh is to Mark Seams. (If you would like to see a detailed tutorial on UV Unwrapping and Editing, see my video tutorial here). To mark a seam, make sure you are in **Edge Select Mode** (which you will see at the top of your screen in Edit Mode [Edit Mode]) and select an edge of your mesh where you would like to tell Blender to cut the mesh open for our 2D UV map we will be unwrapping. Right-click and from the menu choose "Mark Seam". Do this to any edges where you wish to make seams around your mesh object. There is no exact way to do this as it will vary per project and per your own preferences for how you would like your UV map to lay out the sections of your mesh.

• I separated my log holder into two separate parts - the logs and the metal rack. Make sure you are **Edit Mode** and select all of your mesh by pressing **A** on the keyboard and then press **U** to Unwrap. You can choose whichever type of unwrapping you wish, but I chose the first basic option.

• Next open the **UV Editor** so you can see how your object is unwrapped on the UV Map and make any changes there if you wish to do so. To open the UV Editor, click and hold at the right upper corner of the Properties section of your screen and drag down a new section on your screen.

Click hamburger icon and choose "UV Editor" from menu

Drag new section/window
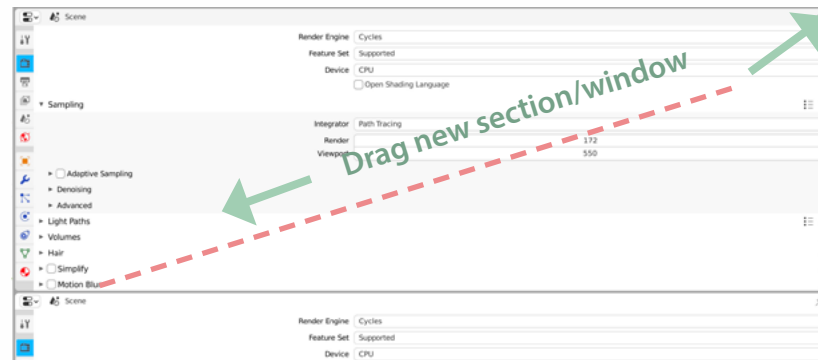
• In the upper left corner of this new section, click the hamburger icon and choose **UV Editor** from that drop down menu. Now you should be able to see your UV map of your mesh laid out. The last thing you need to is create a new image texture for Blender to bake all of your texture and lighting to later on when it is time for that step. At the top of the UV Editor section, choose the menu **Image >> New** and name the UV map whatever you like. In my case, I named my first one Metal Parts for the metal rack of my log holder (for my logs, I named the image texture "Logs").

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Now it is time to create the materials that will be applied to the mesh in the texturing process.

• The first thing to do is go to the **Materials tab** in the properties window (make sure you are in Edit mode for this).
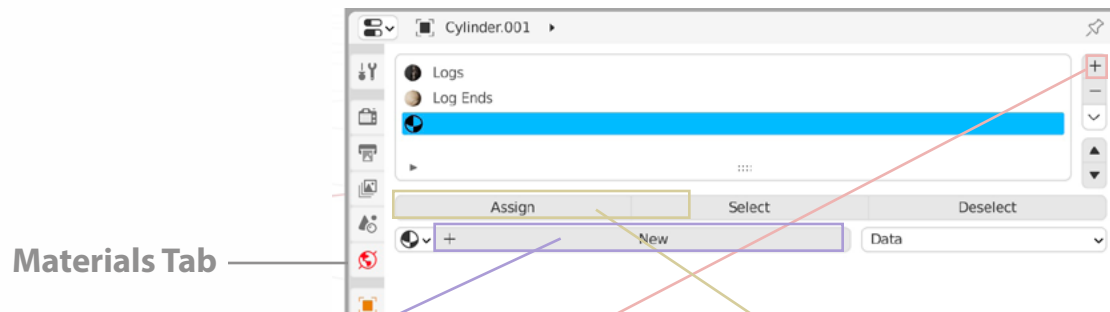
Materials Tab

• On the right side of the panel, press the **+** sign to create a new Material slot

• Press the **New** Button and name your new **Material**. I will be creating 3 materials for my object. The first I will call Metal Parts, the second will be Logs, and the third will be Log Ends.

• Now Assign the mesh faces to these new materials. To do this, go into **face select mode** at the top left of your screen and select the faces of your mesh that you wish to Assign to the first Material you created. In my case, I selected the log holder first.

• Once the faces are selected, go to the first Material slot and make sure it is selected, then press the **Assign** button. **This step is very important** - if you don't press the **Assign** button, the textures on your mesh won't display properly on the mesh faces in SL. (If you only have one material for your object, you can stop here). Repeat these steps for additional Materials.

*Note: you can select and deselect the faces of your mesh which are assigned to materials easily by selecting the material you want and pressing the **Select** or **Deselect** buttons at the bottom of the materials window.

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Now that our mesh is prepared for the texturing process, it is time to install the **HDRI** environment texture we downloaded.

• Go to the **World Tab** and where you see **Color**, click the yellow dot and choose **Environment Texture**

* To be able to see the HDRI, you have to go to the top right of your screen and enable Render View in Viewport Shading.
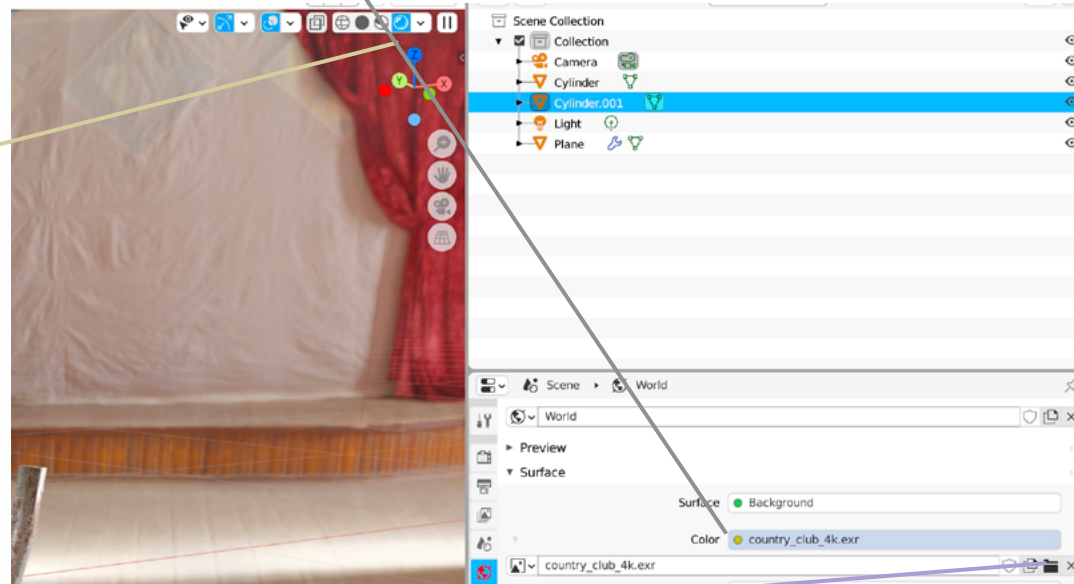
* Note: If you ever see a pink background or object in your scene, that means that some file that you uploaded into blender is missing on its source, which would be your computer. For example, if your background is pink, check that you didn't move the HDRI or one of your PBR files to another folder on your computer.

• Now click the **Open** button and choose the HDRI file that you downloaded
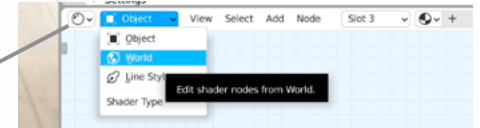
• If you would like to edit the positioning or anything else of the HDRI, in the **UV Editor**, click the left Hamburger and choose **Shader Editor**. In the dropdown menu where it says **Object**, choose **World**. Here you can add nodes to the HDRI texture itself and that won't affect any of your other Materials or UVs in the scene. To rotate or scale the HDRI texture, press **SHIFT** + **A** to add a node. Go to **Vector** >> **Mapping** and plug this in on the left side of the HDRI image texture node. Then press **SHIFT** + **A** and go to **Input** >> **Texture Coordinate**, plug this node in from **Object** into **Vector** on the left side of the Mapping node. Modify any of the values you want - rotation, scale, etc. **Click here to see an image of this.**
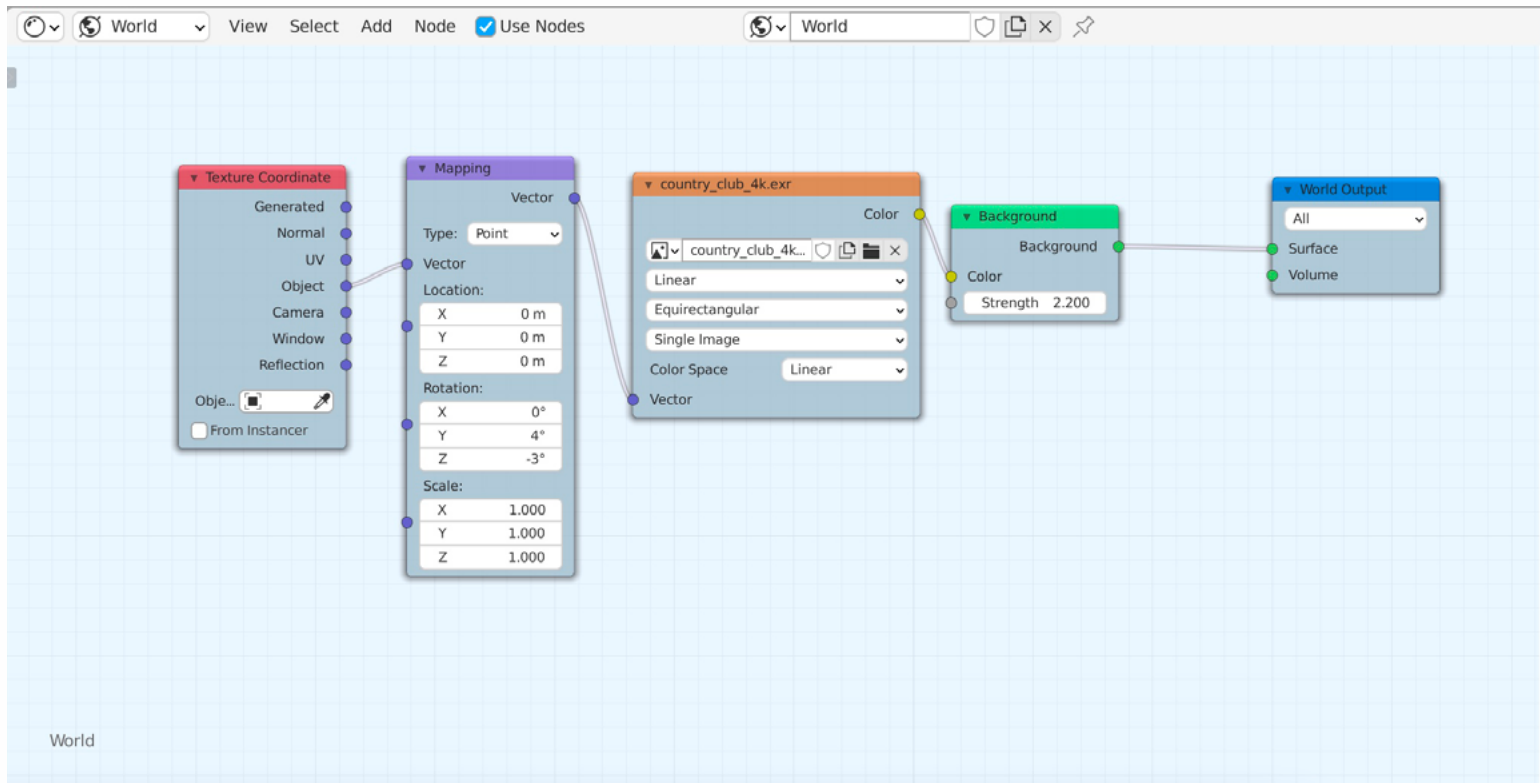
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Now it is time to setup our PBR material by plugging in the maps we downloaded earlier.

• To start setting up your PBR material, click the hamburger under Properties section and choose **Shader Editor** so that you can start working with Nodes. If you don't see the ability to work with Nodes, go to the **Render tab** to check that you are in Cycles and not Eevee

Shader Editor
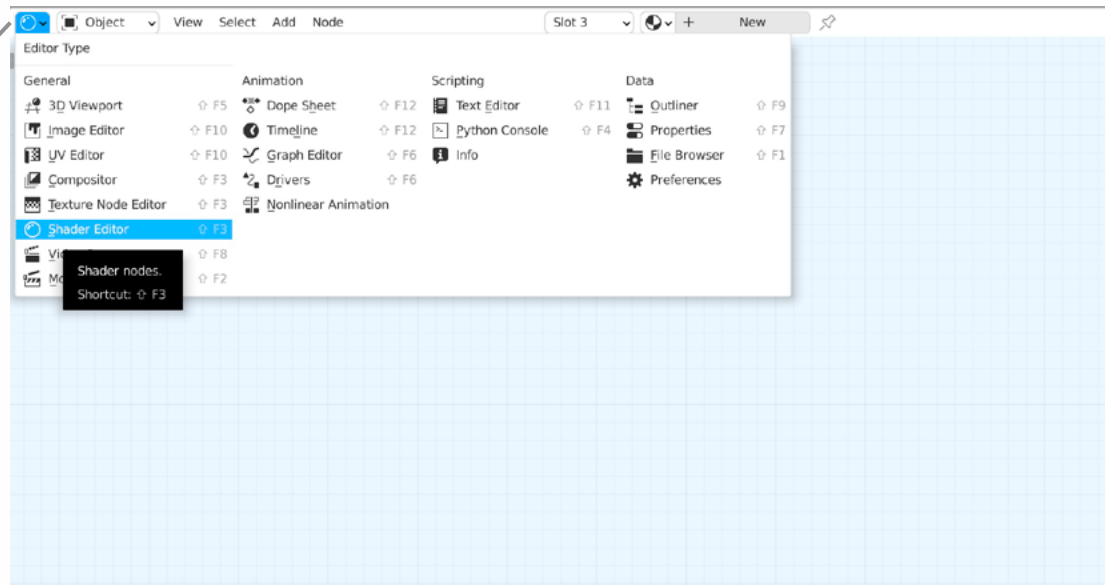
• Now, there are many ways you can setup different nodes to achieve a certain look or effect for your material, but this is just the basic way that I have been doing it.

• In Shader Editor, you should see a few basic nodes and you can leave those there. To zoom into the editor, hold CTRL + Scroll with Middle Mouse Wheel (Or however you zoom into the viewport)

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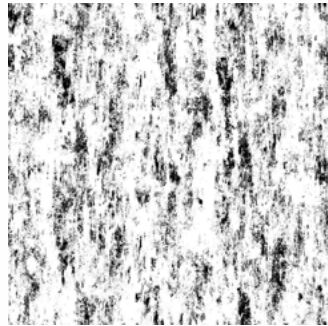
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• If you go back to the folder where you extracted the PBR files you downloaded, you will notice that there are about 4 or 5 files each with different names. Let's break these down.
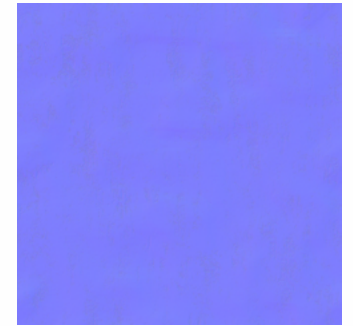

Diffuse/Albedo/Color map shows the base color and pattern of the object and will look more like a normal image of the texture you want.

Metallic/Metalness is like a specular map that tells the shader what part of the texture should be shiny or reflective like metal or not. It is a black and white image where black pixels are not metal and white pixels are metal.
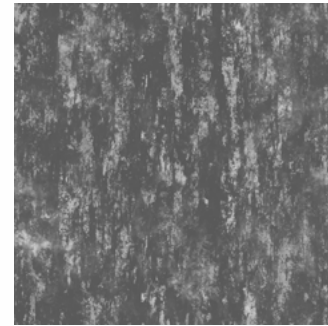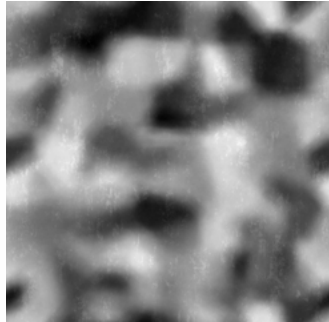
Roughness is a map where white will make the material appear to be more rough while black will make it more glossy.

Normal map is a bump map that gives the illusion of things like bumps, dents, grooves, scratches, etc.

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subsurface modifier in order to have more detail for the map to work with to give the effect of this kind of detail.

Height map is similar to Normal map and gives height or elevation to the mesh. I think that with this one, it can literally displace vertices of your mesh by pushing black areas back and extruding white areas of mesh on the map. I think that this one is more complex and would require you to work with a lot more subdivisions like with a

Ambient Occlusion map which is a grayscale shadows map that says light areas receive more lighting and darker areas receive less. This is the same concept as the AO maps you might know of from mesh template kits in SL.

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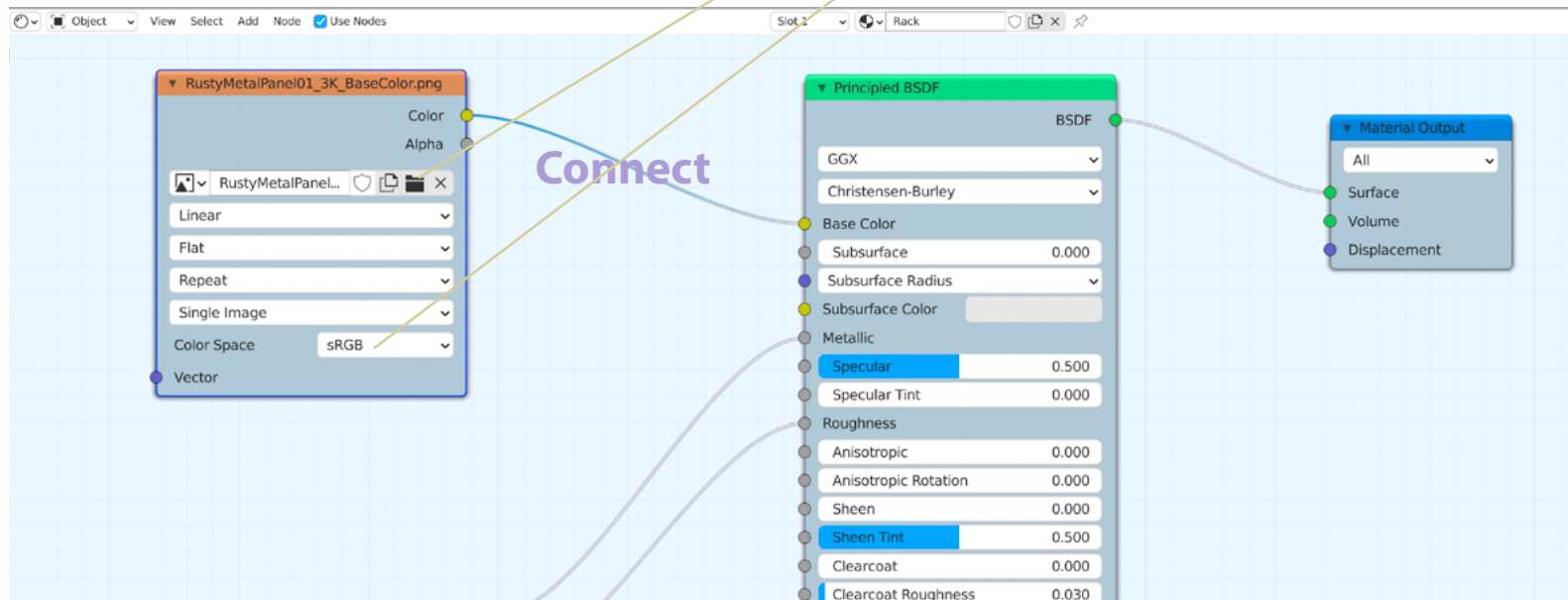| Step 1: Download Reseources | Step 2: Setup Blender Scene | Step 3: Model Object | Step 4: Unwrap Object | Step 5: Assign Material(s) | Step 6: Install HDRI |

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Now that we have a basic understanding of the different types of maps you might get with a PBR download, let's start setting up nodes for each of these maps so that we can create the material we are looking for.

• Add your **Base Color/Albedo/Diffuse Map**:

Press **SHIFT + A** to add a **Texture** > **Image Texture** node. Click the **Open** button to browse the computer for the Albedo/color/diffuse Map that you downloaded with your PBR package. Set **Color Space** to **sRGB**. Click and hold on the yellow **Color** dot to drag over a connection to the corresponding yellow **Base Color** dot on the **Principle BSDF** node.
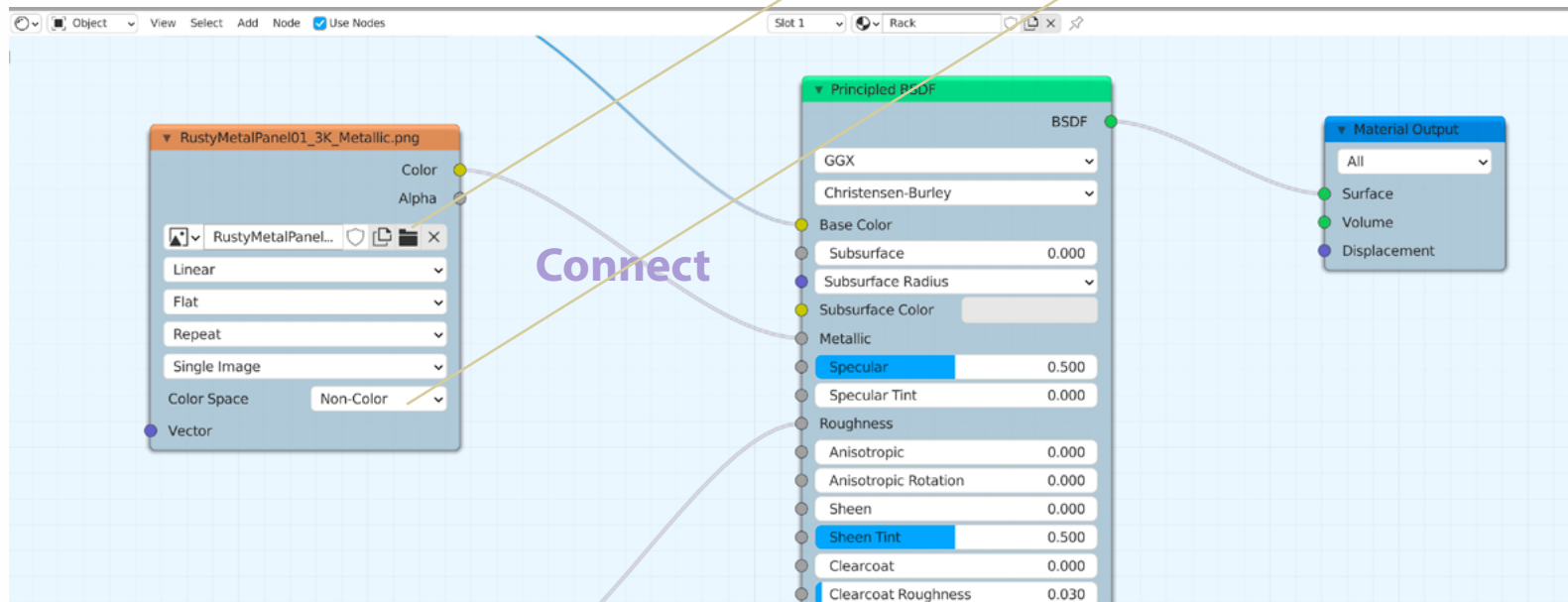
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• Add your **Base Color/Albedo/Diffuse Map**:

Next press **SHIFT** + **A** to add a new **Texture** >> **Image Texture** and click the **Open** button to select the **Metallic or Metalness** map if you have one in your PBR package. If you don't have one, skip this step. Set **Color Space** to **Non-Color**. Click and hold on the yellow **Color** dot to drag over a connection to the corresponding gray **Metallic** dot on the **Principle BSDF** node.

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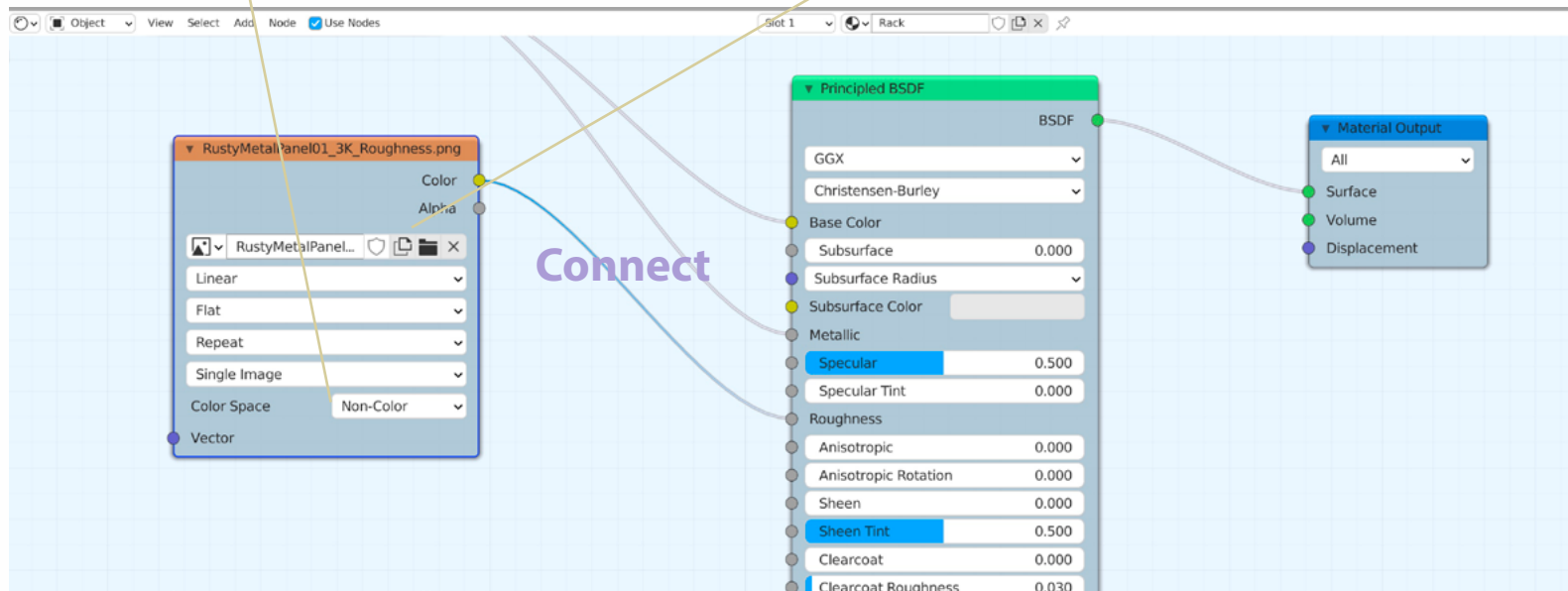| Step 1: Download Reseources | Step 2: Setup Blender Scene | Step 3: Model Object | Step 4: Unwrap Object | Step 5: Assign Material(s) | Step 6: Install HDRI |

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• If you have a specular map, go ahead and install it the same way as you have the metallic map and plug into the specular dot on the BSDF node. If you don't have one, add the Roughness map next.

Press **SHIFT** + **A** to add a new **Texture** >> **Image Texture** node. Press the **Open** button to select your **Roughness** map. Set **Color Space** to **Non-Color**. Click and hold on the yellow **Color** dot to drag over a connection to the corresponding gray **Roughness** dot on the **Principle BSDF** node.
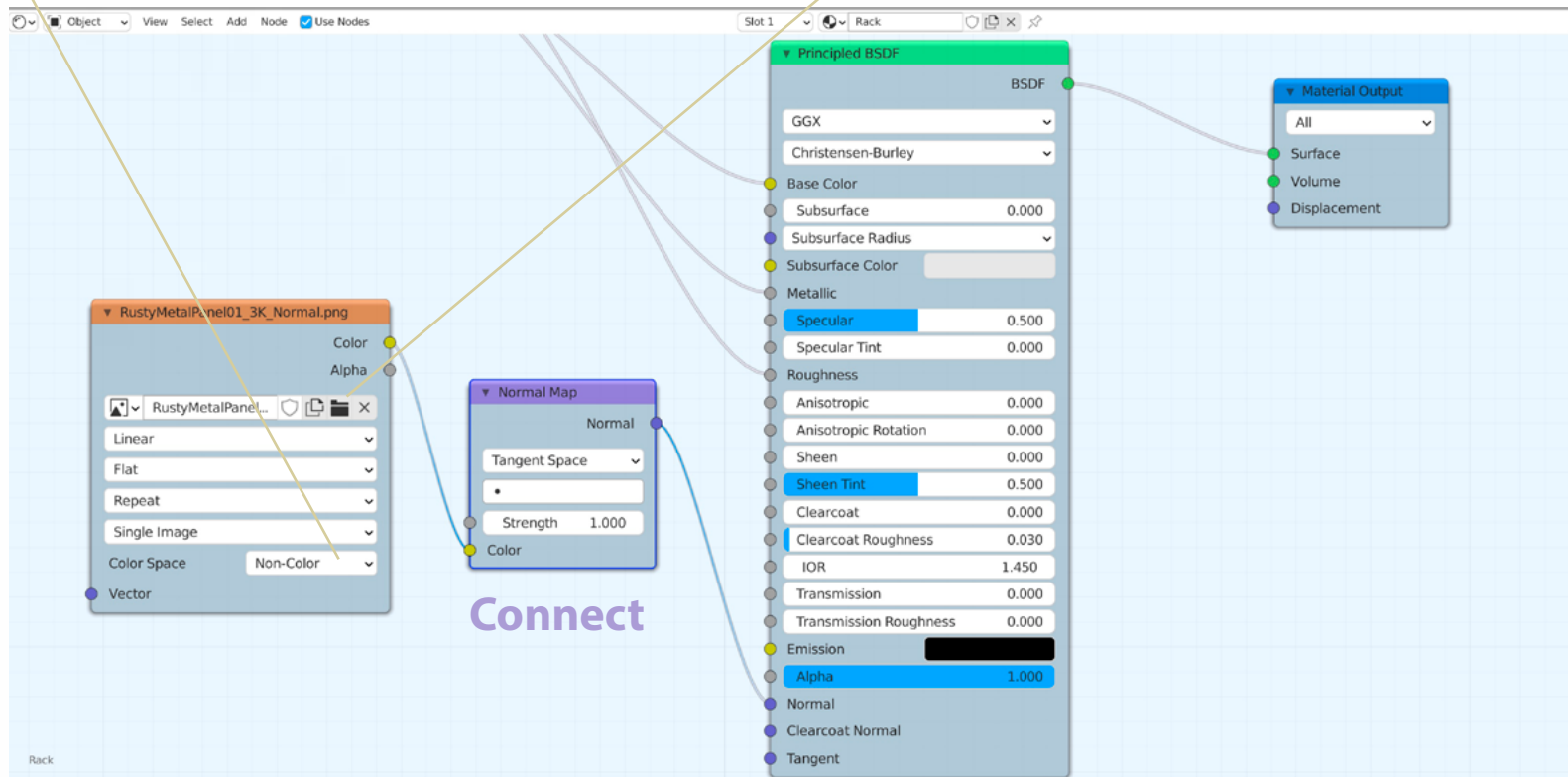
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• Add your **Normal** Map:

Press **SHIFT** + **A** to add a new **Texture** >> **Image Texture** node. Press the **Open** button to select your **Normal** map. Set **Color Space** to **Non-Color**. Click and hold on the yellow **Color** dot to drag over a connection to the corresponding gray **Normal** dot on the **Principle BSDF** node. Next, **SHIFT** + **A** and add a **Vector** >> **Normal Map** and drop it right onto the connection between the **Normal** node and the **Principle BSDF** Node.
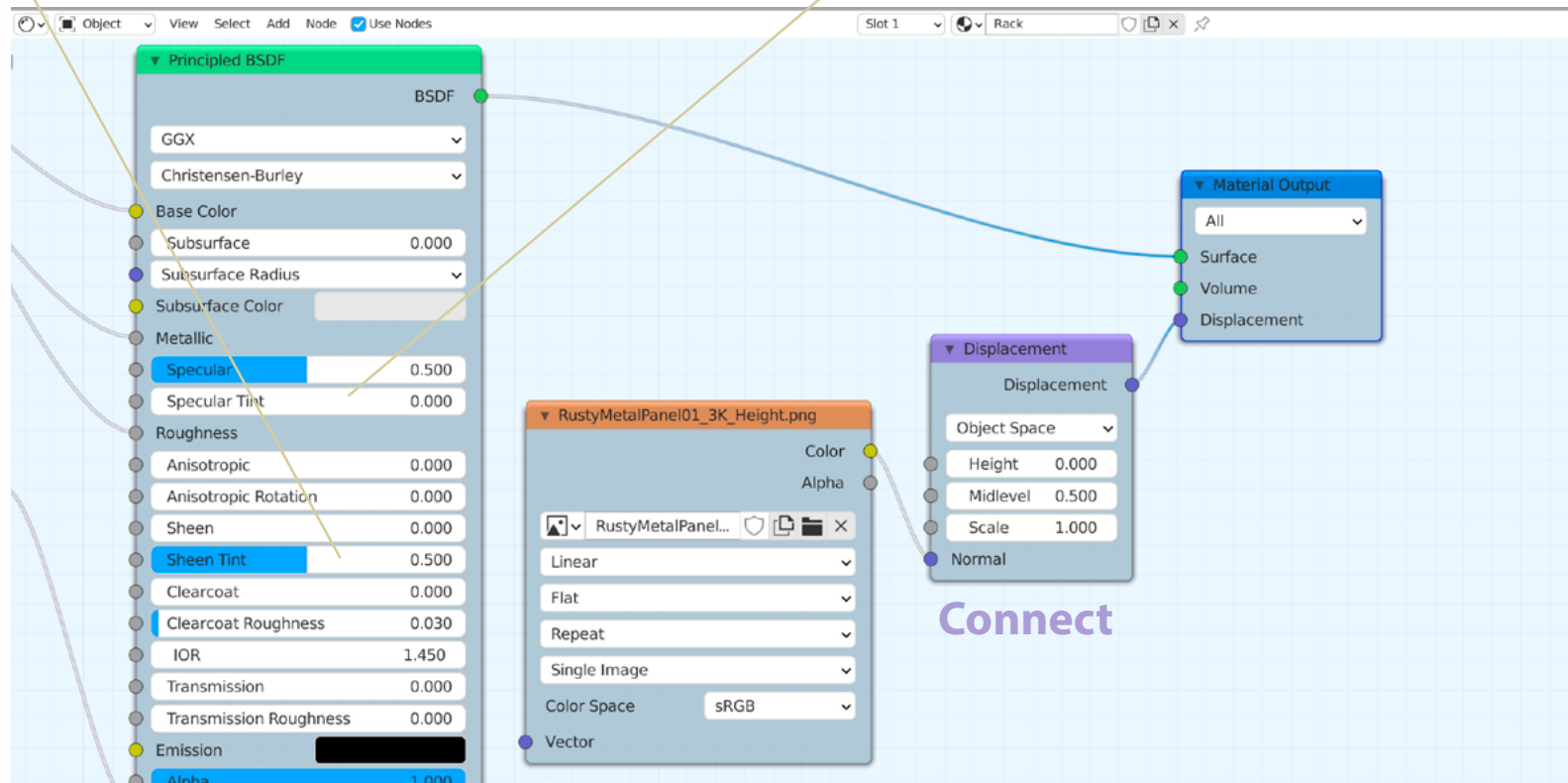

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• If you have a **Height** map or want to work with one:

Press **SHIFT** + **A** to add a new **Texture** >> **Image Texture** node. Press the **Open** button to select your **Height** map. Set **Color Space** to **Non-Color**. Click, hold and drag a connection from the **Color** dot to **Displacement** dot on the **Material Output**. Next, press **SHIFT** + **A** to add a **Vector** >> **Displacement** node and drop it onto the new connection.
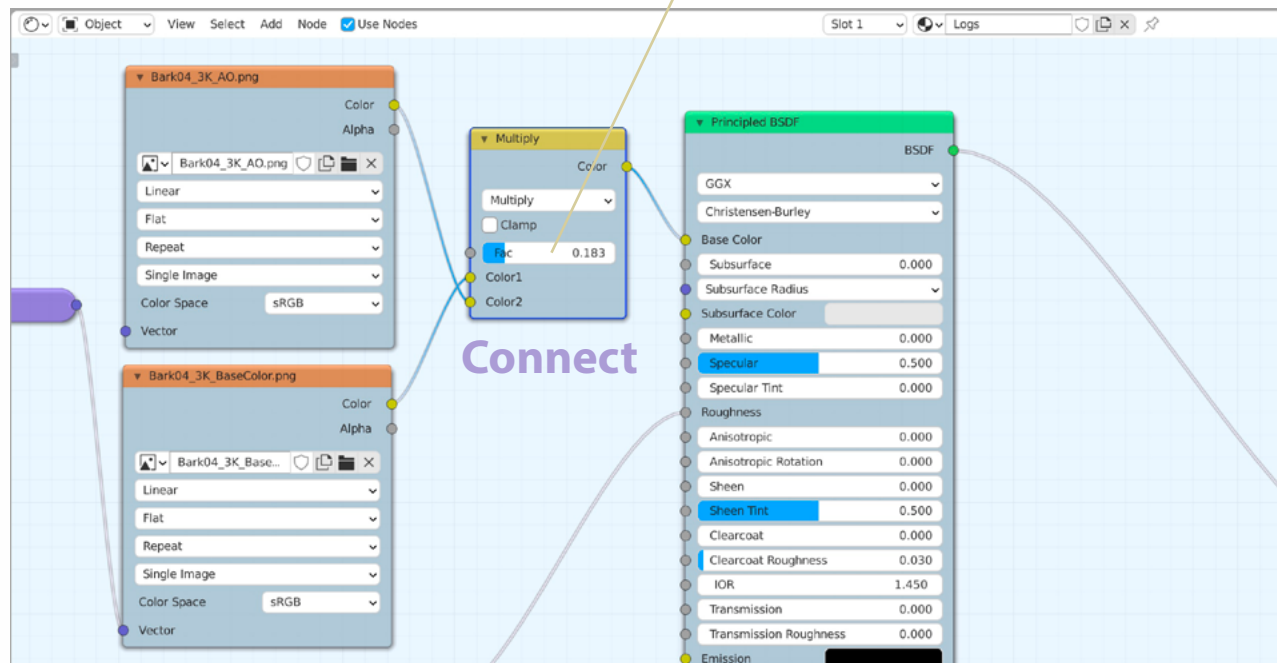
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• If you have an **Ambient Occlusion** map or want to work with one:

Press **SHIFT** + **A** to add a new **Texture** >> **Image Texture** node. Place this one above your Albedo/Color map. Press the Open button to select your **AO Map**. Set **Color Space** to **sRGB**. Next Press **SHIFT** + **A** to add a **Color** >> **MixRGB** node. Drop it on top of the connection between the **Albedo/Color** map and the **Principle BSDF Base Color** dot. This will place Albedo in **Color 1.** Now click, hold and drag a connection from the yellow Color dot on the AO node to the Color 2 dot on the MixRGB **node.** Set the **MixRGB** node to **Multiply** and adjust the **Factor** scale to increase or decrease the effect.
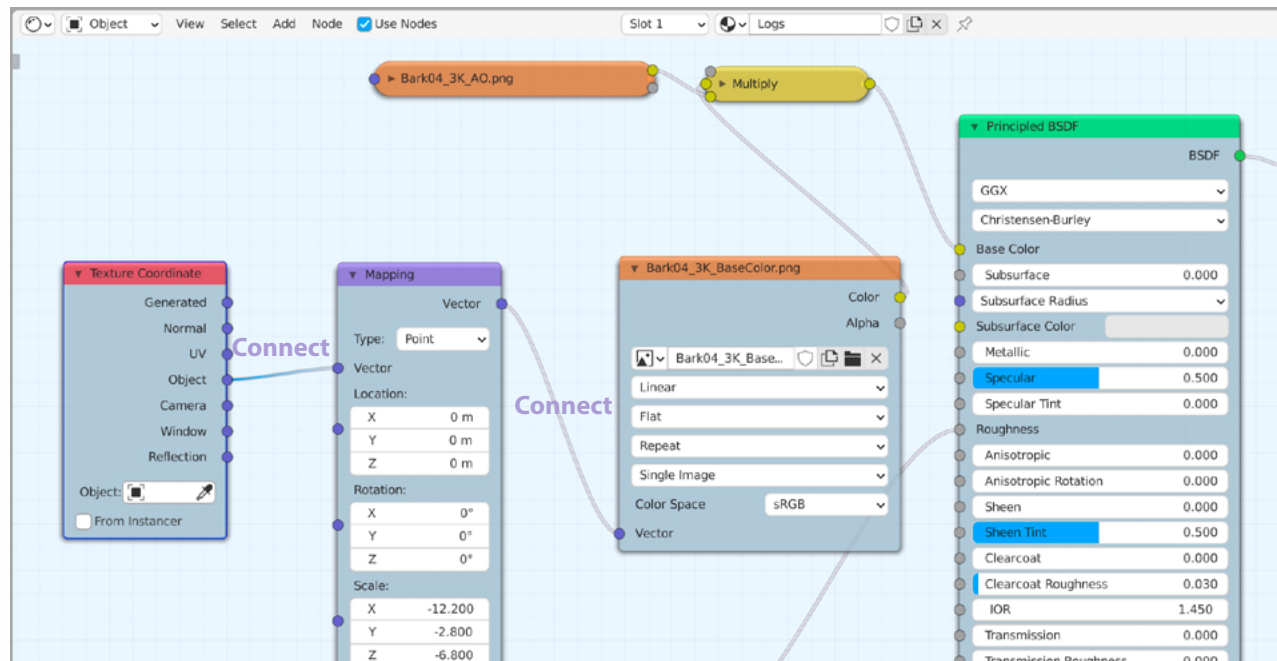
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• If you want to adjust the scale, rotation or the position of your Albedo/Color/Diffuse map, or any of the maps:

Press **SHIFT** + **A** to add a **Vector** >> **Mapping** Node and connect this from **Vector** to **Vector** on the **Color Map** node. Press **SHIFT** + **A** to add an **Input** >> **Texture Coordinate** node and connect **UV** to **Vector** on the **Mapping** Node. You can then use Scale, Rotate or any of the other settings to adjust how your texture repeats on your mesh

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• If you feel that you are not getting enough lighting from the HDRI environment, you can add some Direct Lighting such as lamps to your scene.

Press **SHIFT** + **A** and choose **Lamp** and pick a type of light to rez into your scene. Once your light is rezzed, go to the properties section and to the **Object Data Properties** tab which will give you settings you can adjust for your light. You can also change the type of lamp to another in this tab.

Object Data Properties
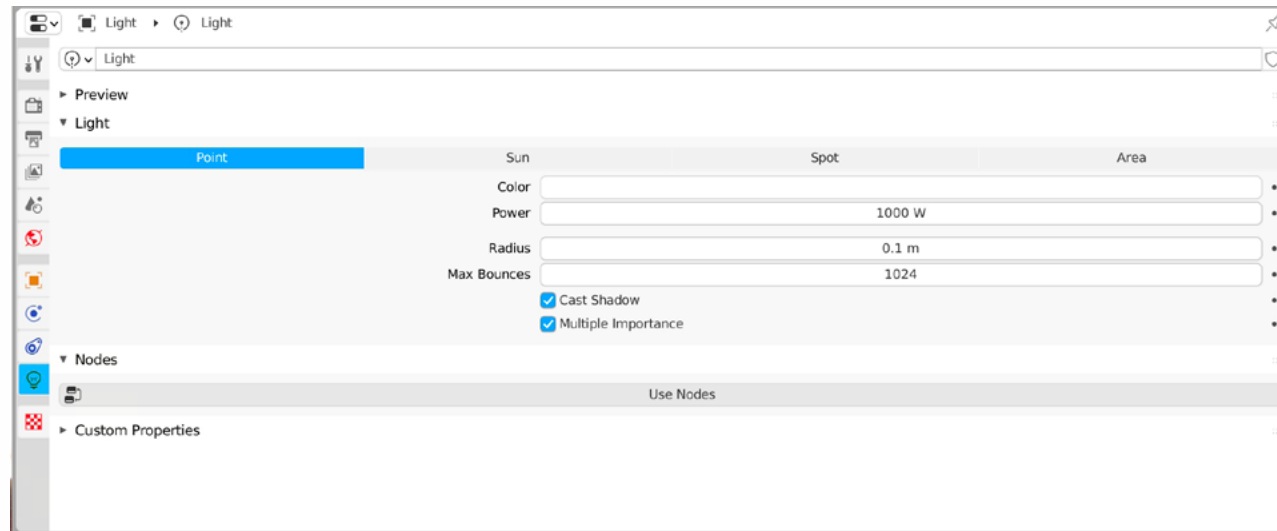
To move the lamp you can go to the viewport and zoom out if you need to in order to see the round lamp(s). Go into Object mode (TAB key) and click to select the lamp. Move it like you would your mesh object, G for Grab

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• Once you are happy with your lighting and materials, it is time to bake your UV maps to upload into SL or to bring into Photoshop or Gimp to edit.

Before baking, make sure that you have made a new image for each UV map you wish to bake out.
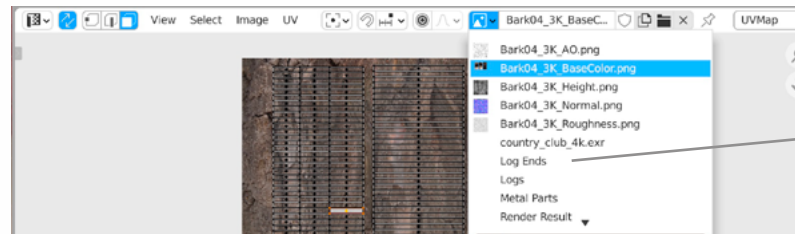
Image textures for parts of the mesh to bake

Select the object you want to bake first. In my case, I chose the logs. In the UV Editor go to the hamburger in the upper left corner to go to Shader Editor.

Shader Editor
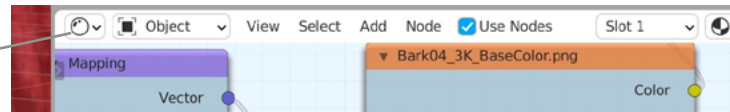
Press **SHIFT** + **A** to add a new **Texture** >> **Image Texture** node for your the new image you will use as your UV map. You can pull this node over to the side, but make sure you have it selected right before you bake.
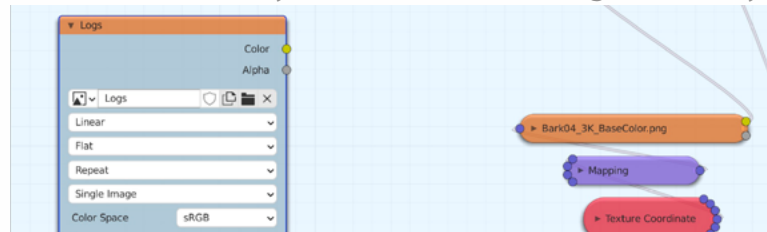
Go to the Render tab 🖼 and scroll all the way down until you see **Bake**. For **Bake Type**, you can choose if you want to do a combined map which will include all textures, lighting and any other properties you added to your materials. You could also choose to bake any one of these individually from the drop down menu. I chose **Combined**. Next, choose if you would like to bake your **indirect lighting** (HDRI), **direct lighting** (Lamps), or both and choose **Bake**.

BUILDING
REALISTIC
TEXTURES
IN BLENDER

Tutorial by irrie Ember • Questions or comments? Contact me at **irrie.net** or in-world

Step 7:
Setup PBR Material

Step 8:
Add Lighting

Step 9:
Bake & Export Texture

Step 10:
Edit Texture in PS

Step 11:
Upload to SL

Step 1:
Download Reseources

Step 2:
Setup Blender Scene

Step 3:
Model Object

Step 4:
Unwrap Object

Step 5:
Assign Material(s)

Step 6:
Install HDRI

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• If you want to adjust the resolution of your Bake map, go to the render tab and at the top, adjust the Render value. The higher the number, the more clear your bake will come out. If you want to see a clearer preview while in Render View, increase the value of Viewport. Keep in mind that the higher these numbers are, the more impact this will have on your computer performance. Higher Render values will take longer to bake and things might get laggy. I like to do around 250 for Render View, but you can choose whichever value that works best for you.
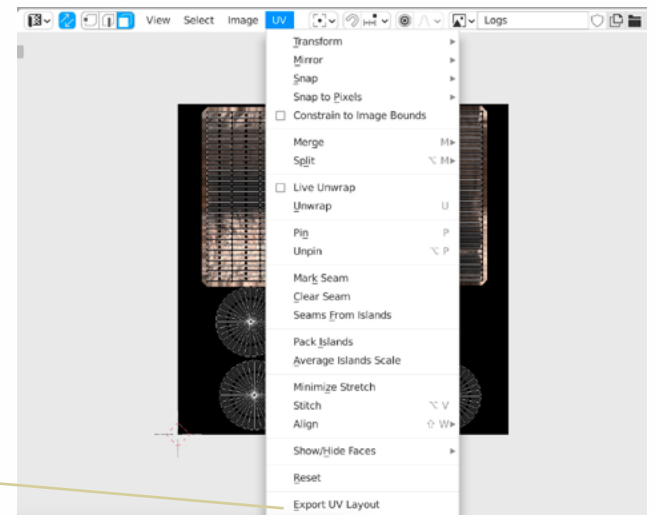
Render Tab
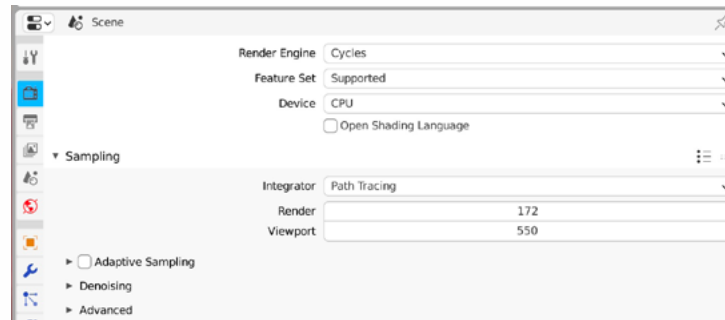
Once you have the Bake map that you are happy with, in **UV Editor** go to **Image** >> **Save As** and save your baked map onto your computer.

UV Editor
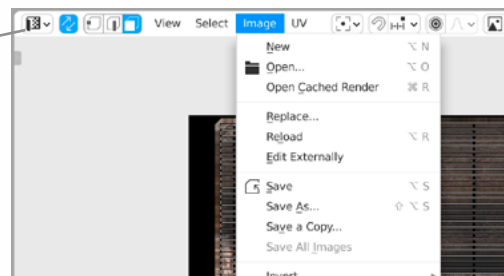
If you plan on editing this map in another program, I would suggest exploring the UV layout along with the bake map. Go into Edit Mode and in the UV Editor, go to UV >> Export UV Layout and this will save all of these UV lines from your UV Map onto an image.

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BUILDING
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Step 7: Setup PBR Material	Step 8: Add Lighting	Step 9: Bake & Export Texture	Step 10: Edit Texture in PS	Step 11: Upload to SL

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• For this example, I am using Photoshop. Go to File >> Open and choose your bake map.

Drag the layer over the New Layer button near the bottom to make a backup copy of this layer before we do editing. You can then turn this layer off by clicking the little eye icon on the left side of the layer.

Drag layer over this button to make a duplicate.
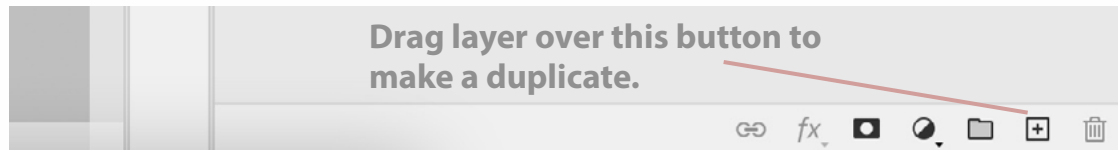
Go to **File** >> **Open** and choose your **UV Layout** file. Press **CTRL/CMD** + **A** to select all, then **C** to **copy**. Go back to your bake map file and at the top choose **Edit** >> **Paste Special** >> **Paste in Place** in order to place your copy of the UV layout in the right position over your bake map as they would appear to be together in Blender. Label this layer UV layout or whatever you want. Now you will have an overlay of the UV lines which can be helpful in knowing where to edit things on your bake map (**remember that before you save this bake map, turn off the UV Layout layer or the lines will be visible in your final map**)

You can now make any adjustments you want to your bake map and I recommend using **adjustment layers** for part of this so that you don't directly edit onto your bake map.

For example, to adjust the contrast of your bake map, click on the bake map layer, then click on the round black and white icon at the bottom of the layers panel to click Adjustment Layer and choose Levels.

Adjustment Layers

This will place any of the adjustments you make onto a layer above your bake map so that any changes you make can be easily deleted or hidden. Increase the levels to adjust contrast, or add a Hue/Saturation adjustment layer to adjust the color of your bake map. Save your revised bake map as the texture you will upload into SL.

BUILDING REALISTIC TEXTURES IN BLENDER

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• Now let's get everything uploaded to SL so that we can see how it all comes together
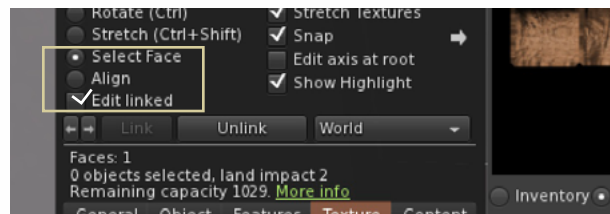
In SL, go to the top of your screen to Build >> Upload >> Model and upload your mesh. I won't get into the specifics of LOD or other settings in the mesh uploader, that will be in another tutorial.
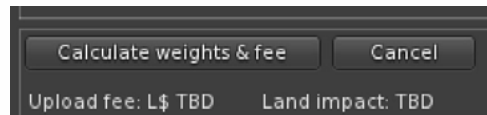
Before paying to upload your bake map, check to see how it looks on your mesh with Local Textures. Right click on your mesh, go to the Texture tab, click the Texture box and choose Local instead of Inventory. Browse for the bake map on your computer and then select it. Now you will see the texture on your mesh in SL.
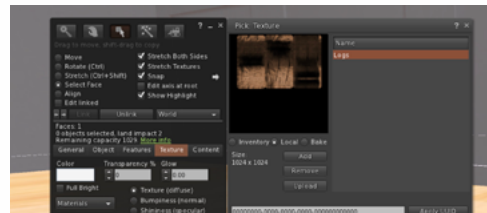
If you want to check multiple textures on one mesh object, as in my case, back in the Build/Edit menu, at the top choose the Select Face option, then select face to select the face you want to texture - or - at the top of Build menu enable "Edit Linked Parts" to be able to right-click the part of your mesh object link set that you want to apply texture to.

Once you are happy with your texture, go to the top of your screen and go to Build menu >> Upload >> Texture and choose your bake map and apply it to your mesh.