**A Simple Photogrammetry Rig for the Reliable Creation of 3D Artifact Models in the Field: Lithic Examples from the Early Upper Paleolithic Sequence of Les Cottés (France)**

*Instructions for automatically masking a black background in Agisoft PhotoScan*

This document provides step-by-step instructions on how to easily mask sets of images taken with a black background for the purpose of creating 3D models in Agisoft PhotoScan. This tutorial does not aim to be comprehensive or definitive. Rather it is meant to be used as a guide for beginners. The authors encourage readers to seek out additional resources to learn about additional masking options.

Method 1 uses background masking capabilities within Agisoft Photoscan itself. Method 2 creates alpha channels using Adobe Photoshop. This second method allows users somewhat more control of the exact extent of the generated image masks. Users may wish to try this second method if the application of the first method does not result in a mask with a clean edge around the target object.

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The following versions of the software listed below were utilized in creating these tutorials:

Adobe Photoshop CS6 Version 13.0.1 x64
Agisoft PhotoScan Professional Edition Version 1.1.5 build 2034 (64 bit)
Microsoft Paint Windows 8.1 Edition Version 6.3 Build 9600

## Step 1 – Option 1  Creating a black ‘background’ image in Adobe Photoshop

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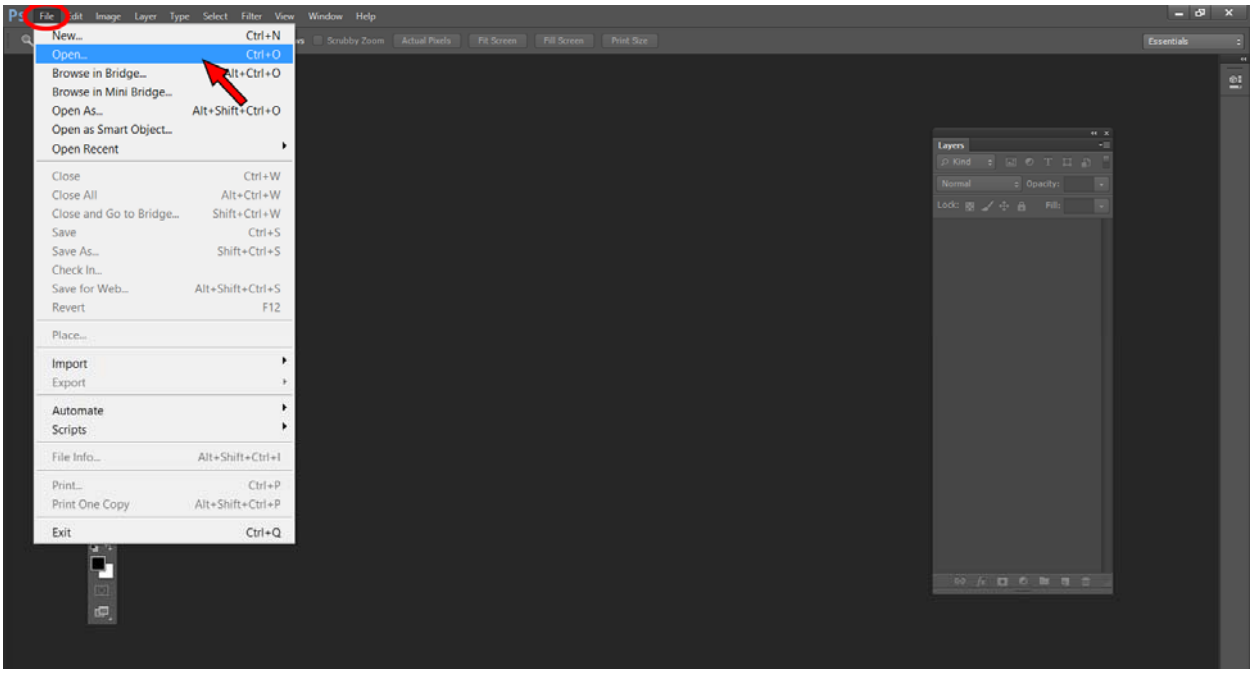
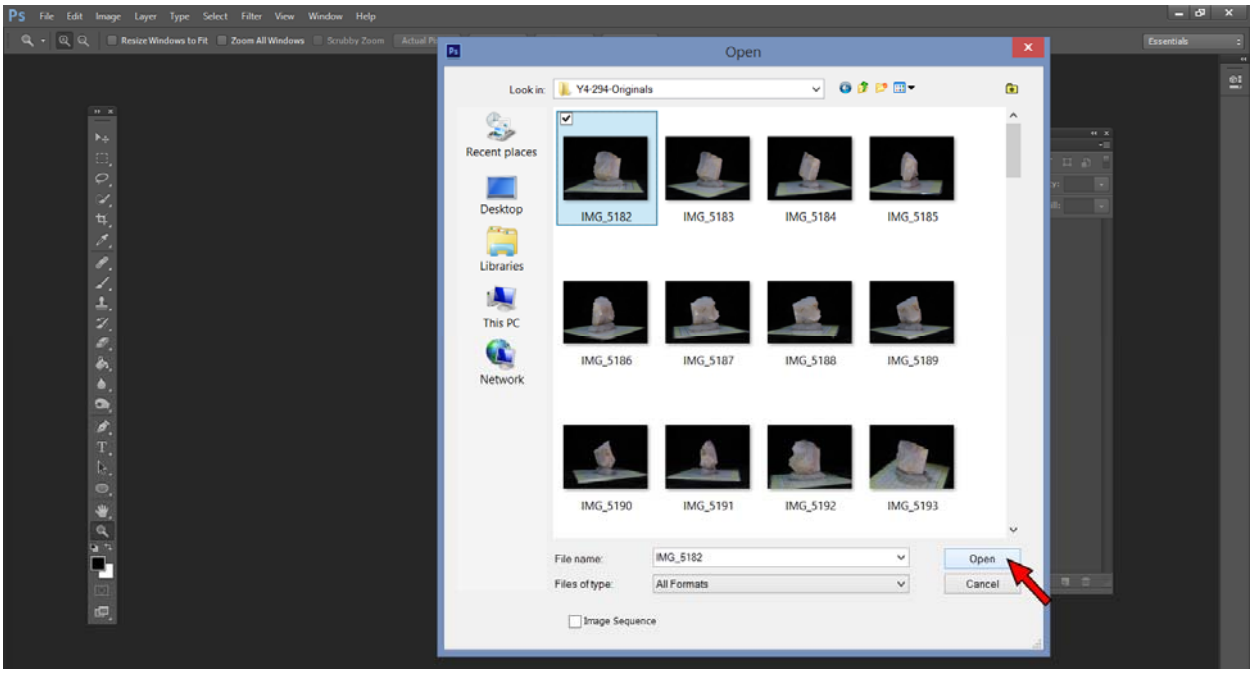
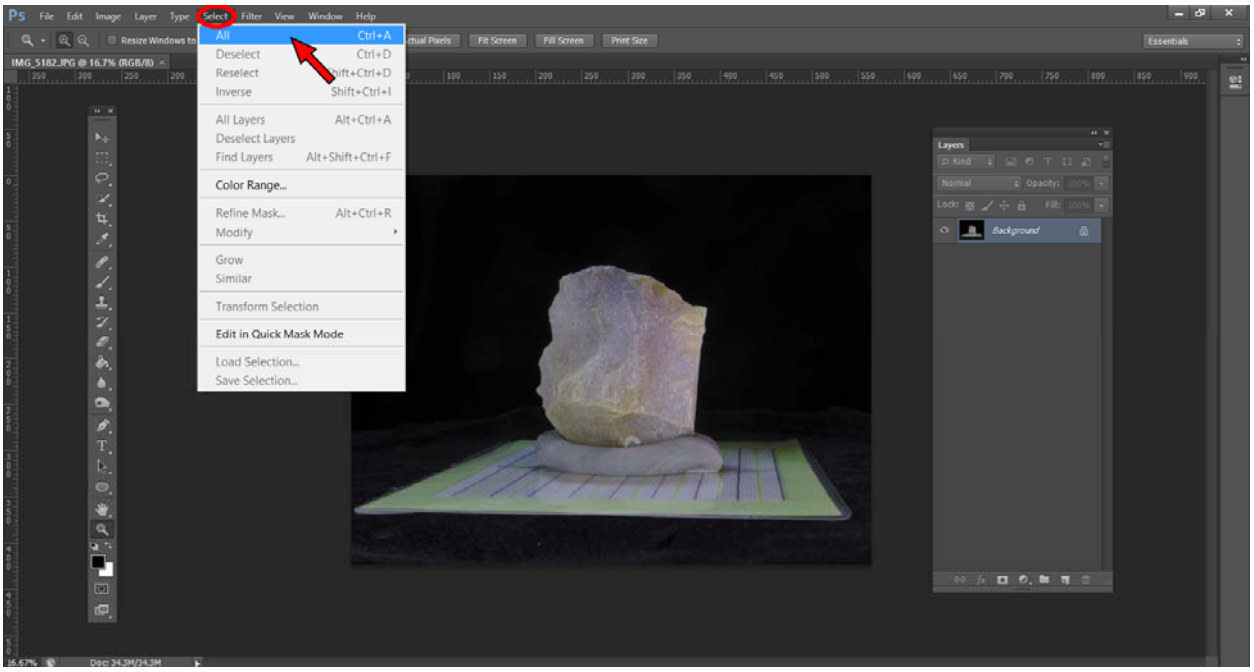
**1.** Open Adobe Photoshop. Click *File* → *Open*.



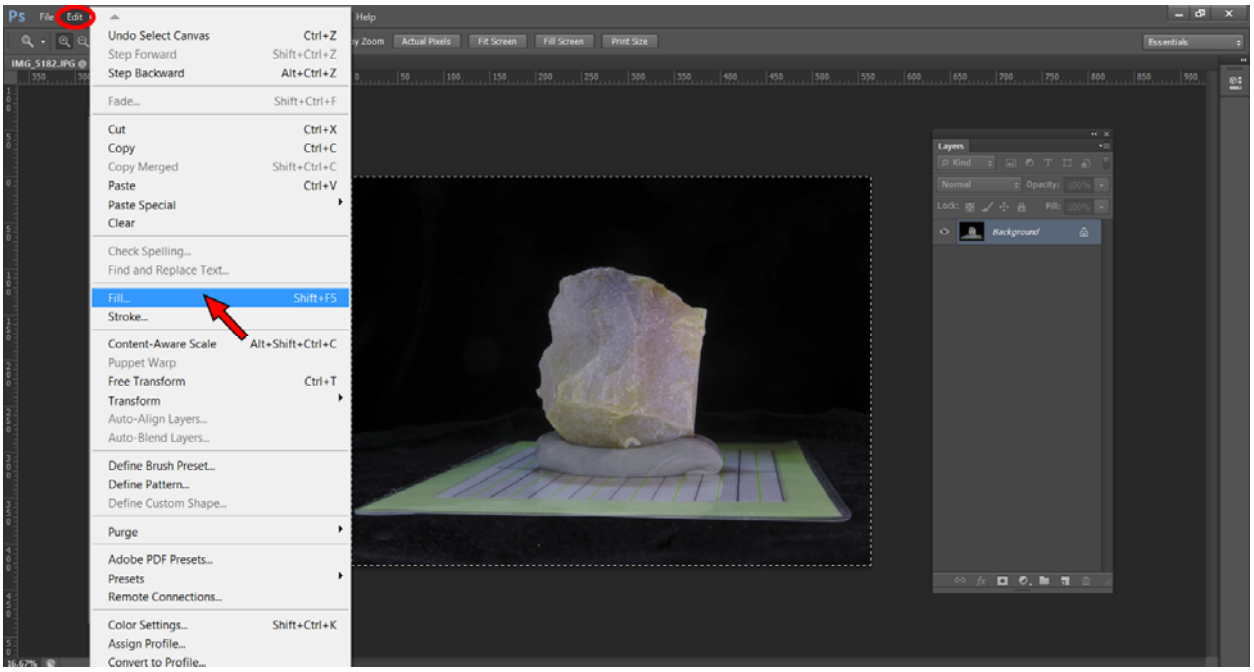

**2.** Navigate to the set of images you want to process. Select one of the images and click *Open*.



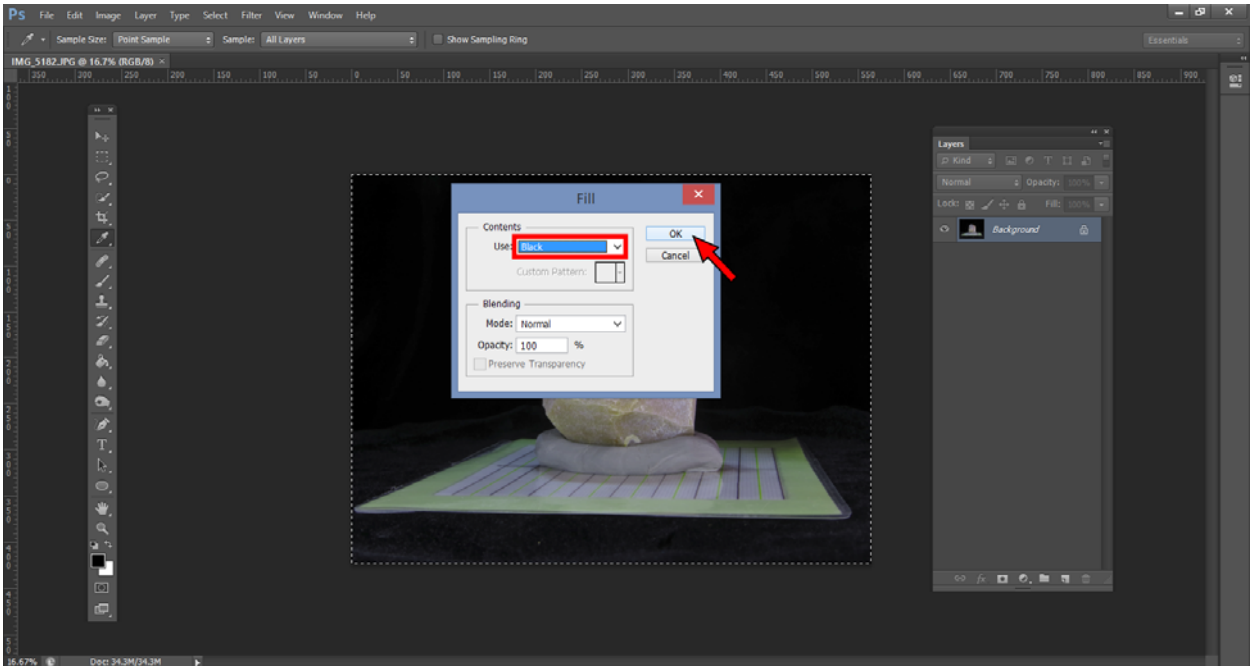
**3.** Click *Select* → *All*.



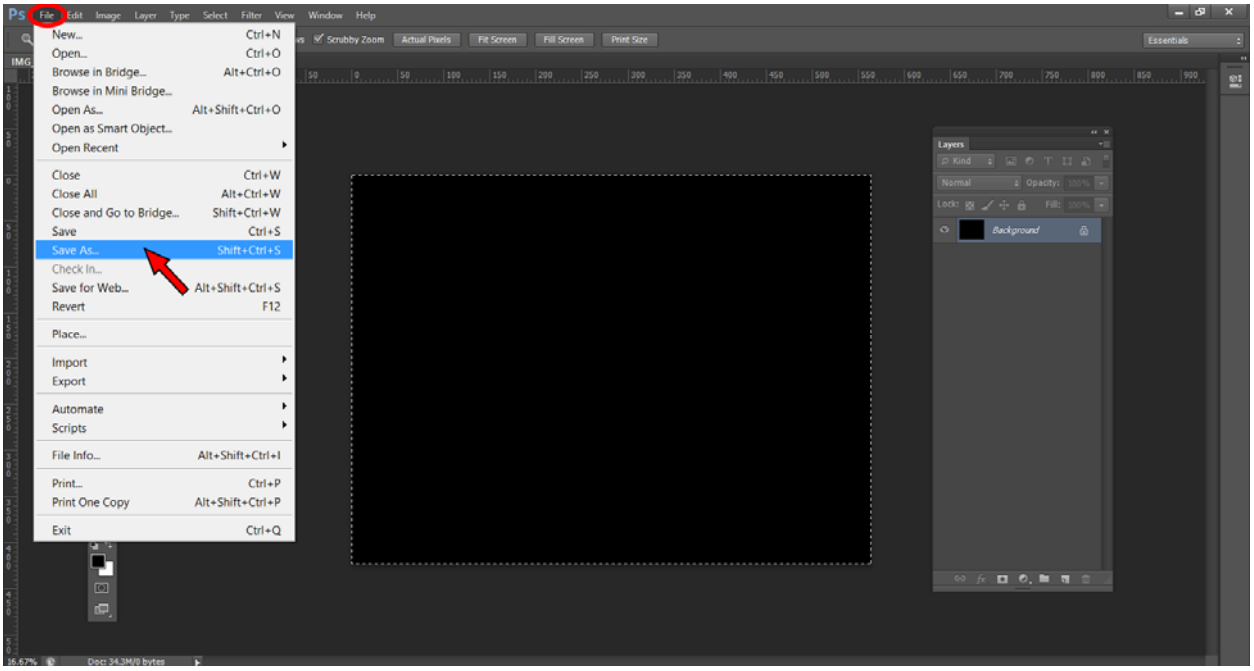

**4.** Click *Edit* → *Fill*.



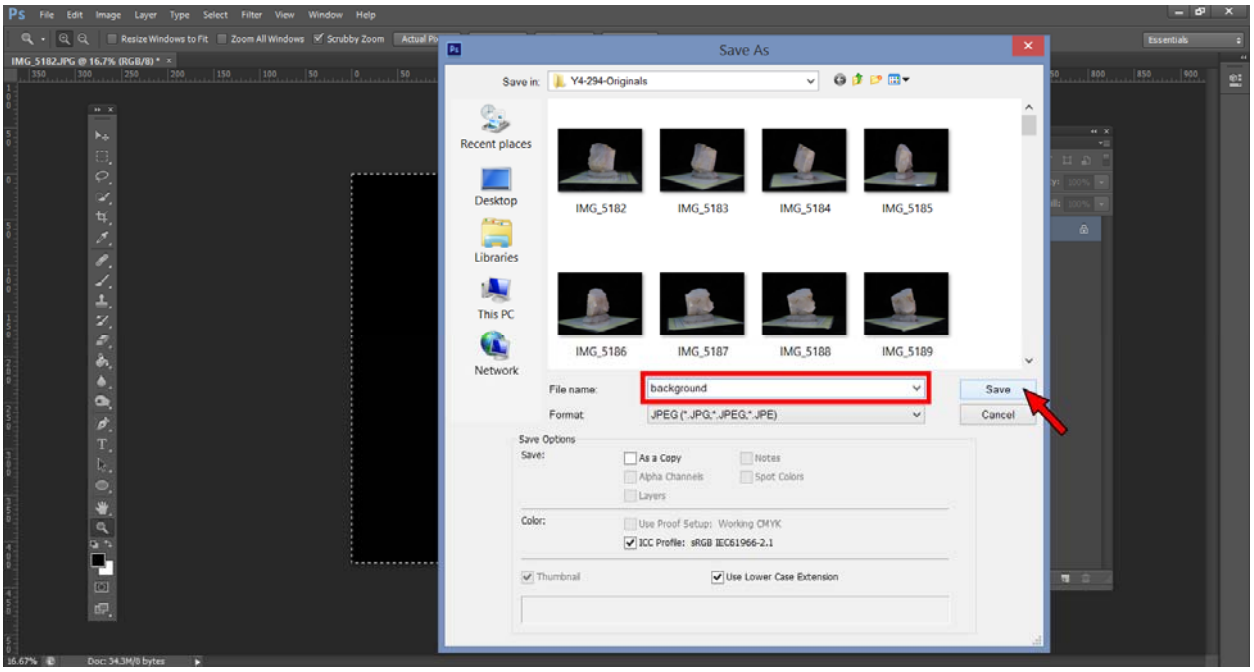
**5.** Set the contents to use *Black*. Click *OK*.



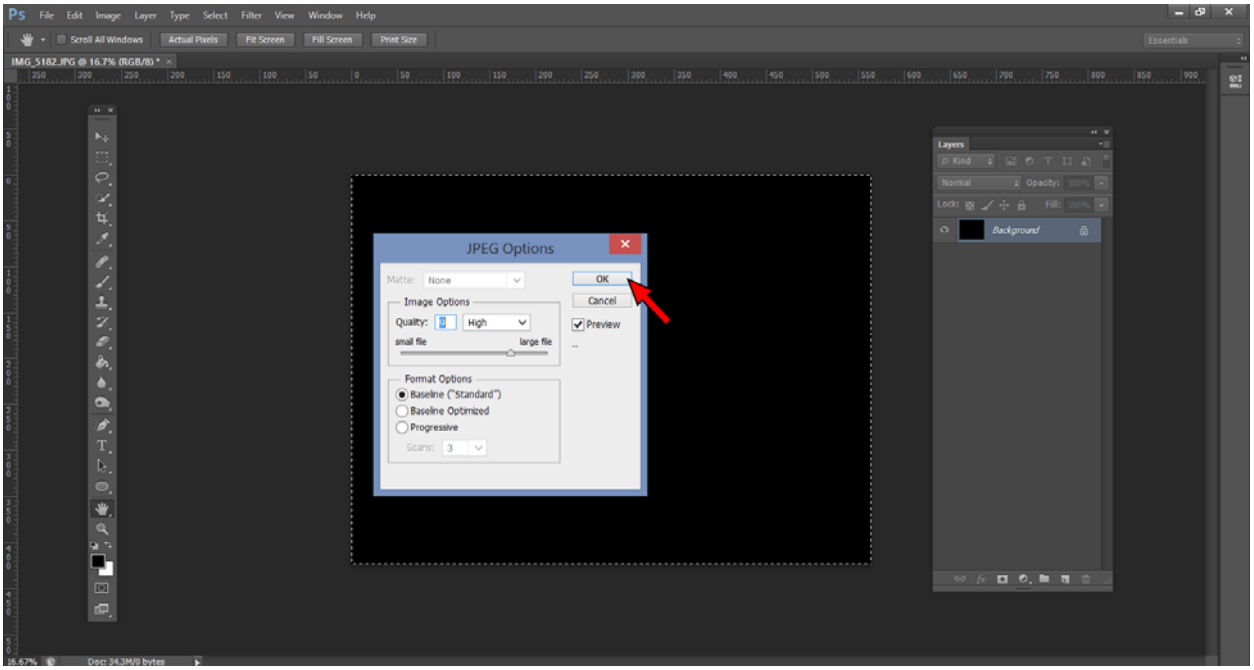

**6.** Now that the image is filled in, you can save it. Click *File* → *Save As*.



**7.** Choose a place to save this background image. Navigate to this folder. Set the file name as something easy to remember like “background.” Save the file as a JPEG.

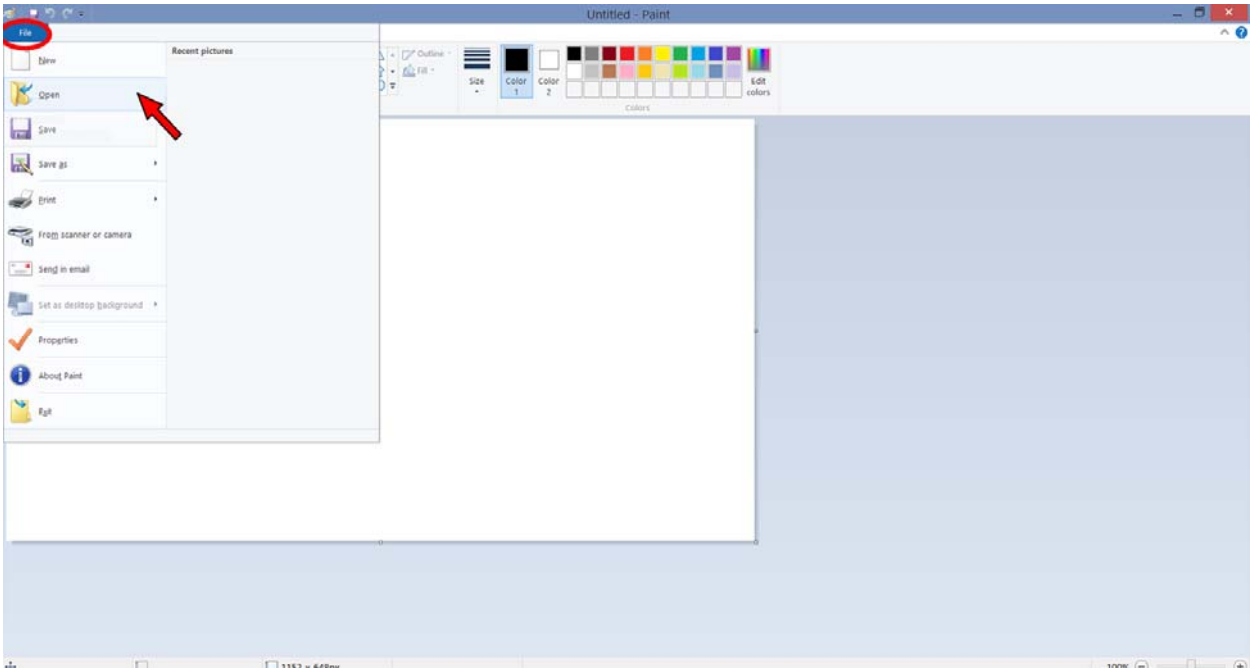



**8.** If prompted, at this step you may accept the default settings that Photoshop provides.

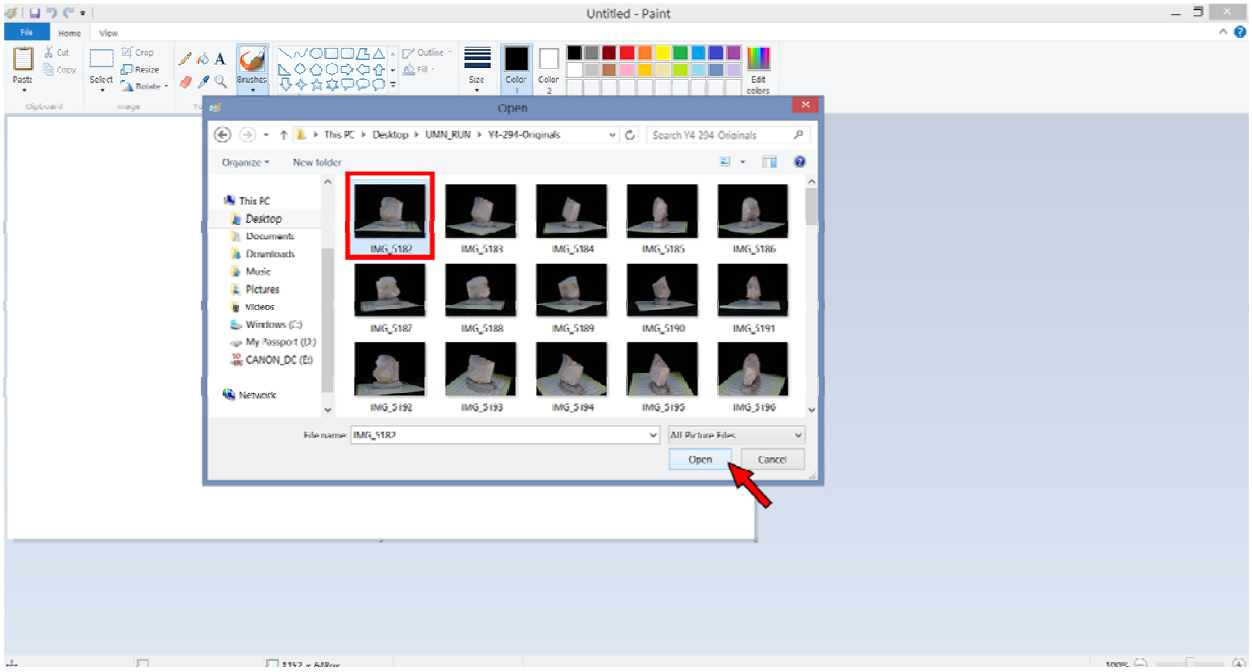


## Step 1 – Option 2  Creating a black ‘background’ image in Microsoft Paint

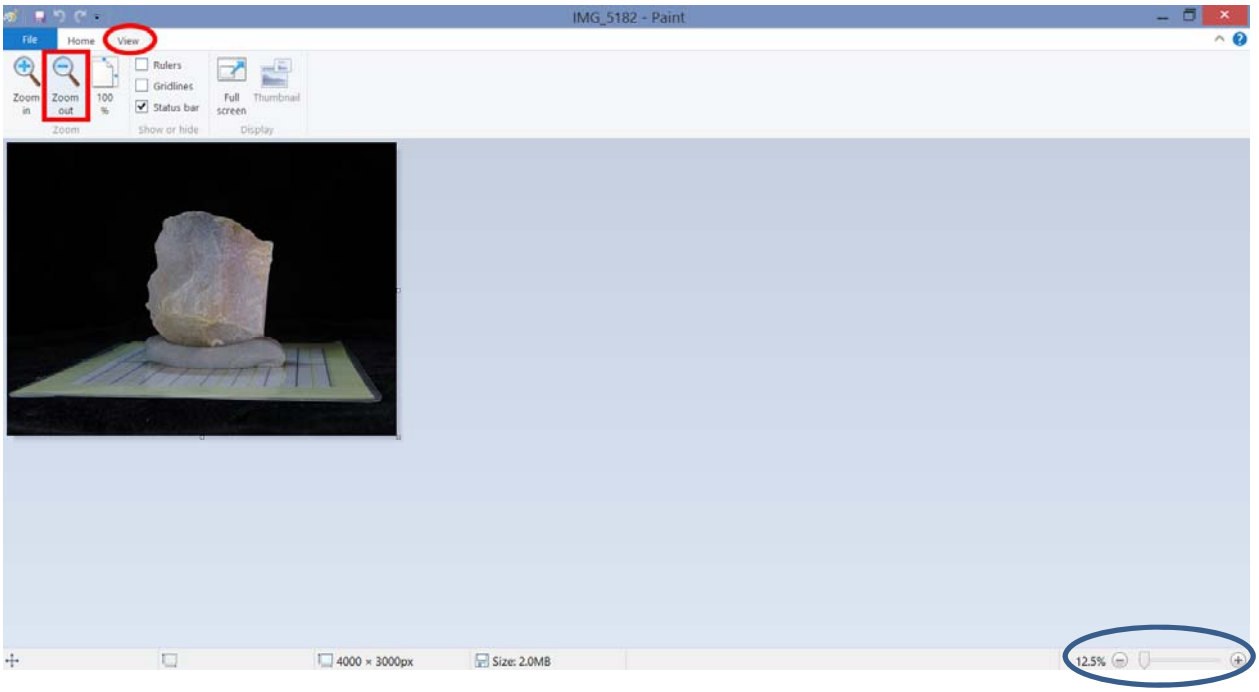
**1.** Open Microsoft Paint. Click *File* → *Open*.



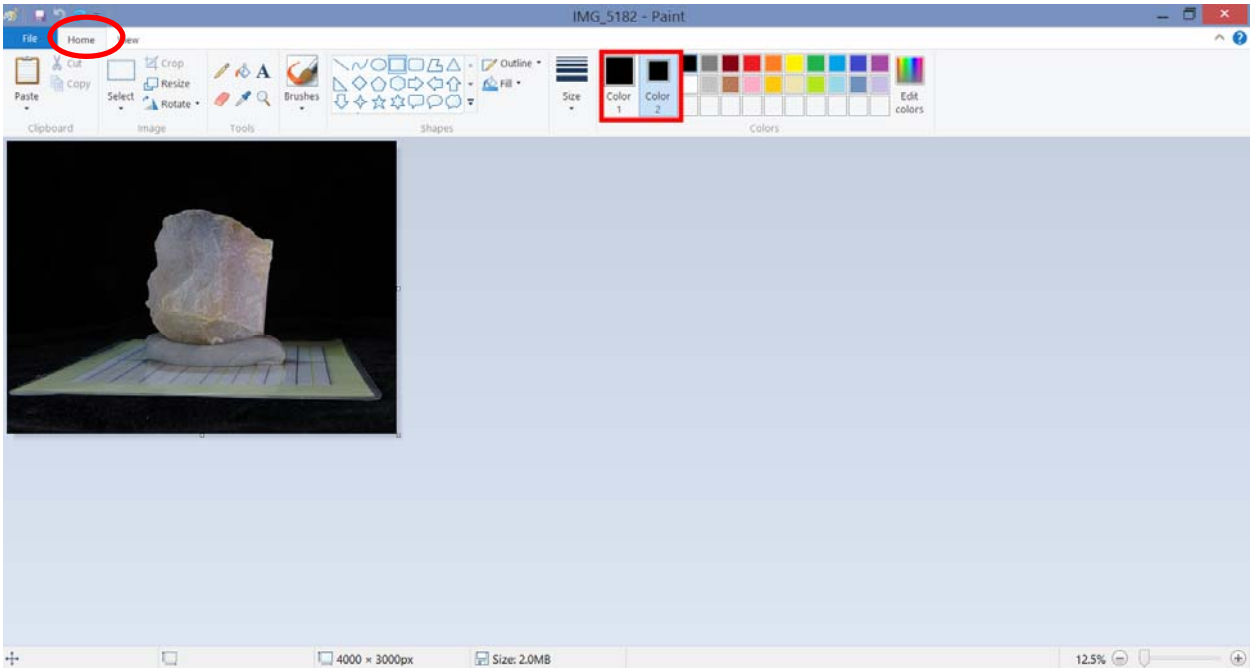

**2.** Navigate to the set of images you want to process. Select one of the images and click *Open*.



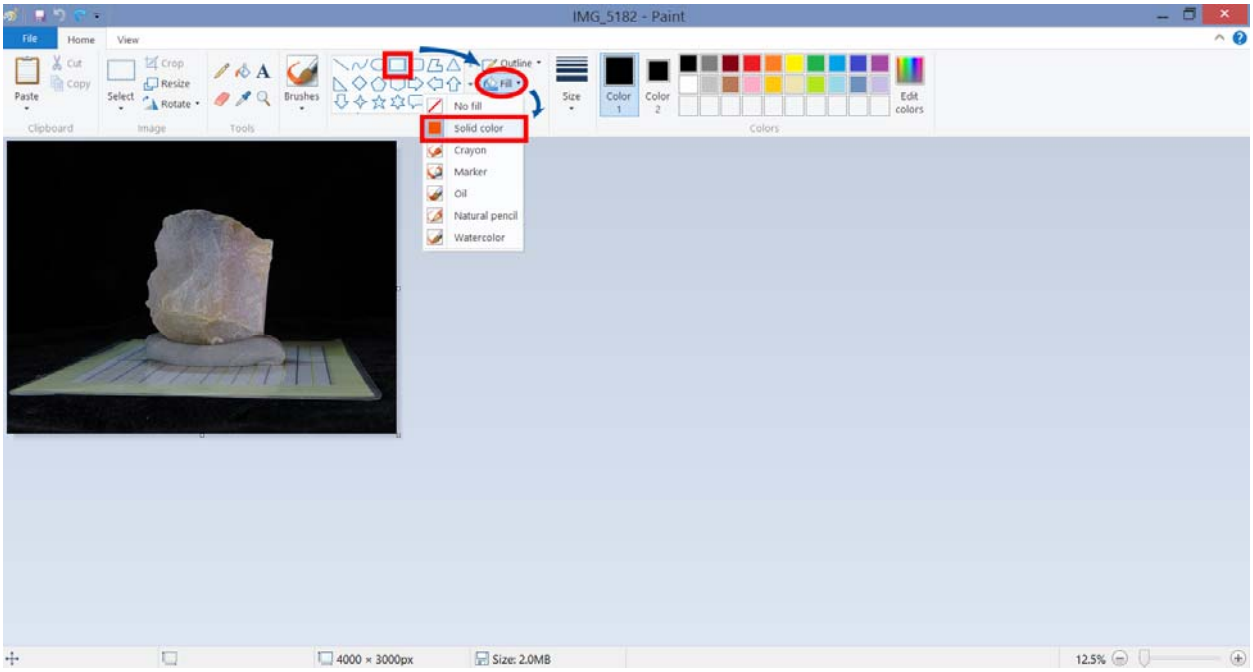
**3.** The image may open at full size, and so only a portion of the image may be visible. Click *View* → *Zoom Out* until the entire image is visible. Alternatively, you may use the slider bar in the lower right hand corner.



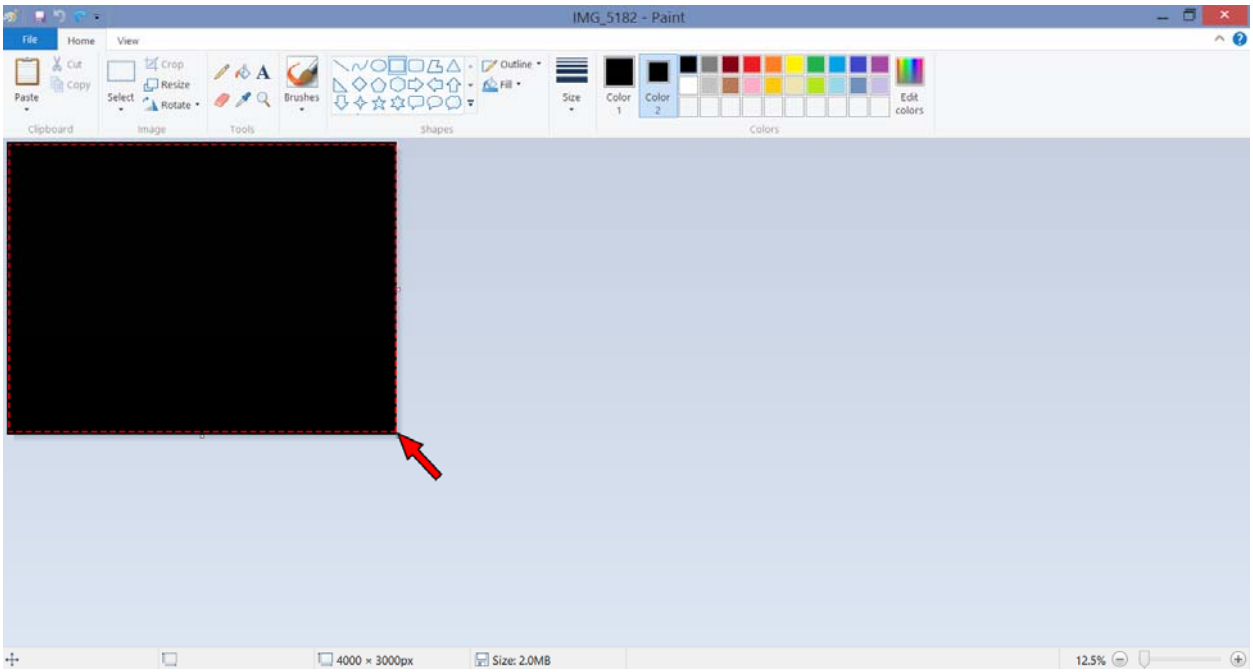

**4.** Return to the *Home* tab. Make sure that both *Color 1* and *Color 2* are set to black.



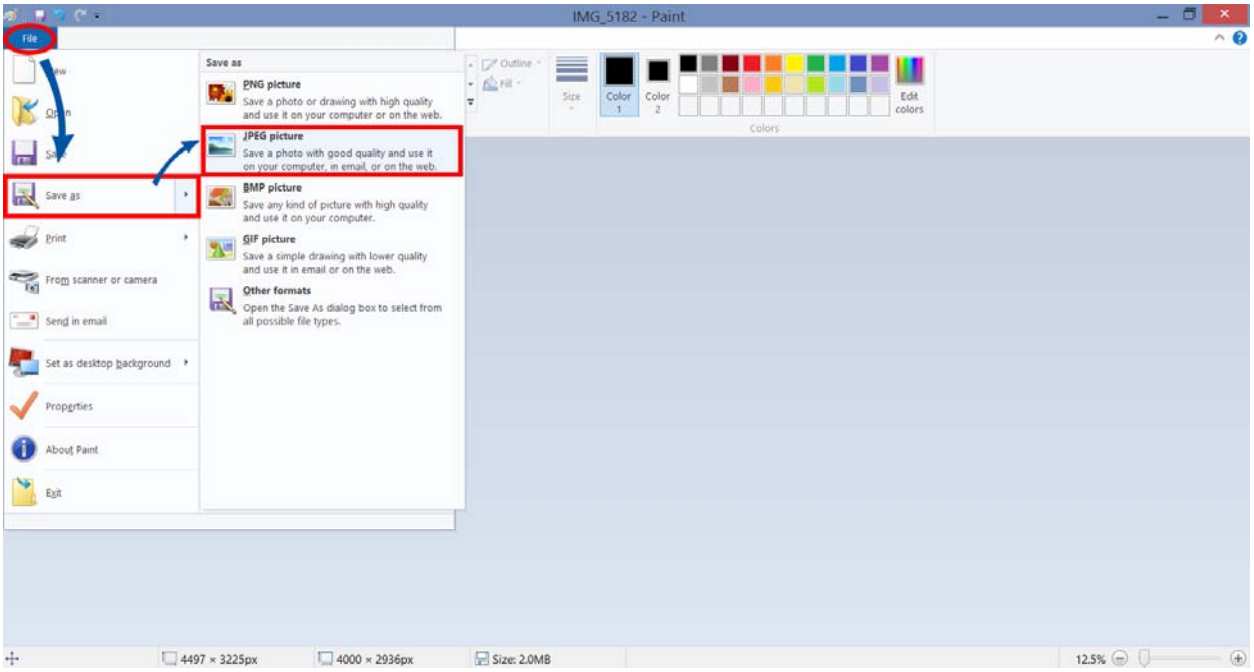
**5.** Click on the rectangular shape icon. Click *Fill* and set it to *Solid Color*.



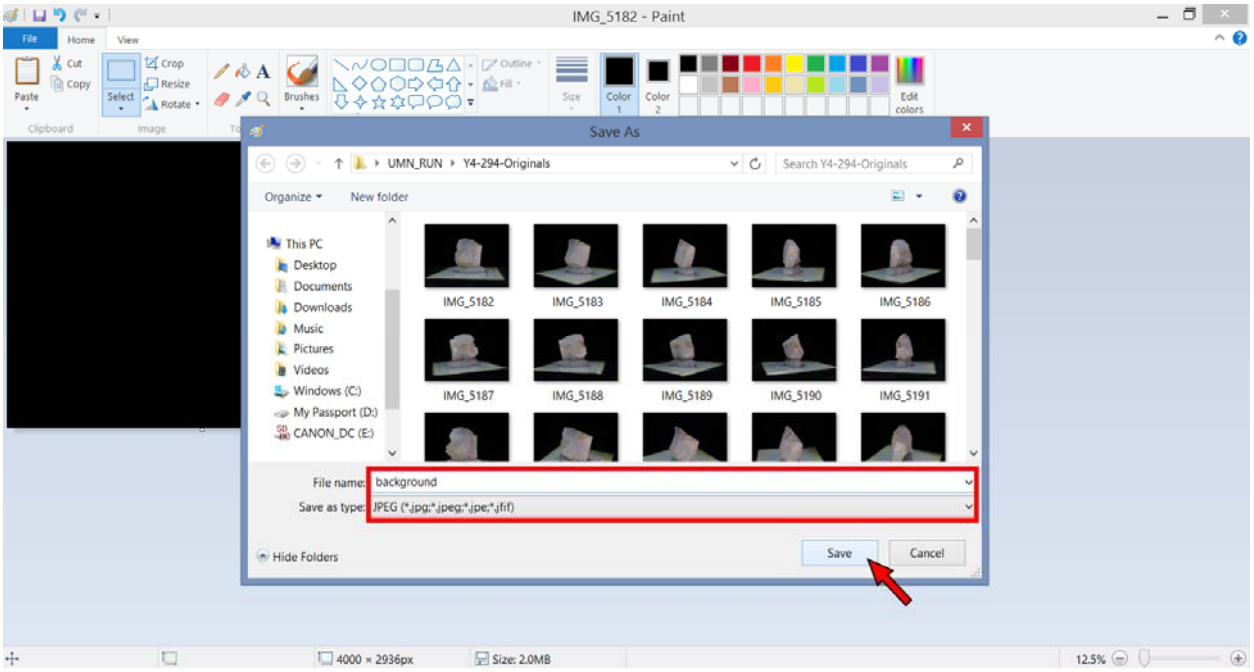

**6.** Drag a rectangle across the image. This should turn the entire image black. Reposition / resize the rectangle, or repeat the previous stage if necessary.



**7.** Click *File* → *Save As* → *JPEG picture*.

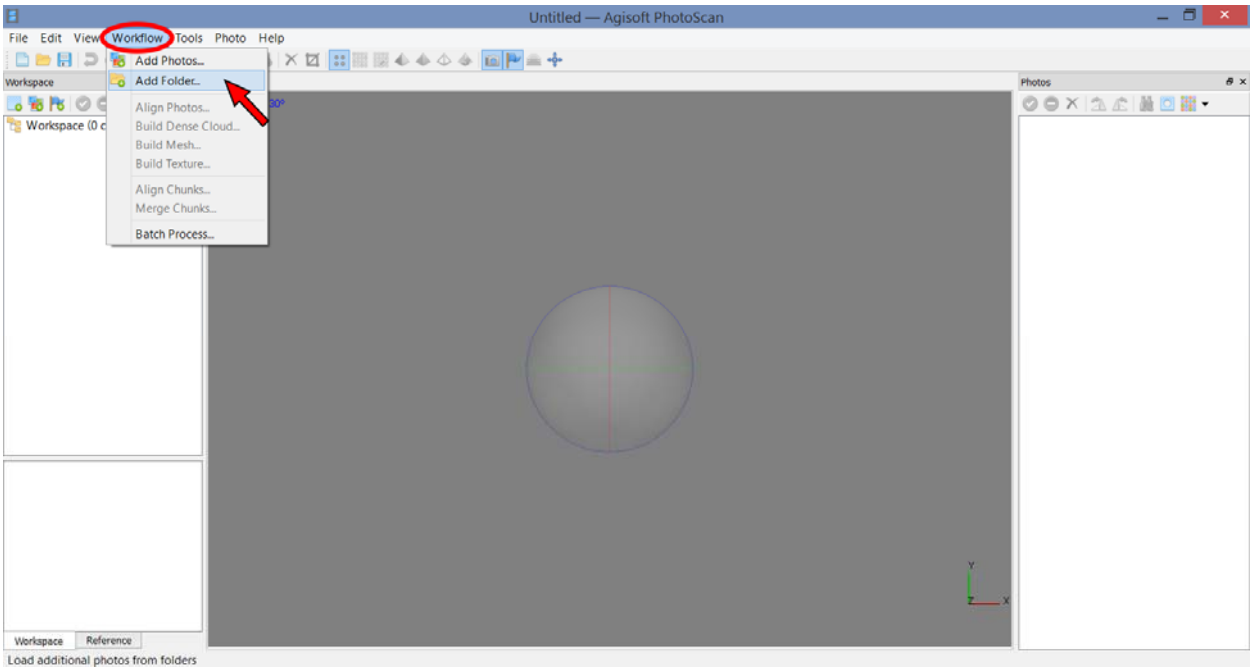



**8.** Choose a place to save this background image. Navigate to this folder. Set the file name as something easy to remember like “background.” Save the file as a JPEG. Navigate to this folder. Set the file name as something easy to remember like “background.” Save the file as a JPEG.

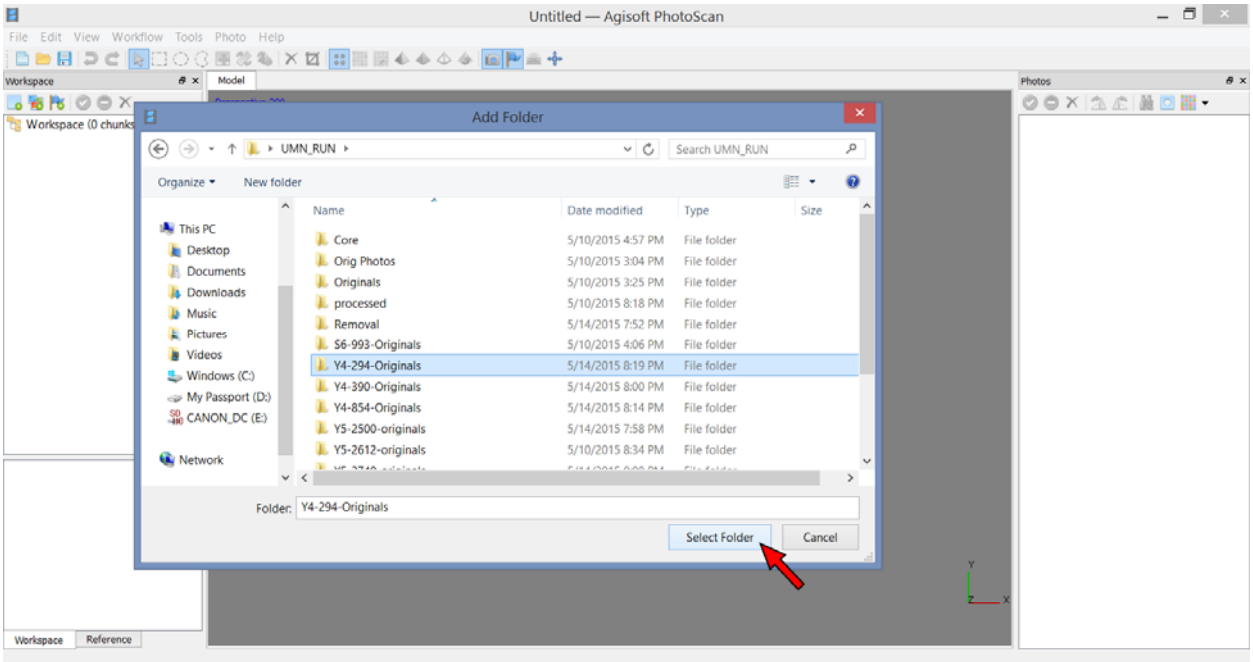


## Step 2 Importing photos and masks into Agisoft PhotoScan

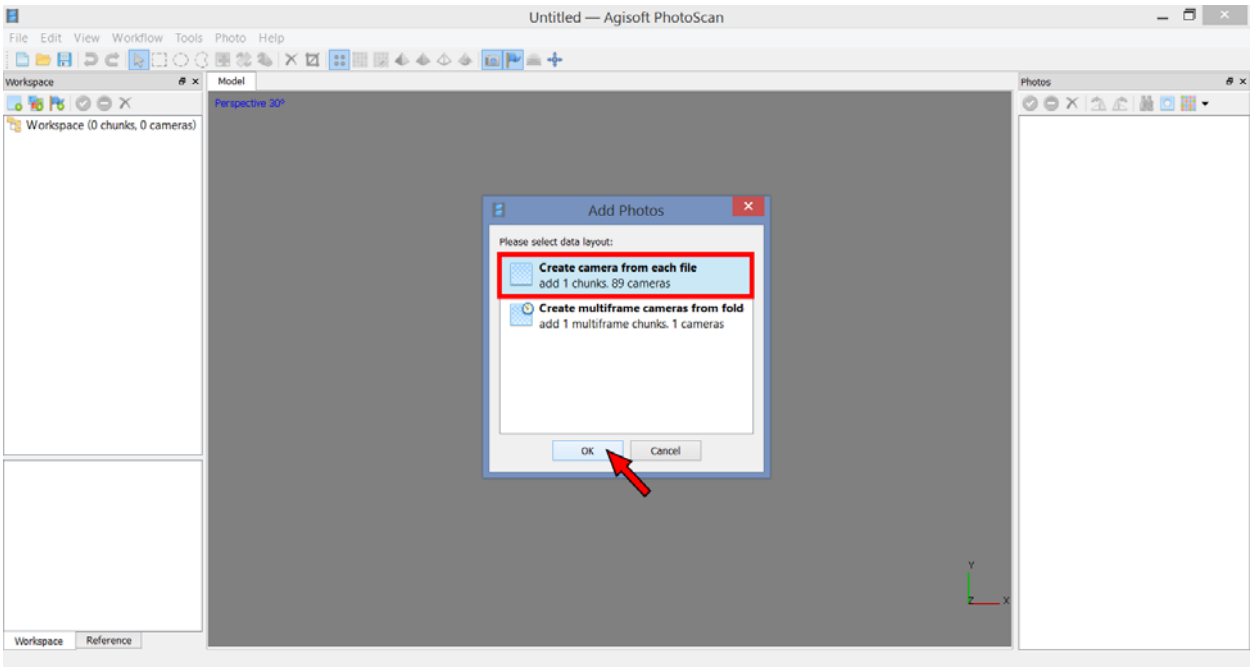
**1.** Open Agisoft PhotoScan. Click *Workflow* → *Add Folder*.



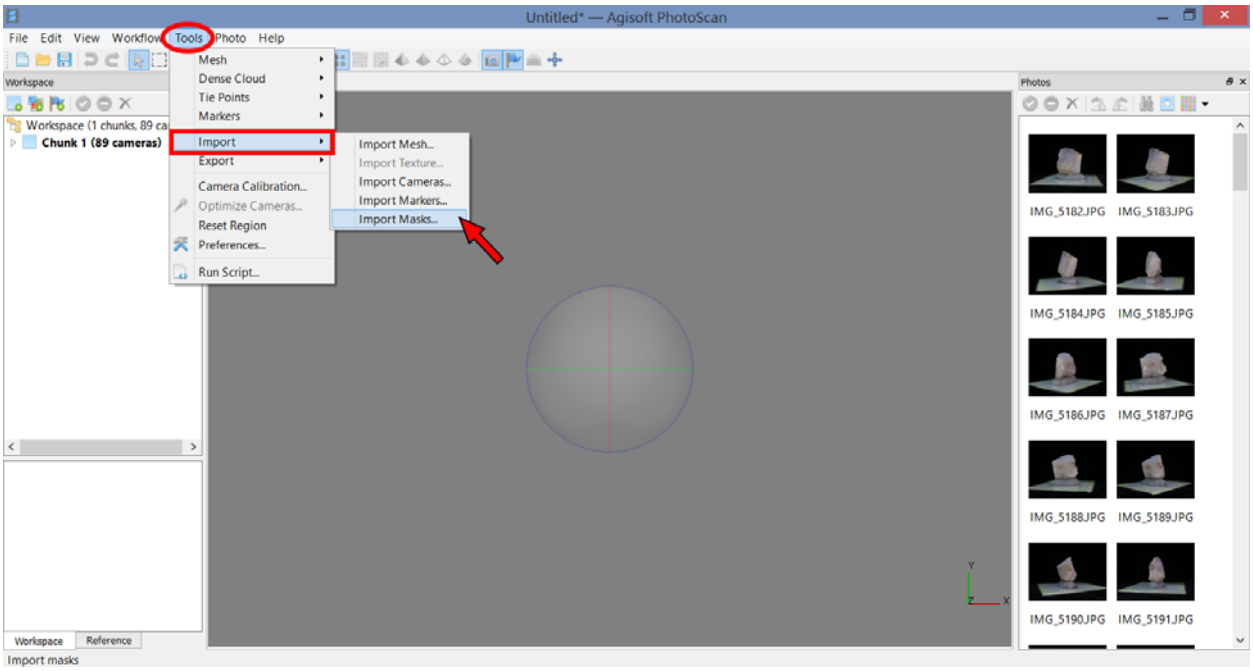

**2.** Navigate to the folder with the set of images you would like to process. Click *Select Folder*.



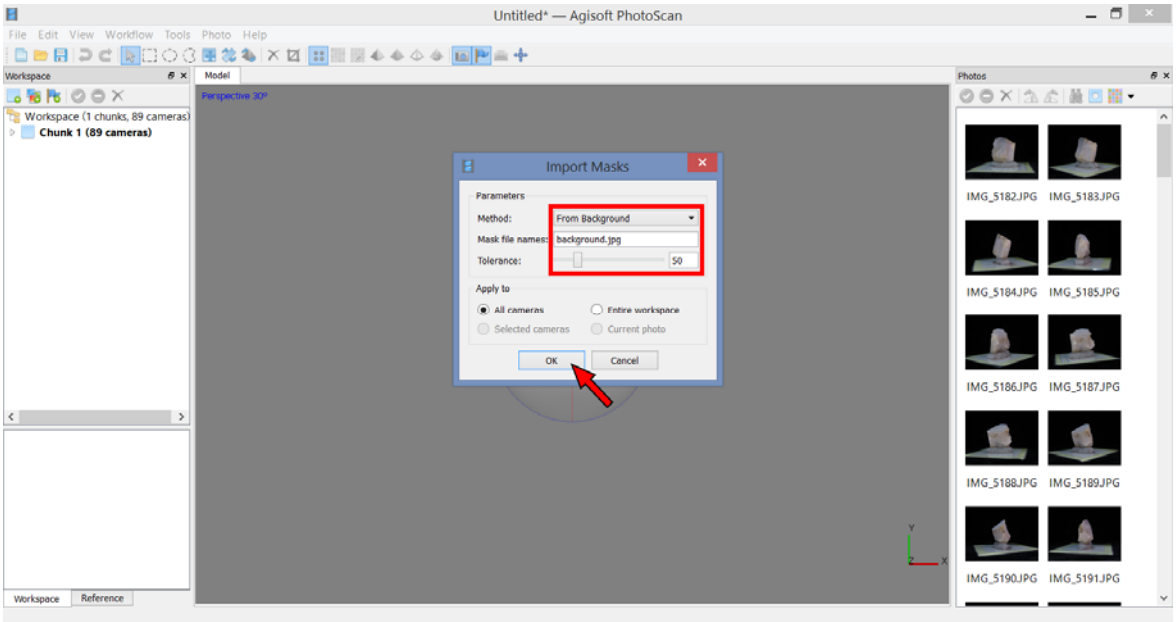
**3.** If prompted, select *Create camera from each file*. Click *OK*.



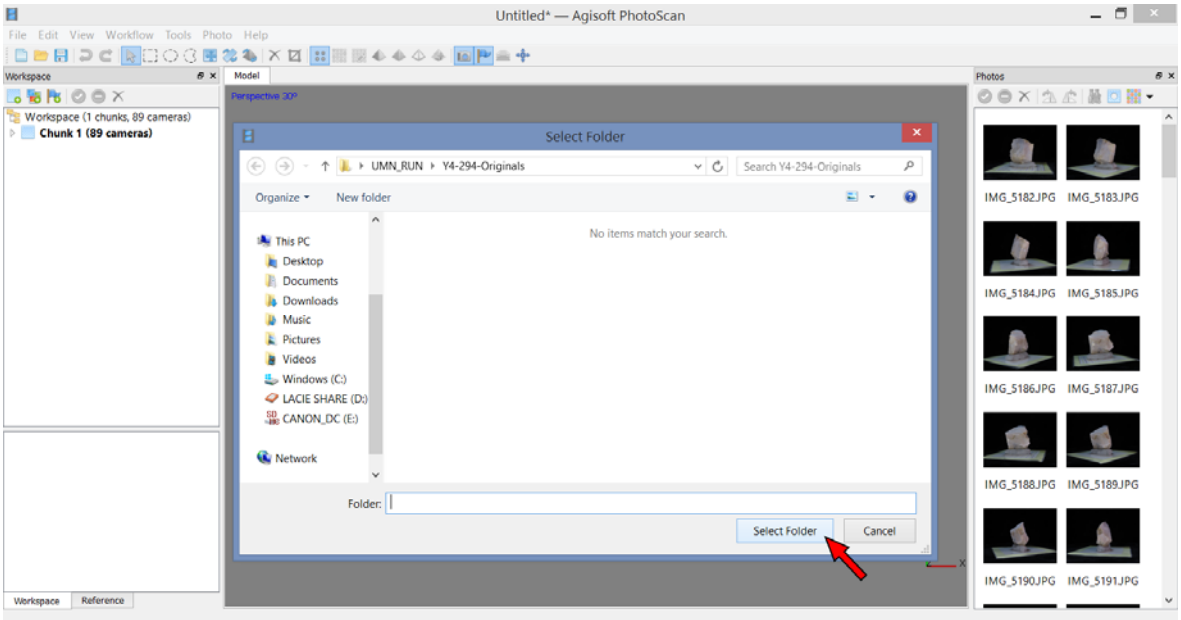

**4.** Once the images are imported, click *Tools* → *Import* → *Masks*.



**5.** For the masking method, select *From Background*. In this case, we are using a single file to mask all of the images. Set the file name to be one you created in Step 1. You can also change the level of tolerance[1] the masks will be processed with. In this case, we want this to apply to all images / cameras. Click *OK*.

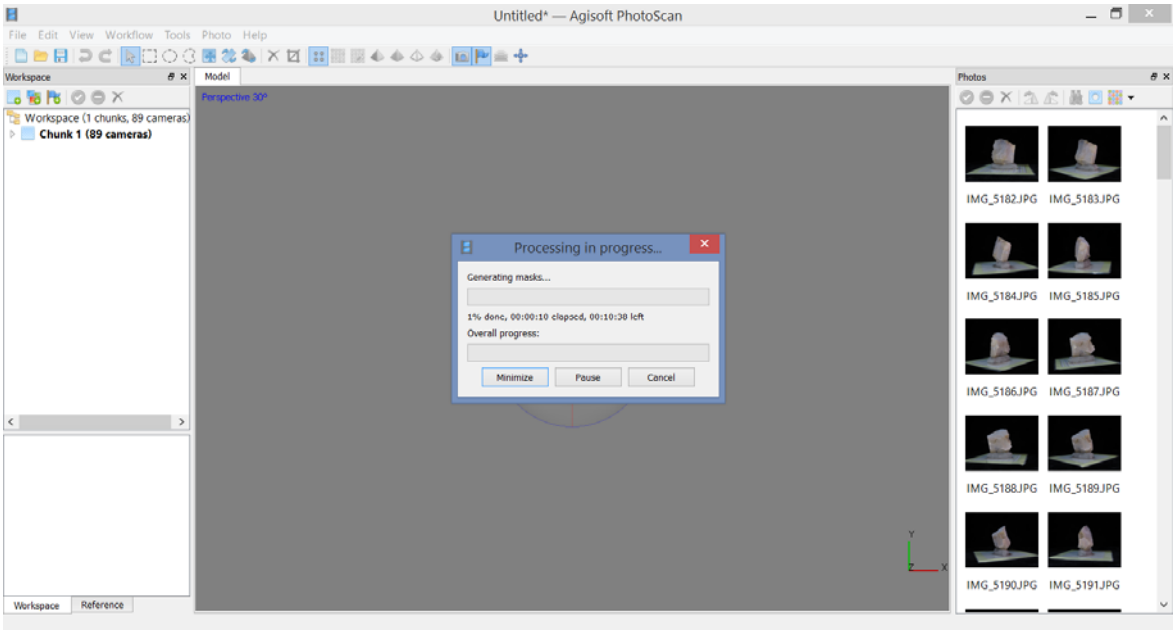



**6.** Navigate to the folder where you saved the background image, then click *OK*.

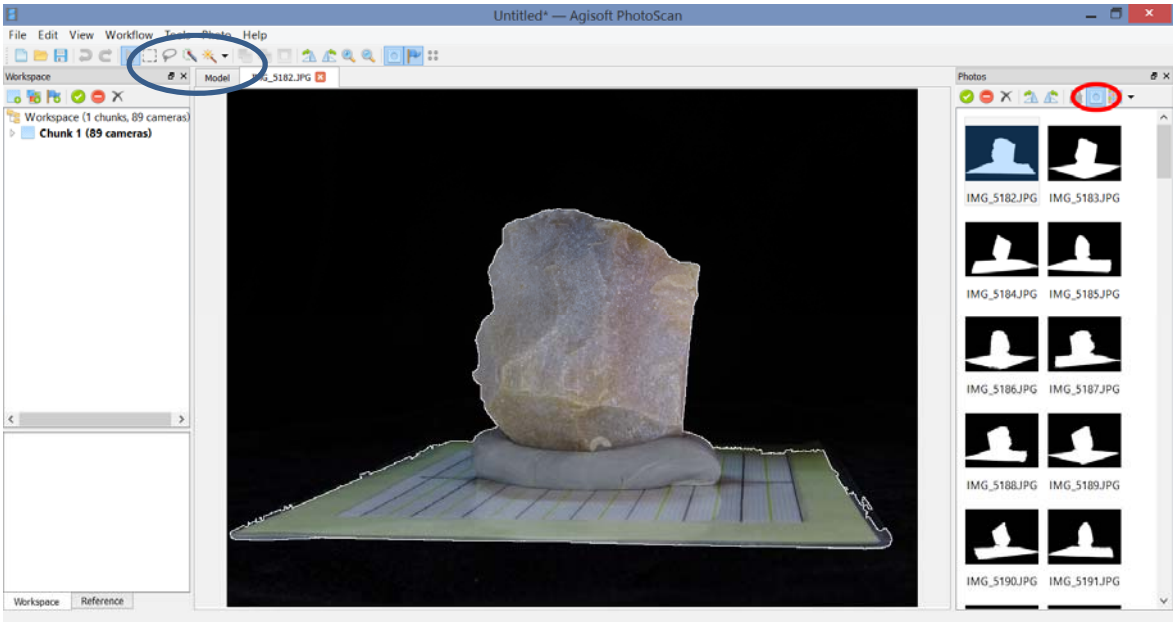



[1] Tolerance refers to how different in tone and color a pixel may be from the background image to be included as part of the image mask. A level of 50 usually works well, but you can adjust this if need be. If not enough of the background is being masked, you can try raising the tolerance. If too much of the image is being masked, try lowering the tolerance.

**7.** PhotoScan will now begin creating the image masks.



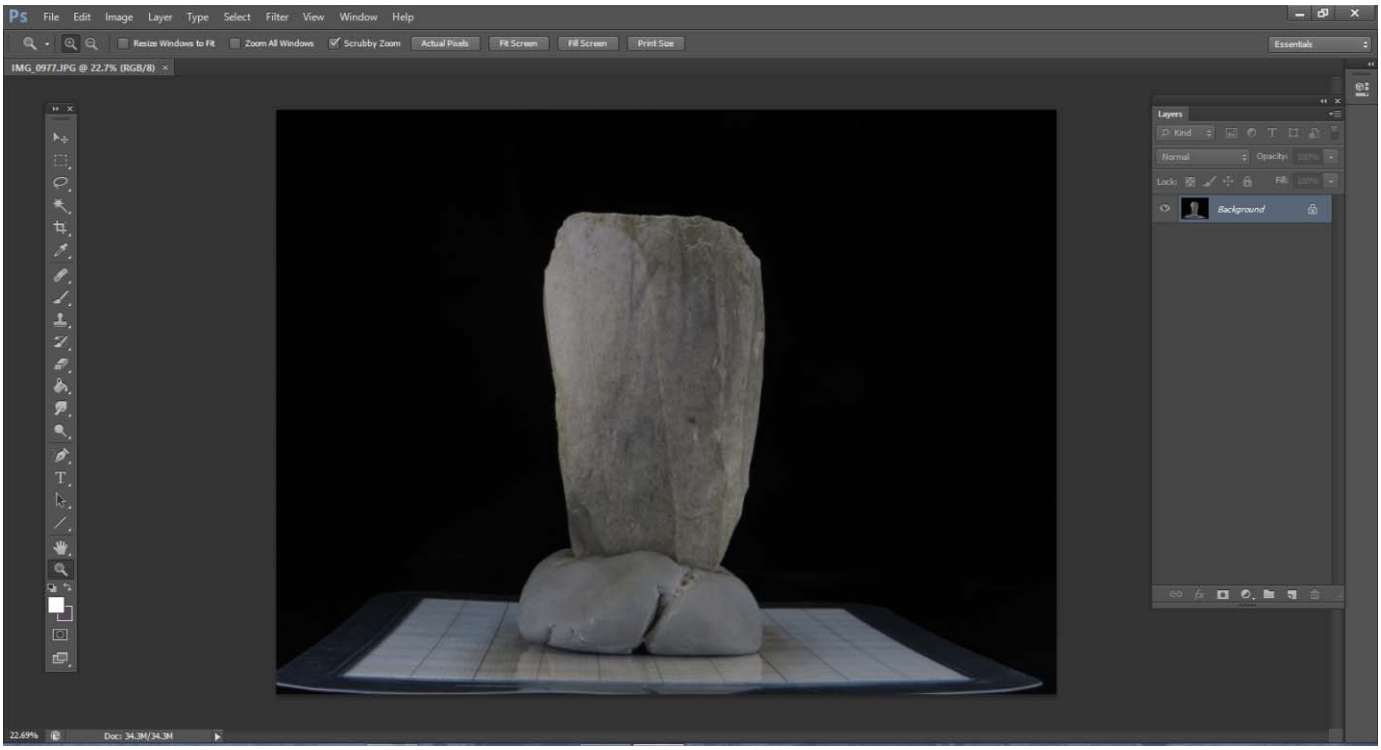

**8.** Once processing has completed you can preview the masks by toggling the icon circled in red below. You can view masks in greater detail in the center window by double clicking on the thumbnails in the *Photos* pane (displayed here on the right). You can also edit individual masks once they are imported into PhotoScan by using the tools circled below in blue. Once you are happy with your masks, you can proceed with processing your 2D images into 3D models.



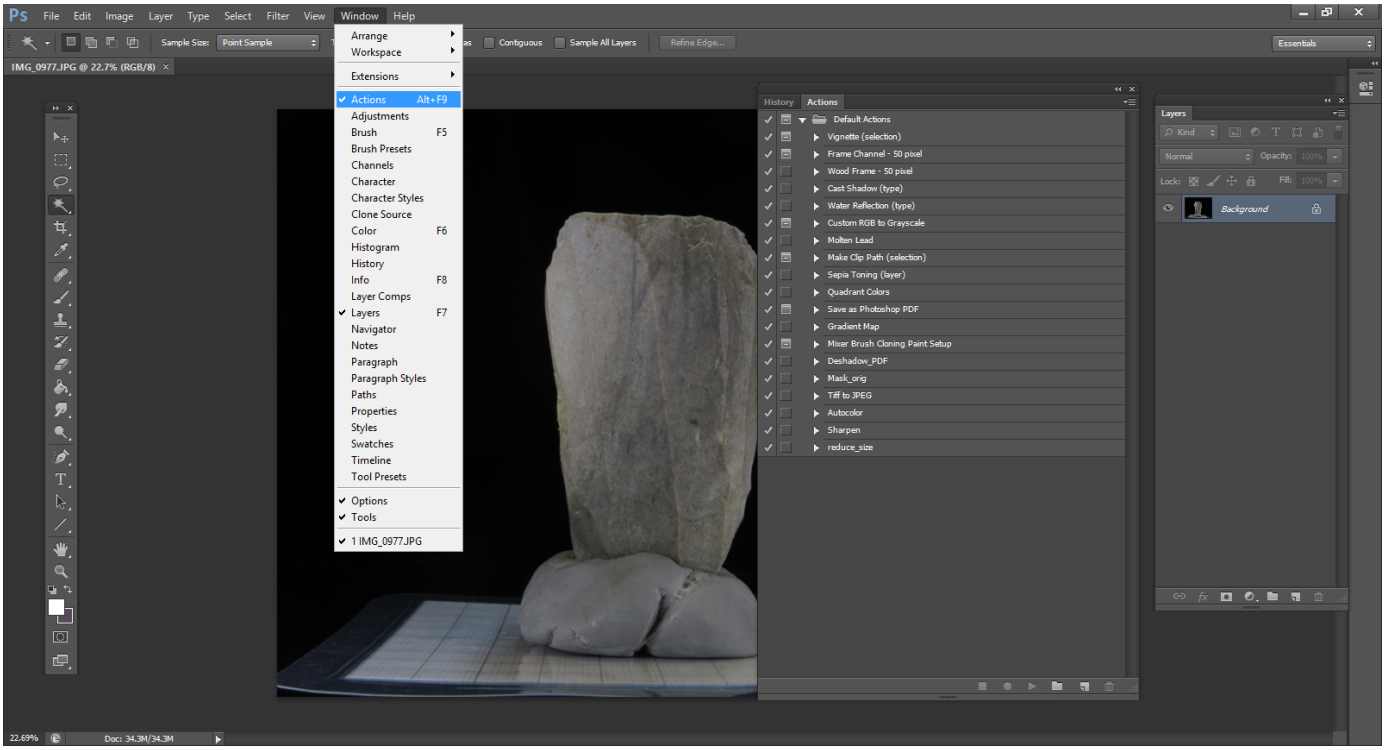
Method 2

## Step 1: Creating an action in Adobe Photoshop

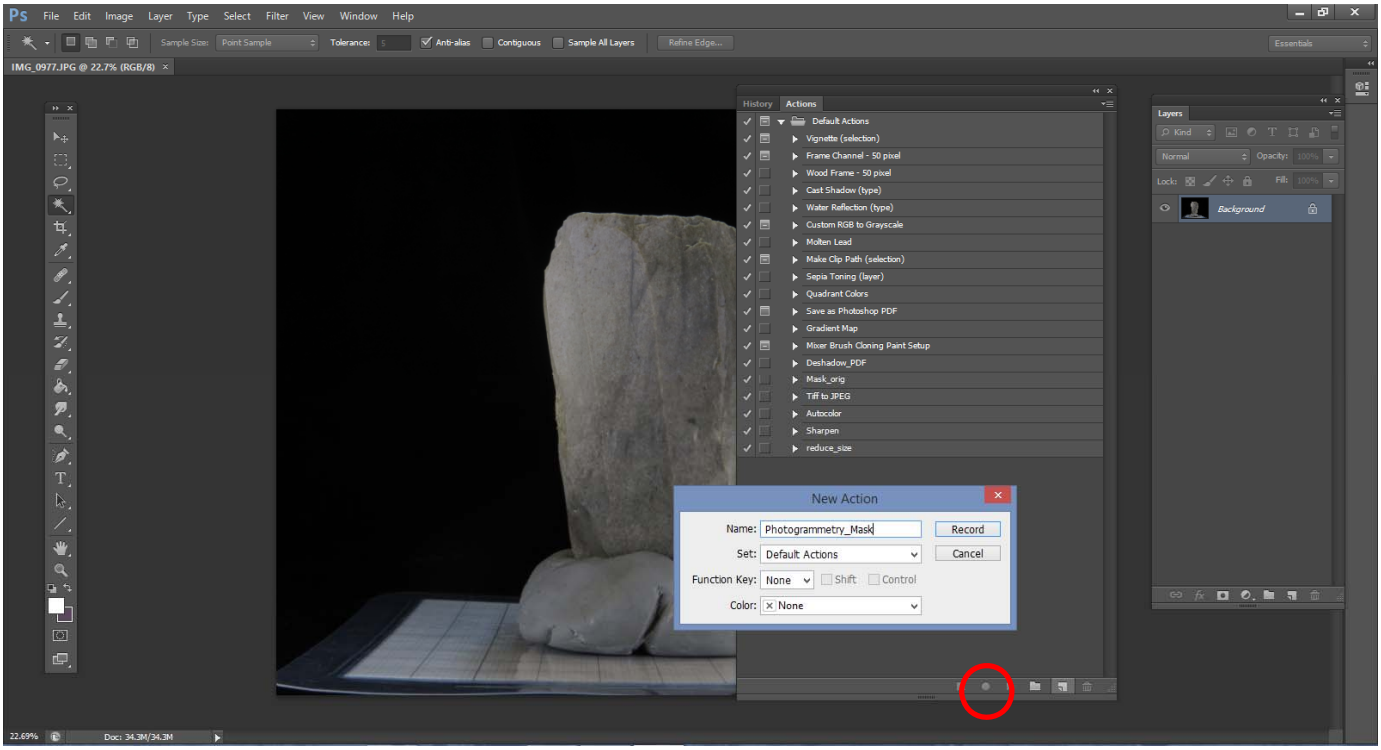
1) Open a photo taken with the photogrammetry rig in Adobe Photoshop.



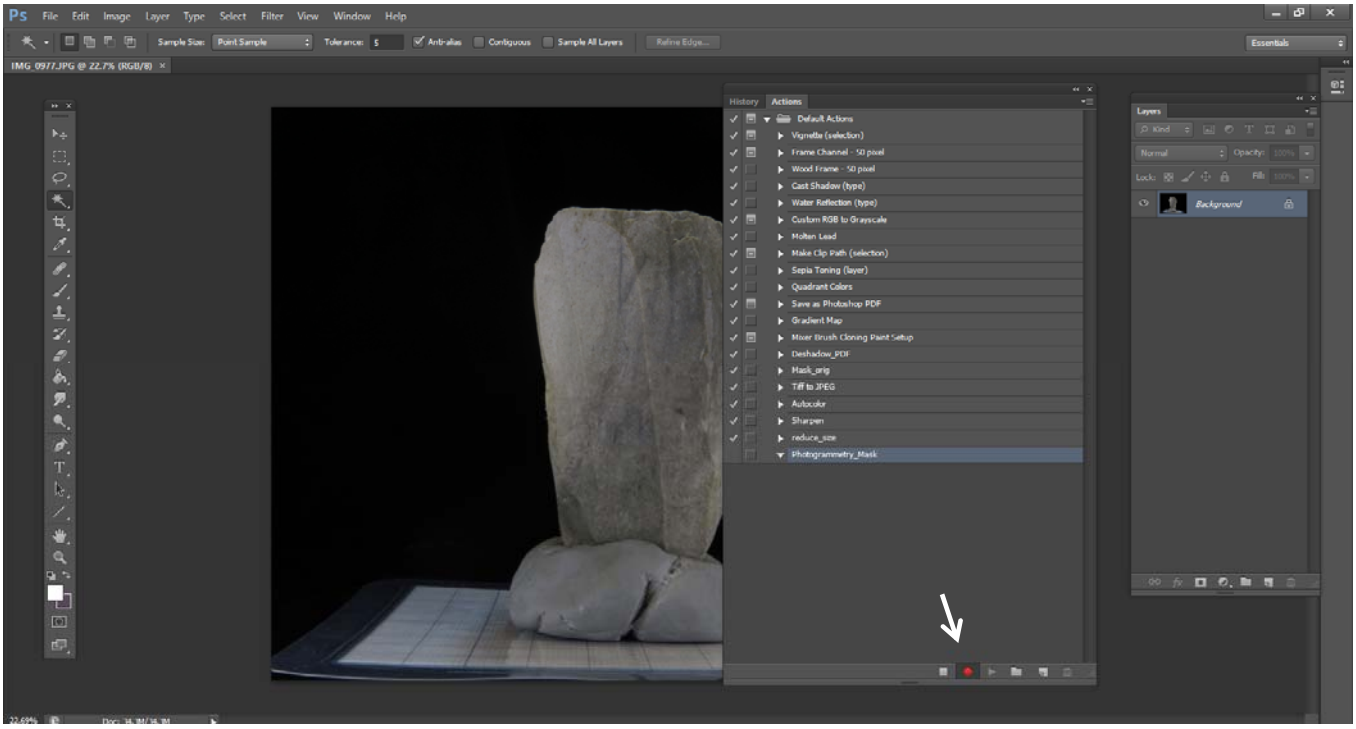
2) Open the action window by clicking on *Window* → *Action*



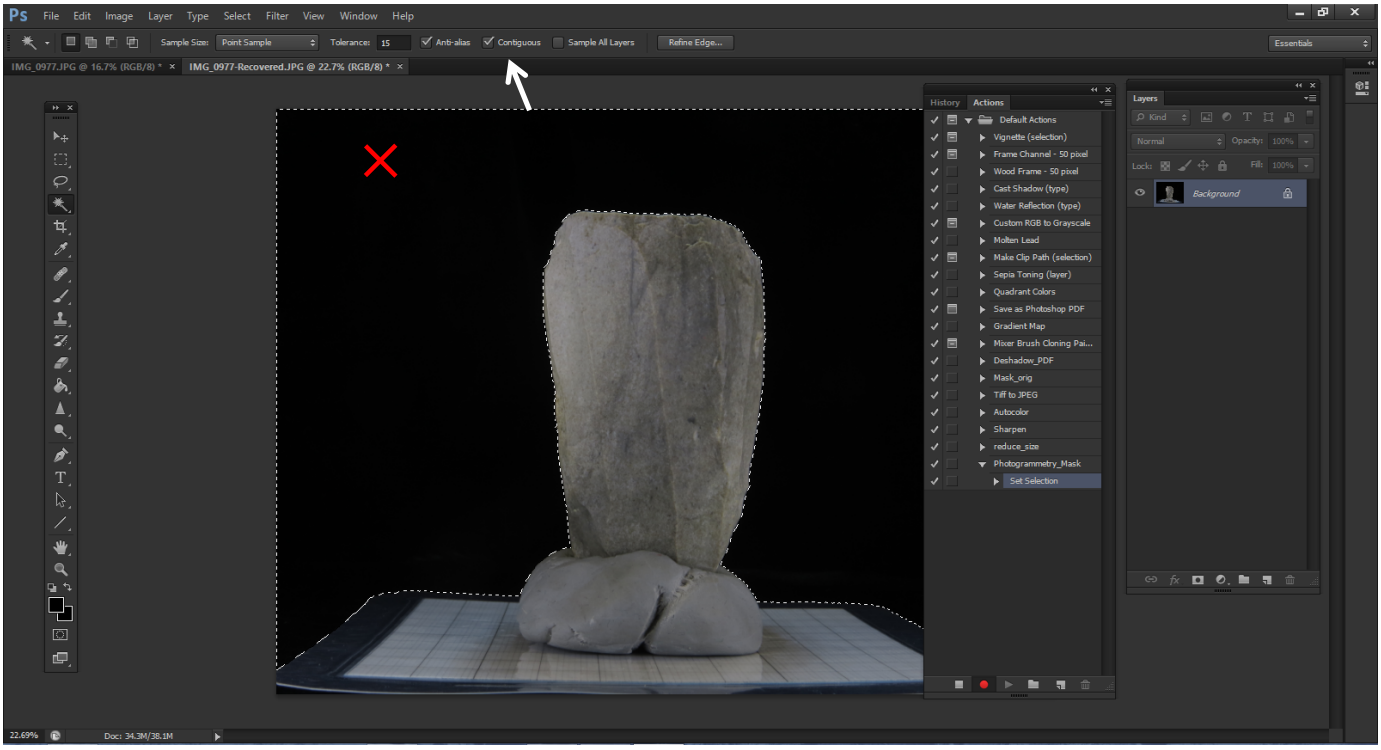
3) Create a new action by clicking on the  icon (circled in red in the screenshot below). Give the new action a name, and set it as a default action. Click *Record*.



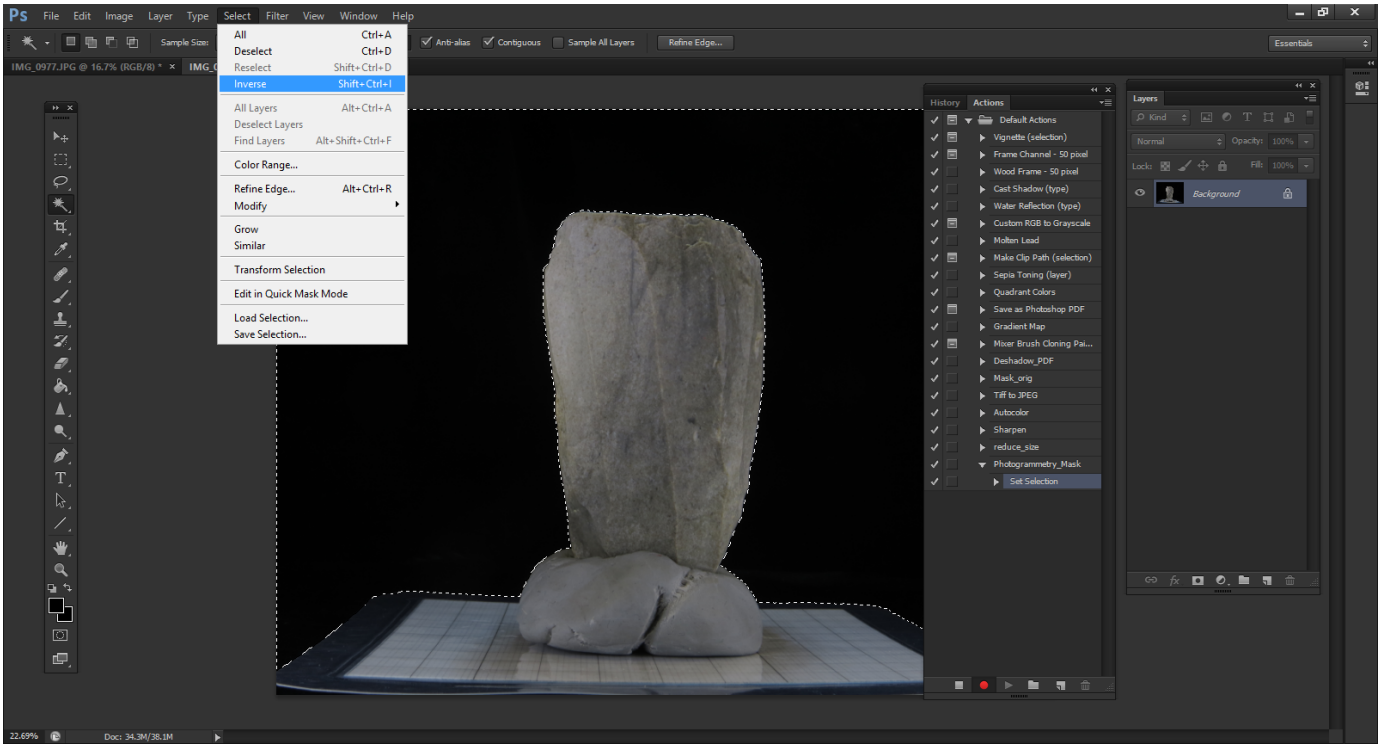

A red circle will appear showing your actions are being recorded.



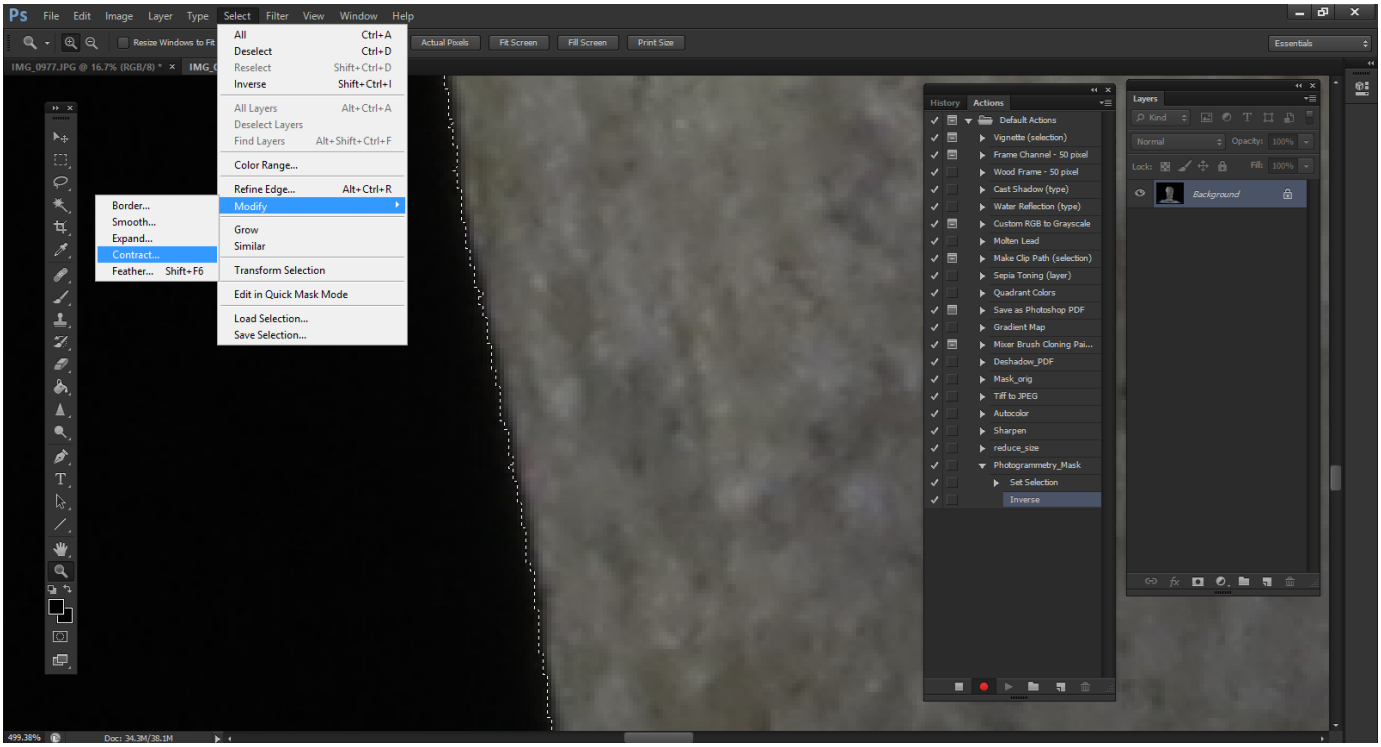
4) Using the magic wand tool  select a spot on the black background in the upper left hand corner of the image (represented below by the red X). You will want to click on a place that will consistantly select the background in each photo, you are processing and not the object. Make sure the box next to *Contiguous* is checked (as indicated by the white arrow). You may want to experiment with the tolerence level, but a setting of 15 usually works well.



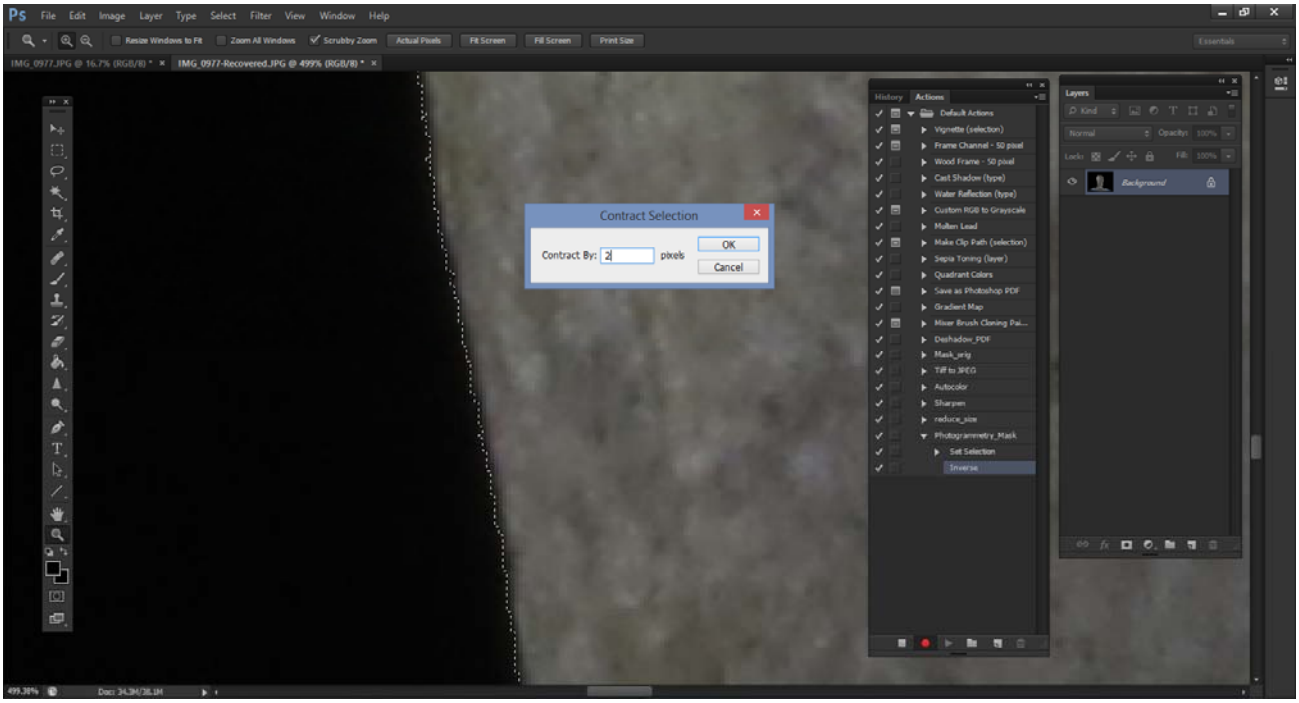
5) Change the selection to the object and scale rather than the background by clicking *Select* → *Inverse*.



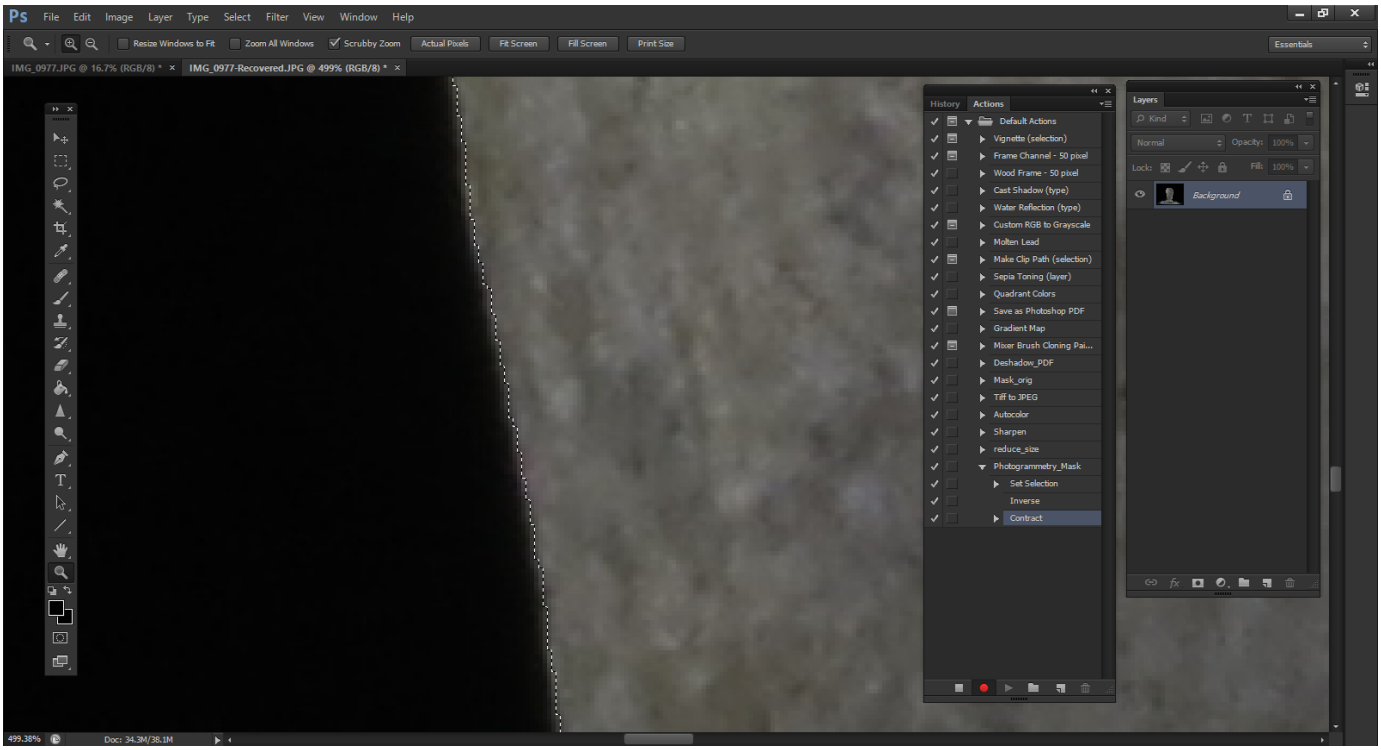
6) If you zoom in, you will likely notice a line of black pixels is still included in your selection. To mitigate this, click *Select* → *Modify* → *Contract*.



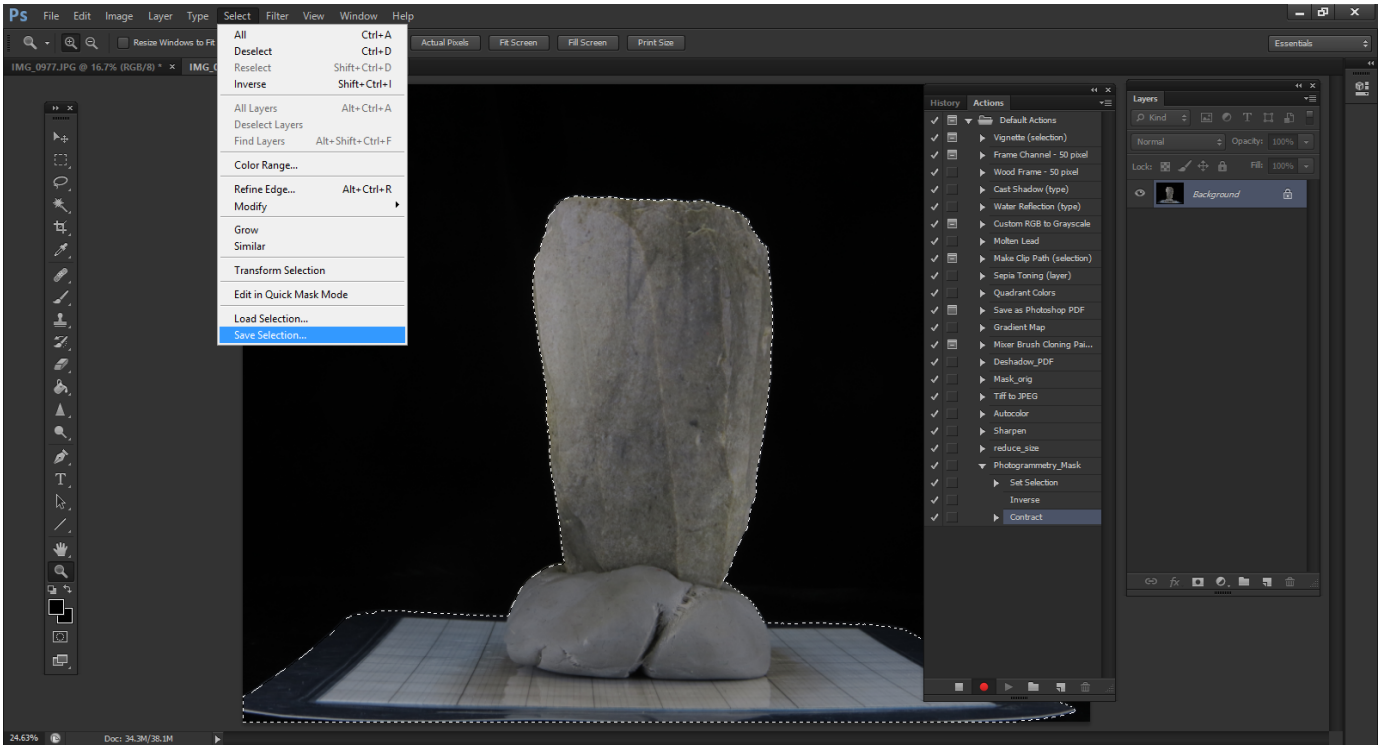

Contract the selection by 2 or 3 pixels, depending on the resolution of your photos and the size of the remaining black area you observe. Click *OK*.



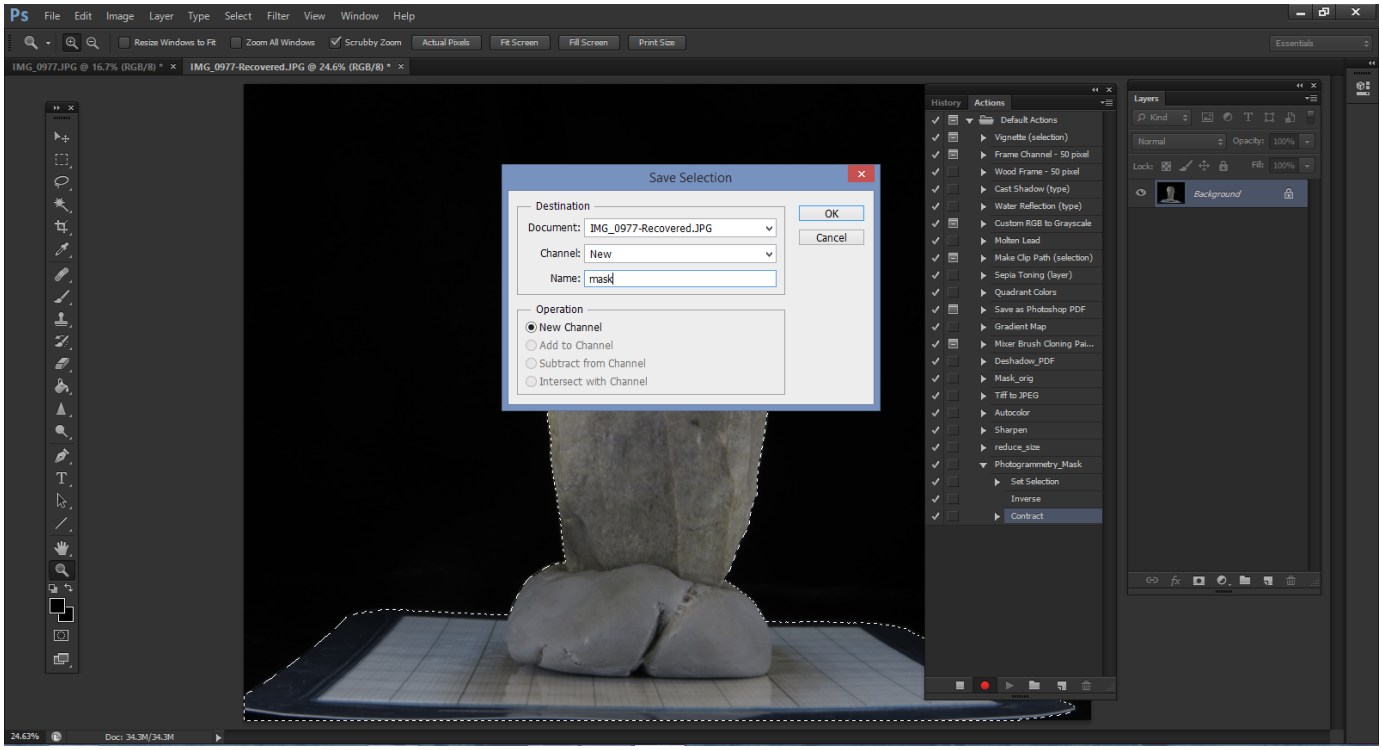
The selection should now be tighter around the edges of the target object.



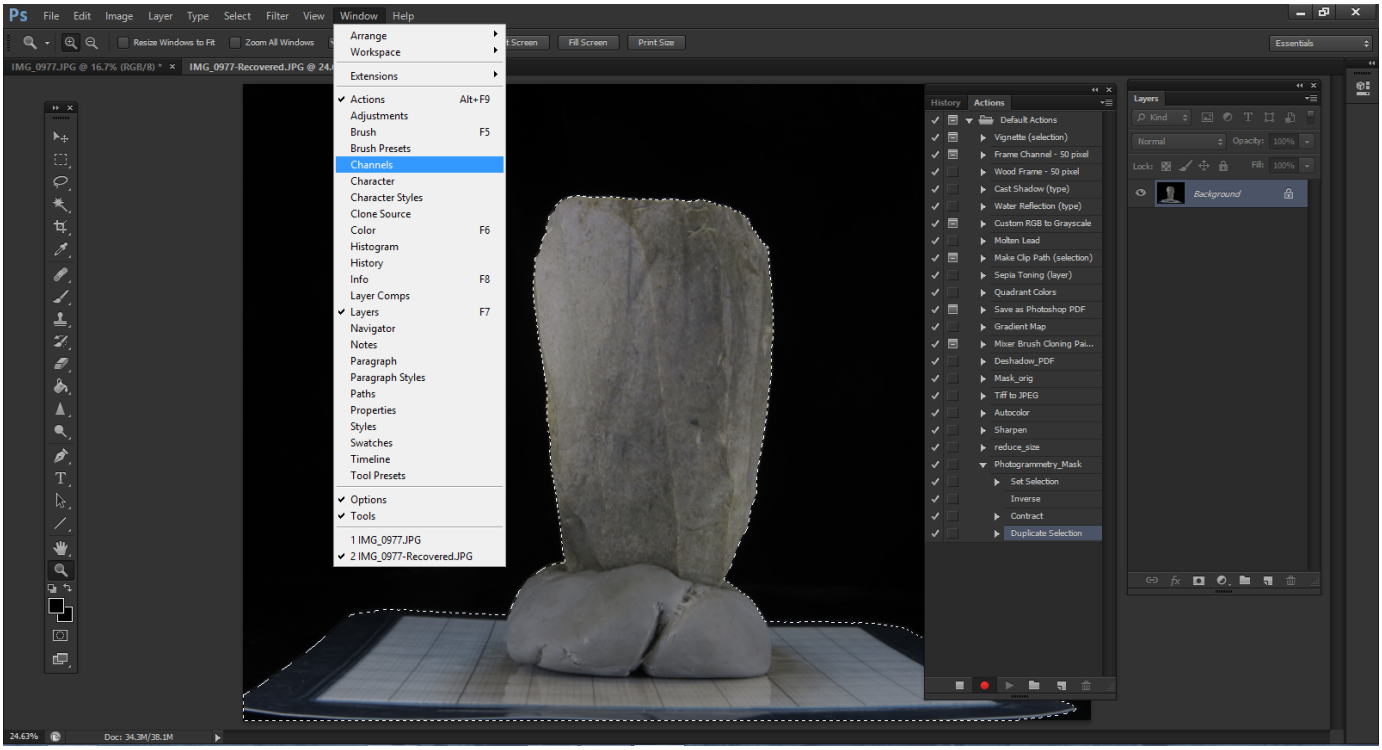
7) Now you will create an alpha channel around representing your selection. To do this, click *Select* → *Save Selection*.

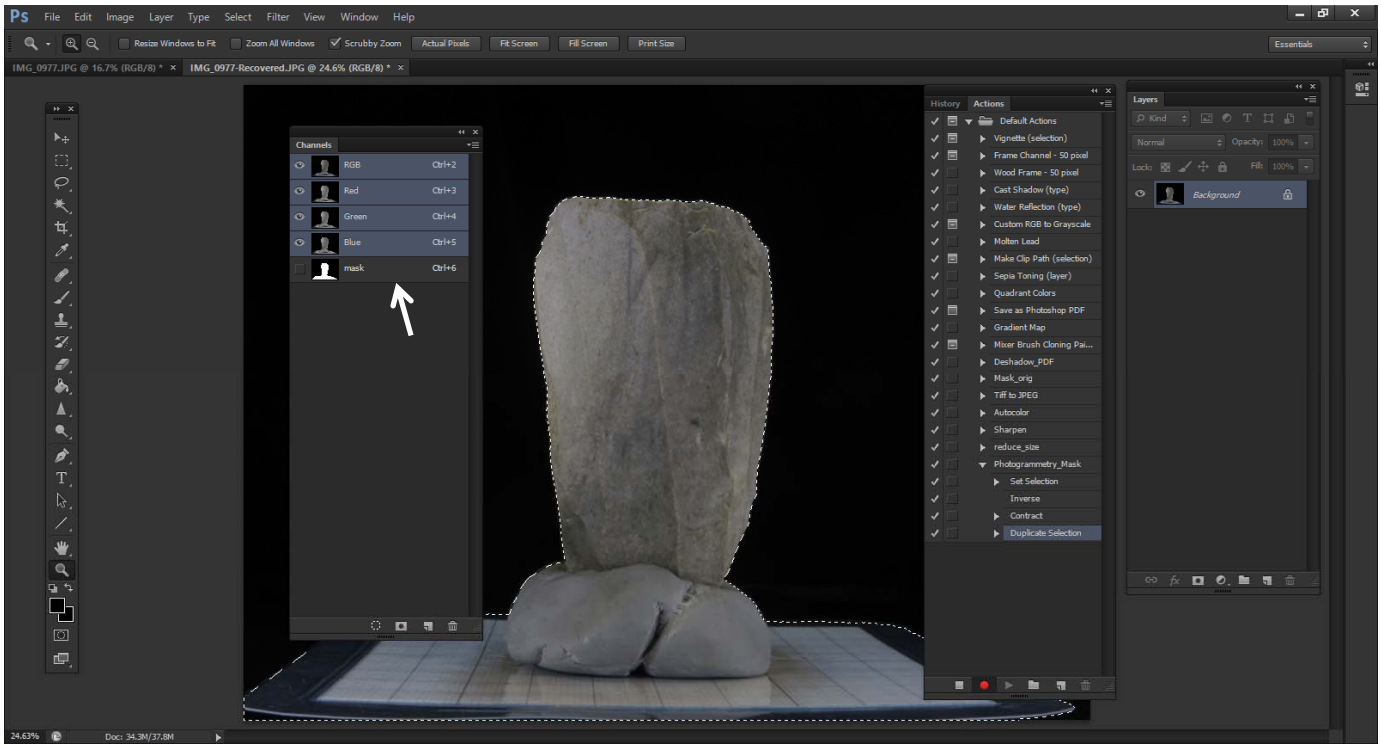


Save the selection as a new channel.  Give the channel a name.  Click *OK*.

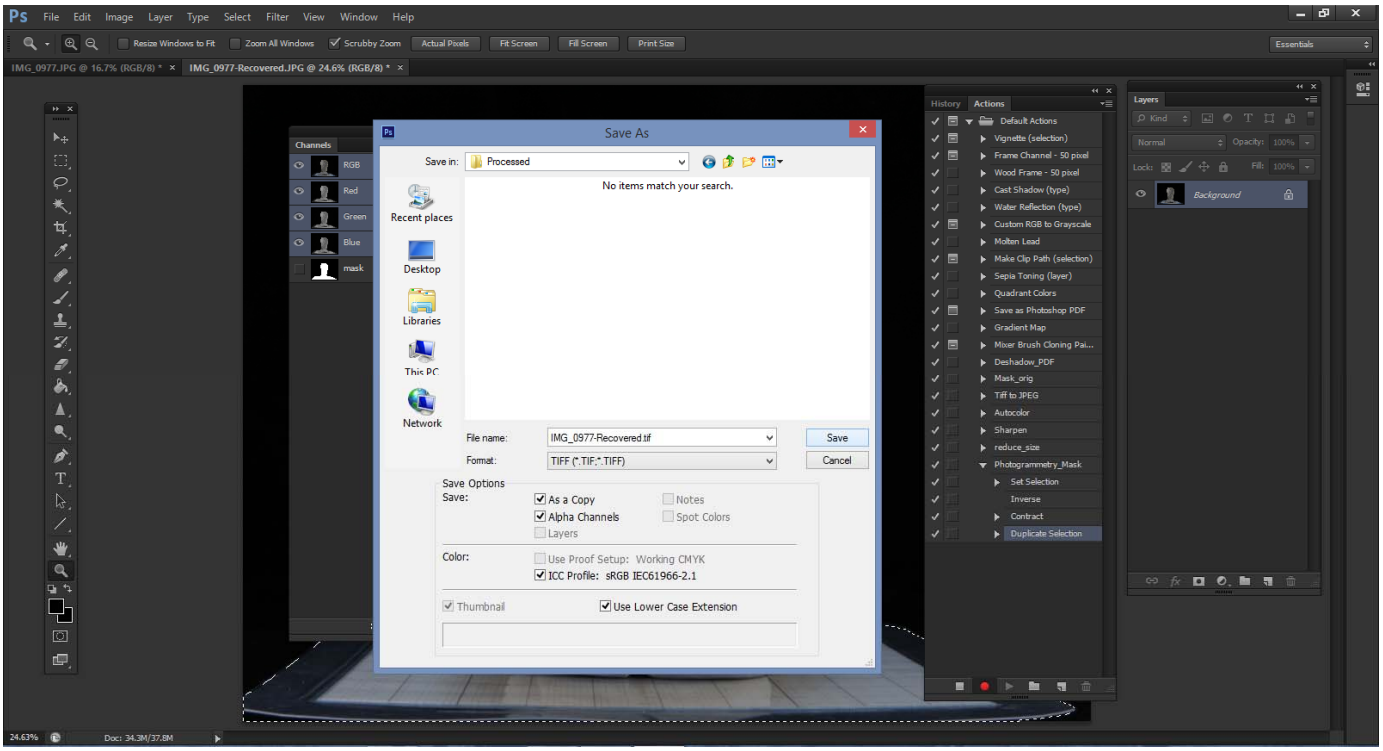



8) You can view this alpha channel mask by clicking *Windows* → *Channels*.

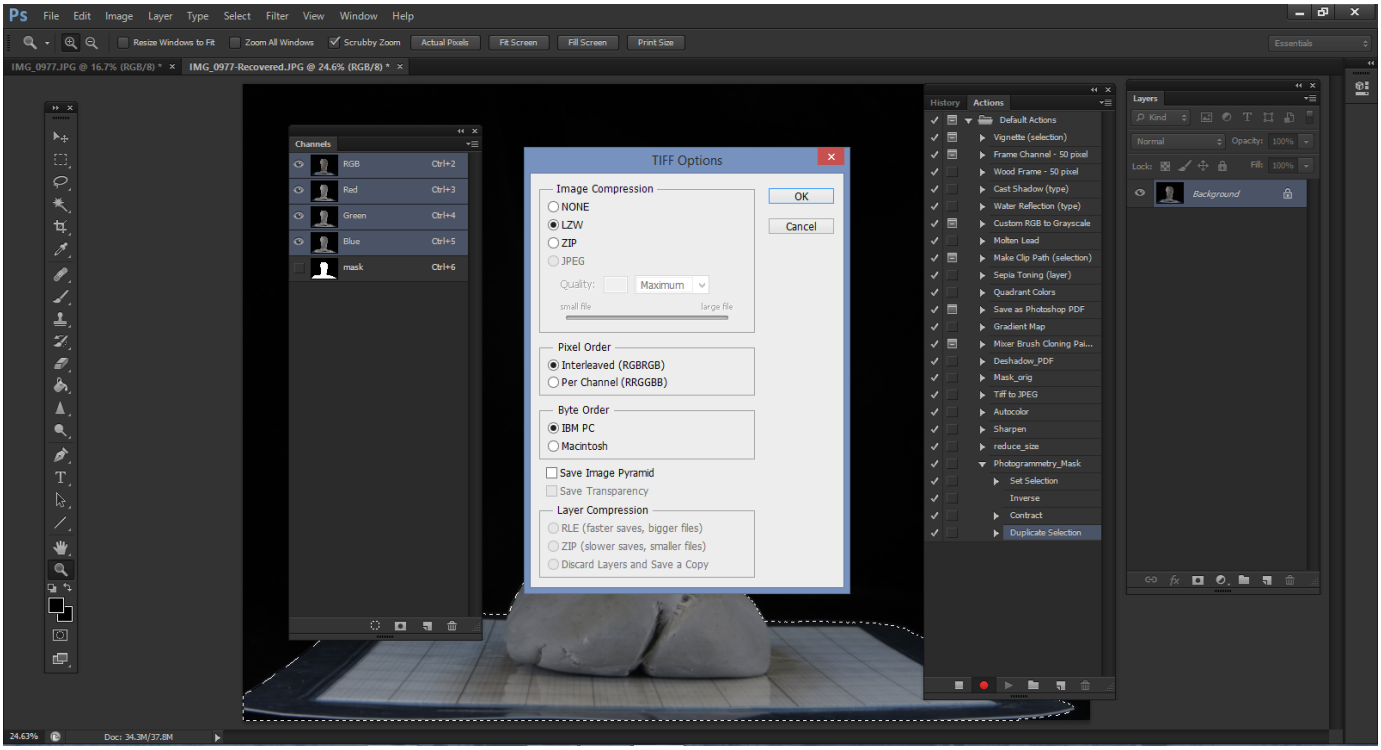




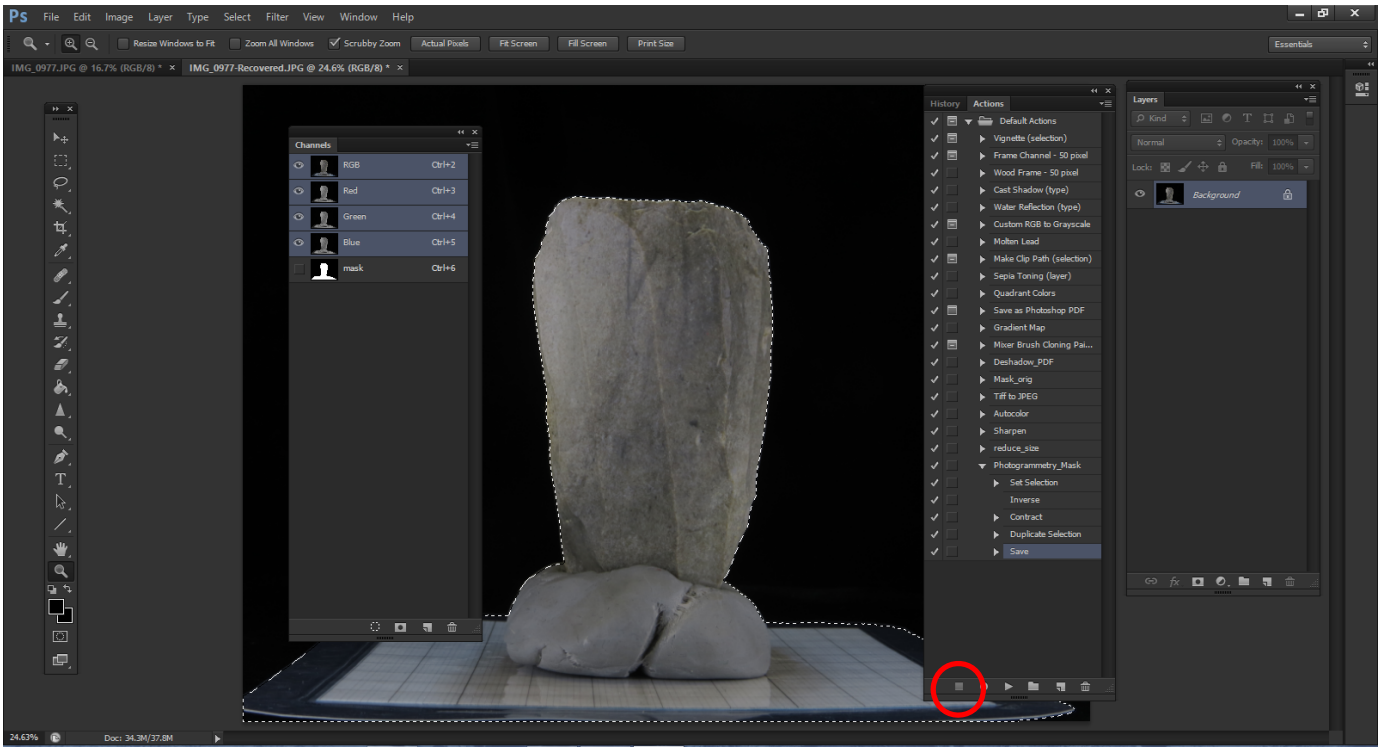
9) Next, save the photo by clicking *File* → *Save As*. Save the image as a copy and a TIFF, and be sure to include the alpha channel. Click *Save*.



You can use compression in order to avoid overly large file sizes. Click *OK* to save the file.

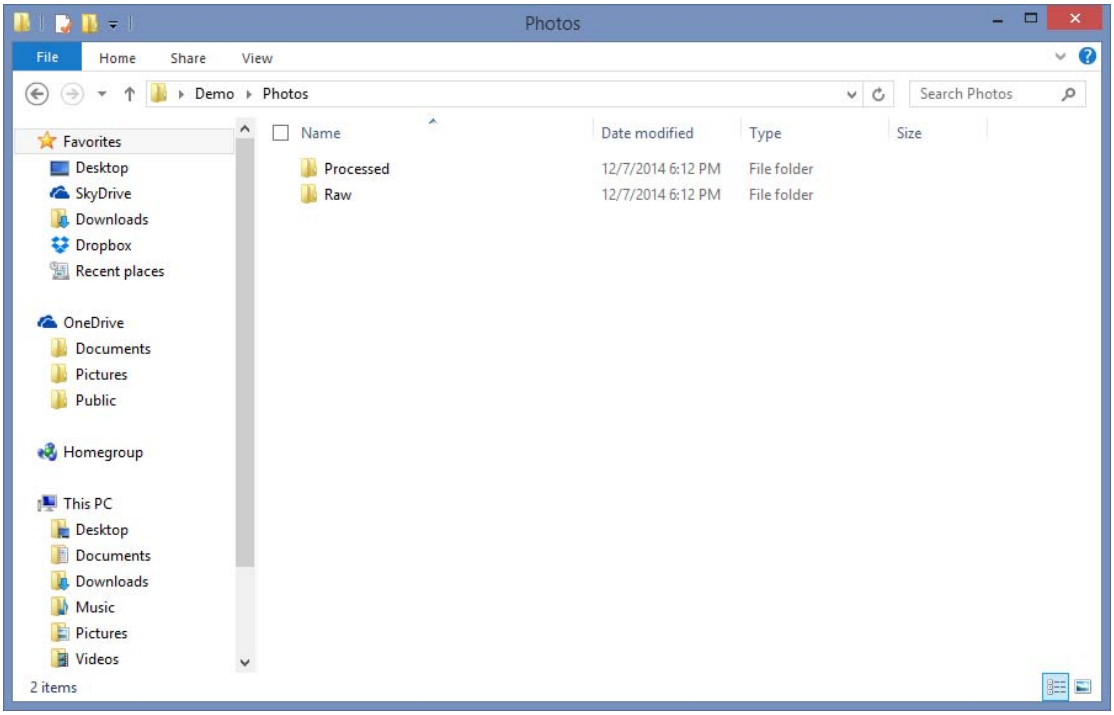



10) Stop recording the action by clicking the square stop icon  on the actions window (circled in red below).

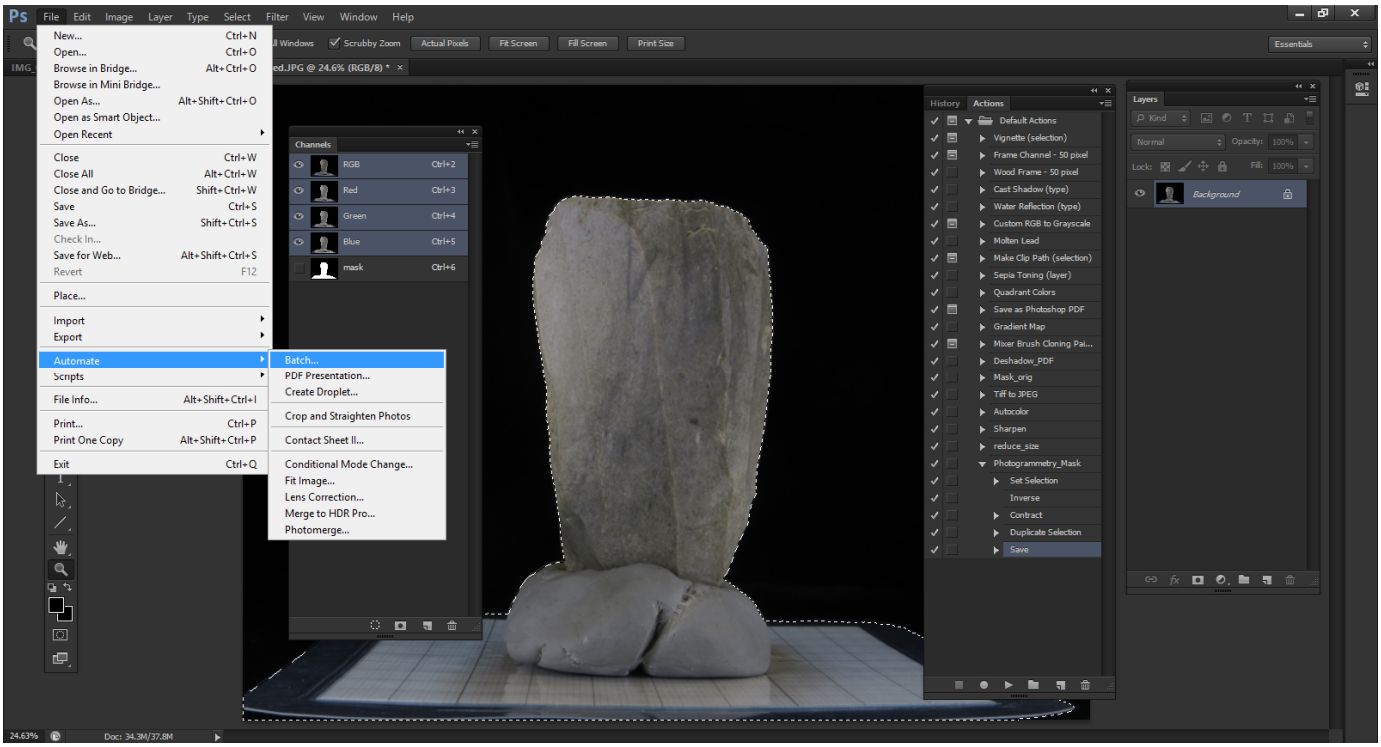


## Step 2 : Running a Batch Process

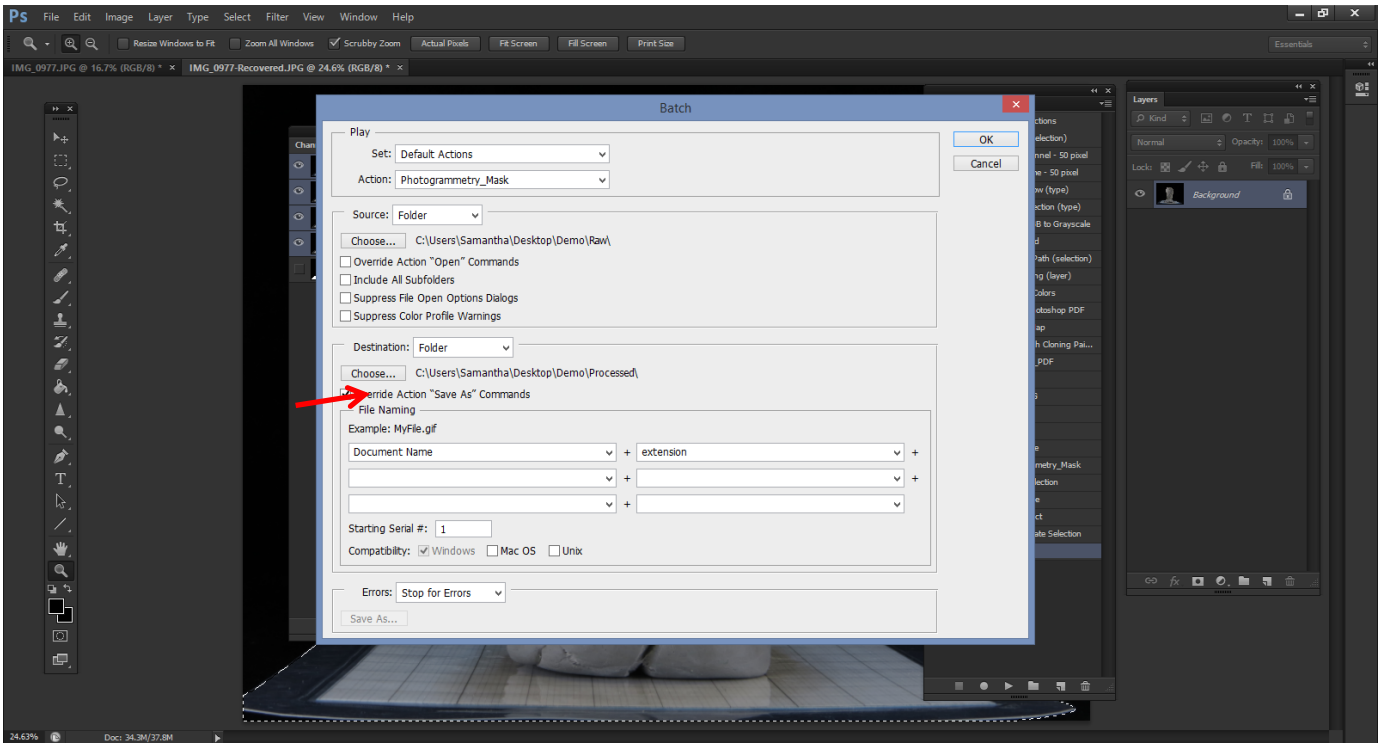
1) Create folders for your raw and processed photos.



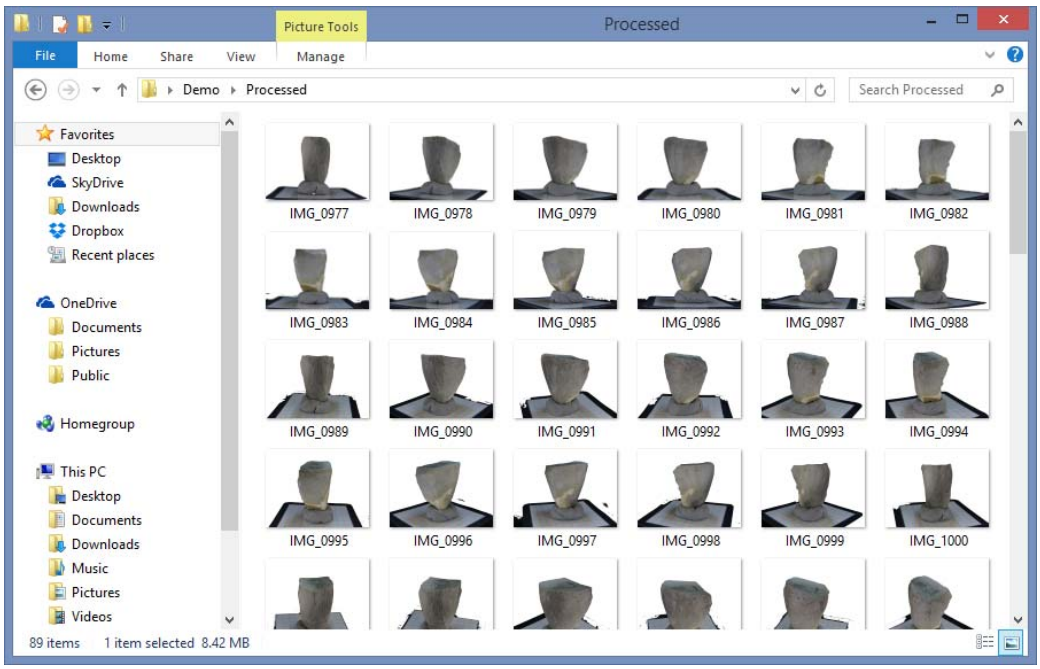

2) In Photoshop click *File* → *Automate* → *Batch*.



3) Select the action you created in the previous step. Set your source folder as the folder containing your raw images. Choose your desired destination folder for your processed images. Make sure that *Override Action "Save As" Commands* is selected (as indicated by the red arrow below). Click *OK*.

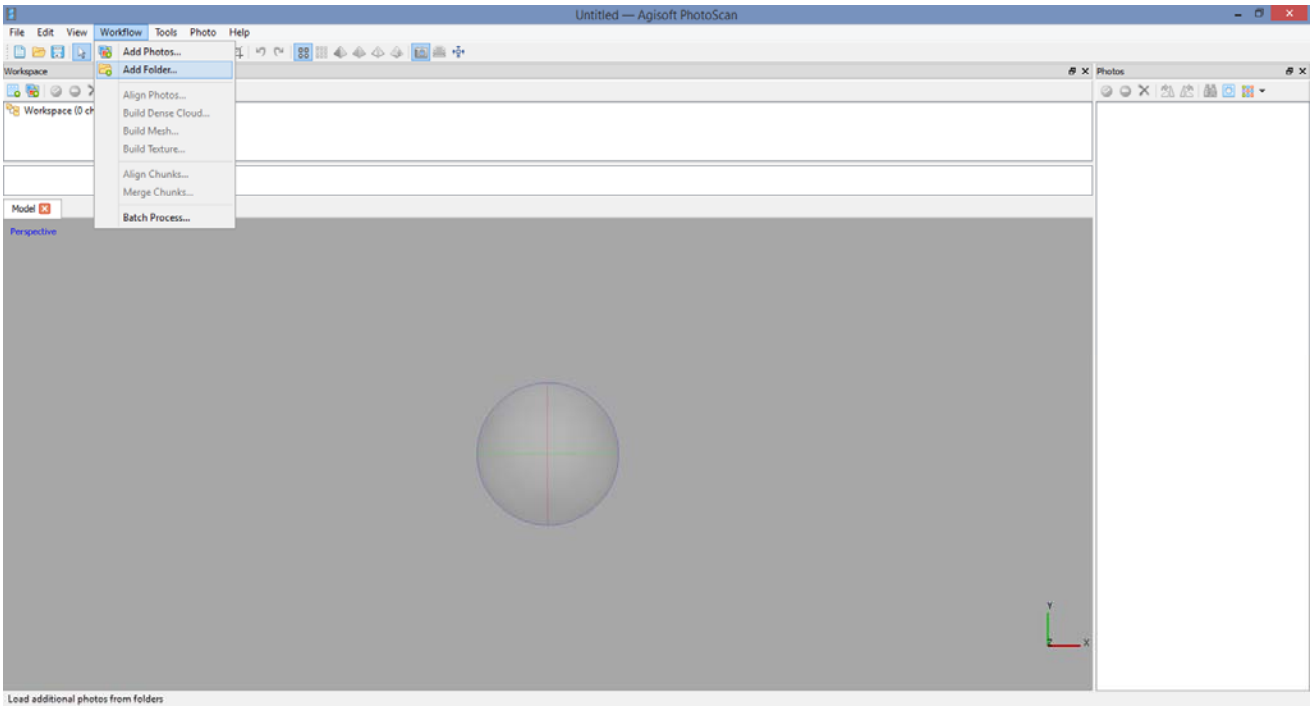



4) Once the batch process has run, if you open the designated destination folder for your processed images, the image thumbnails should display with a white background.

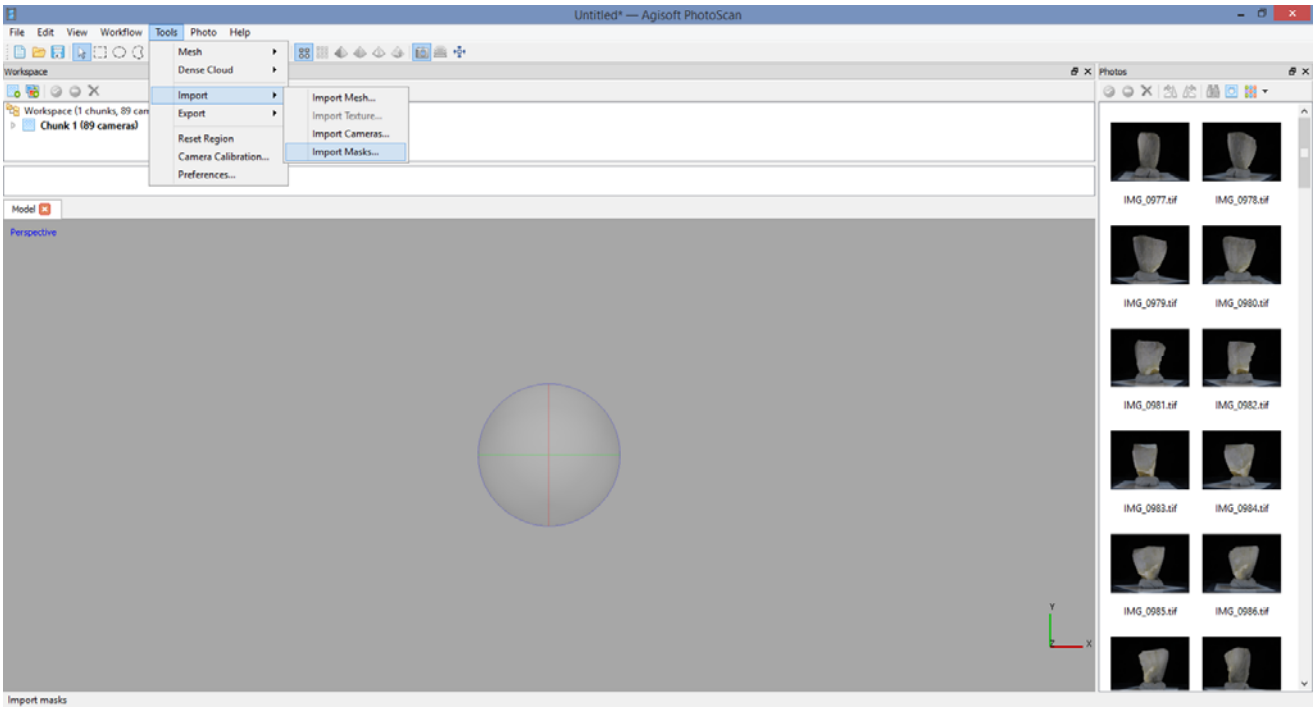


## Step 3 : Importing Image Masks into Agisoft PhotoScan.

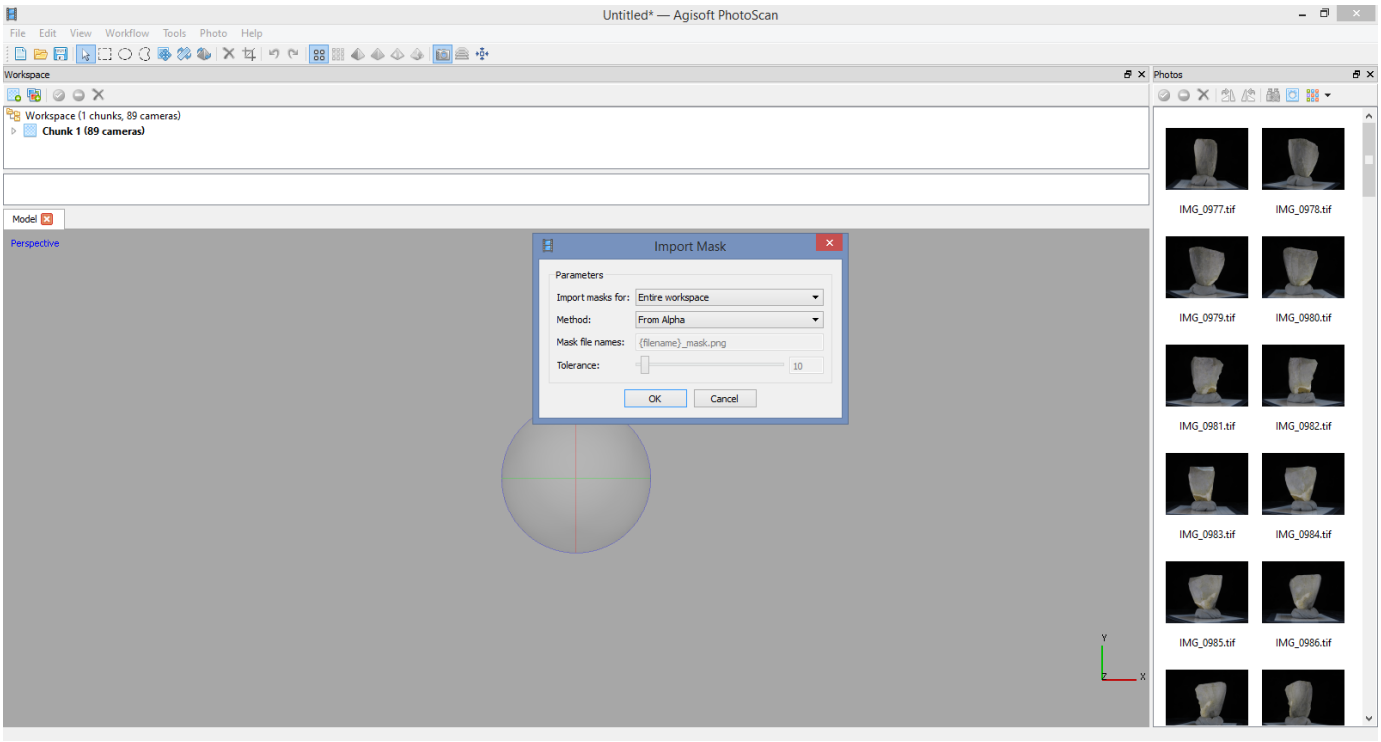
1) Import your photos into PhotoScan by clicking *Workflow* → *Add Photos*. Select the appropriate folder.




2) Once the images are imported, you can import the masks. Do this by clicking *Tools* → *Import* → *Import Masks*.



Import masks for the entire workspace. The method should be set to *From Alpha*. Click *OK*.




Once the masks are imported, you can view and edit them by double-clicking on images in the photo window.