

Unity Tutorials 4 – Terrains

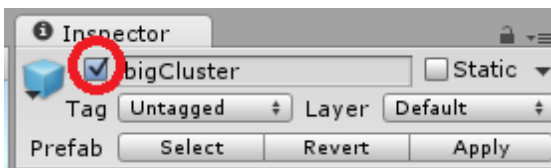
I – Creating a Terrain

Before beginning, load your previous scene. If you don't have one, skip to the next paragraph.

Cleaning up the Scene

The cluster object you created will be in the way during this tutorial, so we are going to hide it. To do so, click on your object so that it shows up in the Inspector. Click on the little check box next to the name. This will make the object non-existent and it will no longer appear in your scene. To bring it back simply click the check box again.

Note: Non-existent objects cannot be interacted with at all. They also cannot be used in scripts.



What is a terrain?

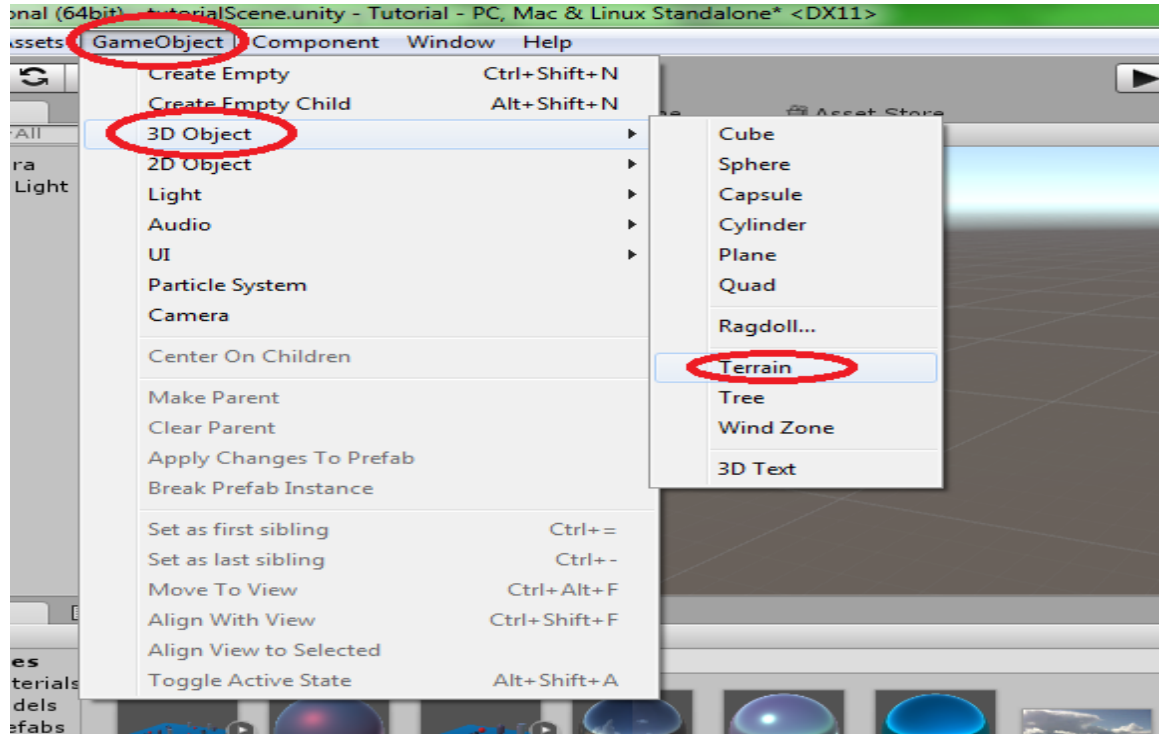
A terrain is a landscape that the user can create within Unity. With a terrain, a user can easily sculpt a floor without needing to model one.

Setting up a Terrain

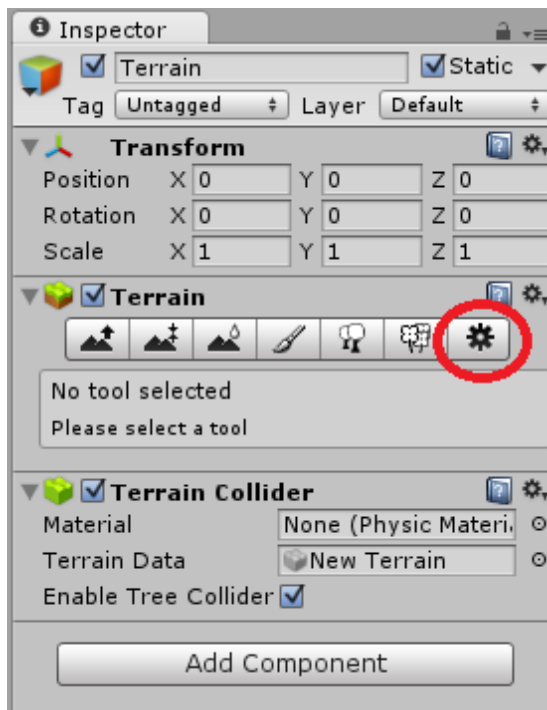
To create a terrain, go to “GameObject”, “3D Object”, and “Terrain”. The terrain will appear in your scene and hierarchy just like any other 3D object.

For starters, the terrain is a bit too big so let's shrink it down.

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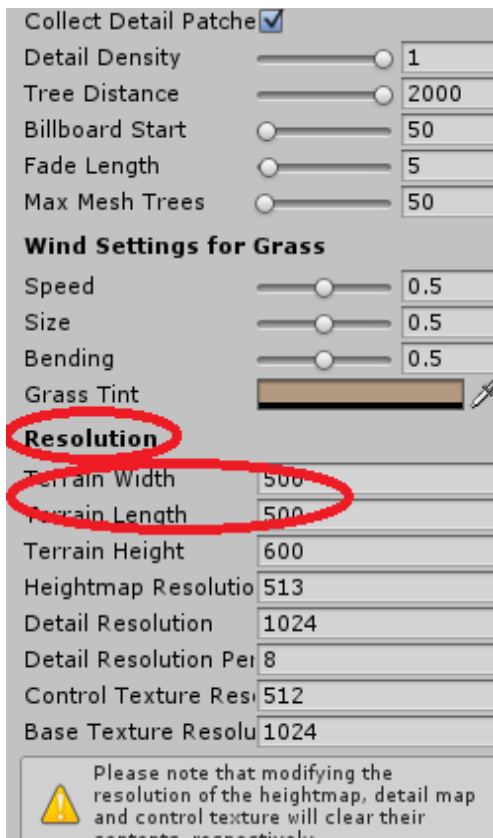
Terrains have an extra settings menu within the inspector.



Click on the gear icon to open it.

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Scroll down to find the “Resolution” section at the bottom. This is where you can change the size of the terrain. Change the width and length to 200 for now. The “Terrain Height” is the maximum height that you can give a particular hill on your terrain.



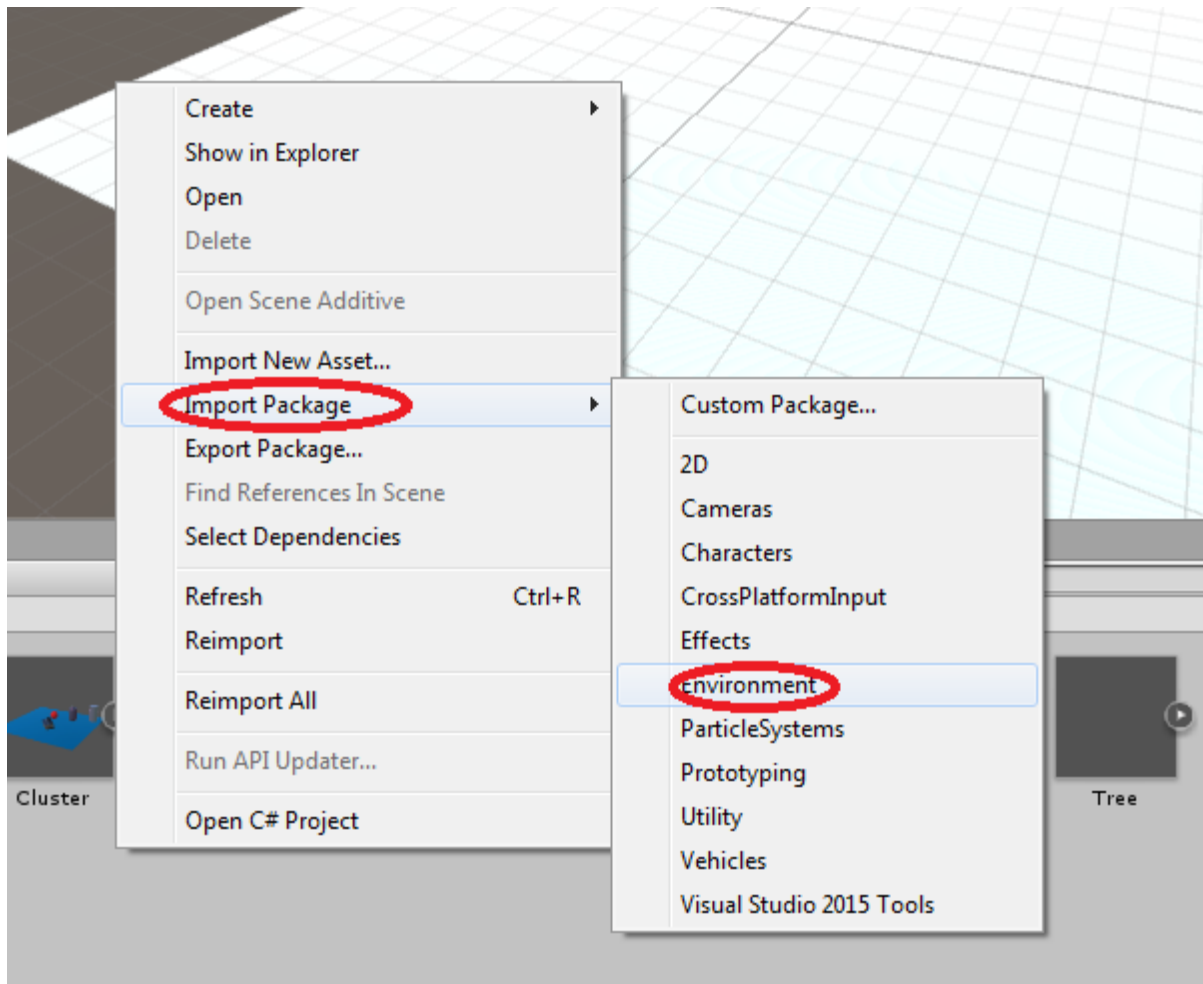
Importing Standard Assets

Standard Assets are a collection of assets that come packaged with Unity. They are not imported into your assets by default, but you can easily import them to make use of them. There are a number of different **packages** that you can import. For this tutorial we will be importing the “Environment” package.

Right-click in your Assets window and hover over “Import Package”. Click on “Environment”.

Package: A package is an entire unity project that is stored in a single file. This file can be imported into other unity projects for easy sharing and moving.

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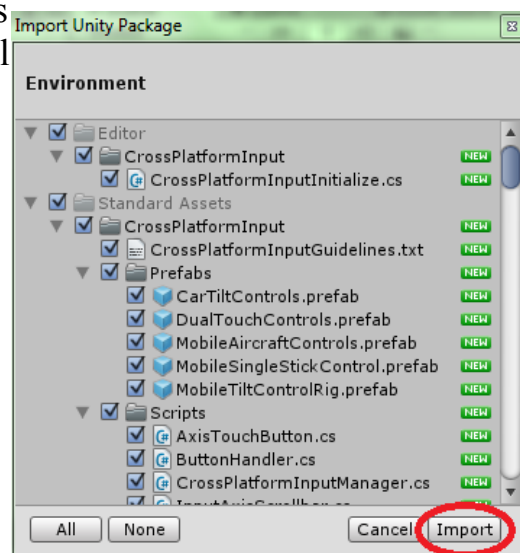


A window will eventually open with numerous items and check boxes. These are all the assets that we will be importing. You can uncheck an asset to skip it. For now, just click “Import”.

Once it is imported you will find a folder in your Assets containing numerous assets that we can use with our terrain.

Important Commands

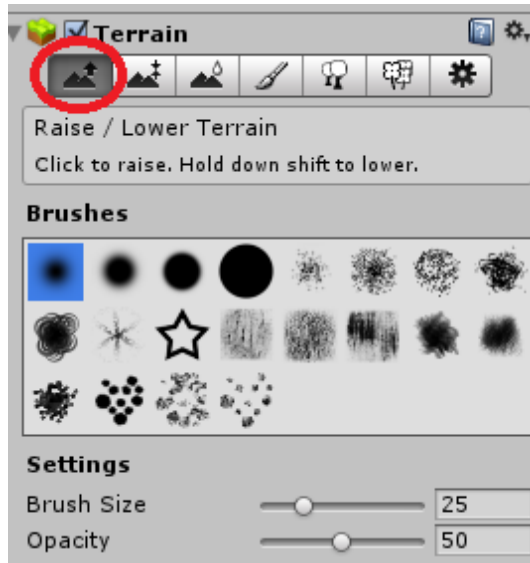
You can press CTRL and Z at any time to undo a previous action. Pressing CTRL and Y will redo this action.



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II – Building Terrains

Raise/Lower Terrain



The Raise/Lower Terrain tool allows you to “paint” hills and valleys onto your terrain.

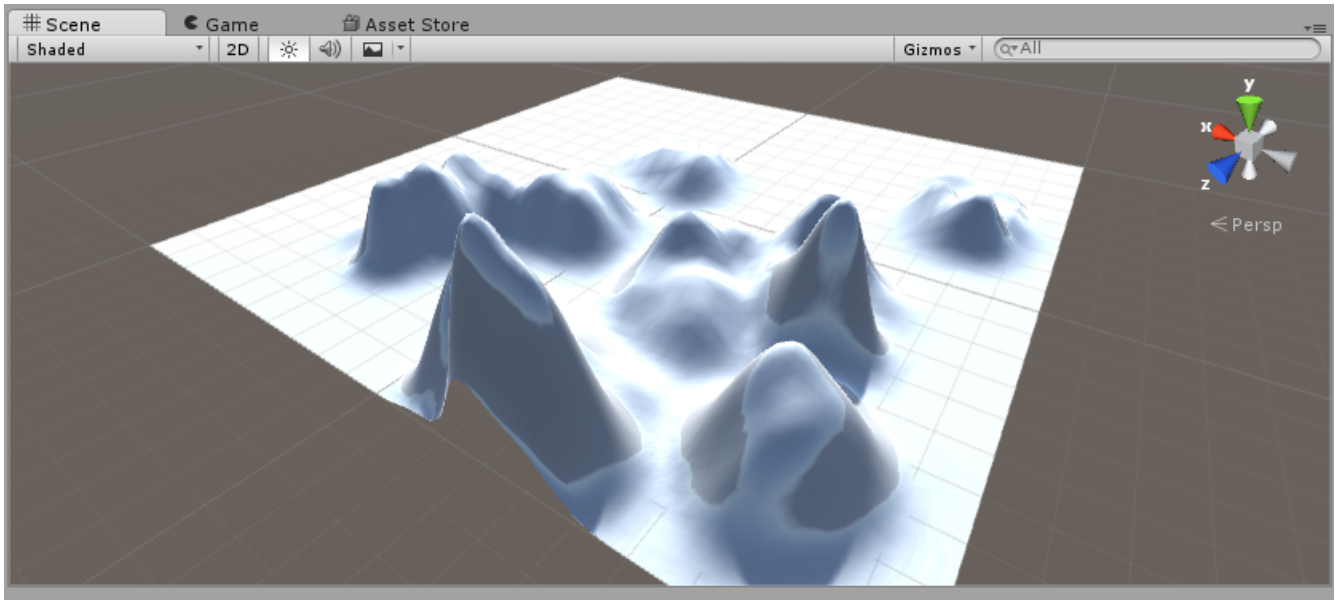
Clicking and dragging over your terrain will raise it, while holding SHIFT and doing the same will lower it. The terrain's height begins at the lowest value, meaning that you cannot lower it past the starting point. If you want to make a valley you will need to first raise the whole terrain.

First try making some hills. The brush option determines the shape of the hill. The brush size determines the size of the raised area. The opacity determines how high the terrain will be raised with each click.

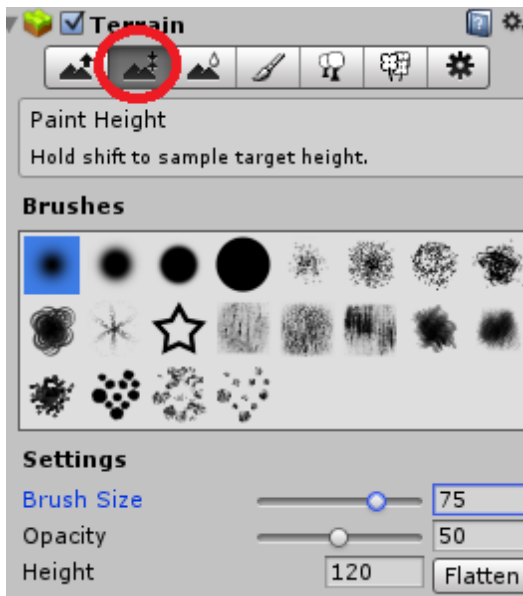
With a 200x200 terrain, a 25 brush size will not be very big. Try changing it to 75 then paint some hills.

Although it takes longer, it is easier to control your hills by repeatedly clicking instead of clicking and dragging.

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Paint Height

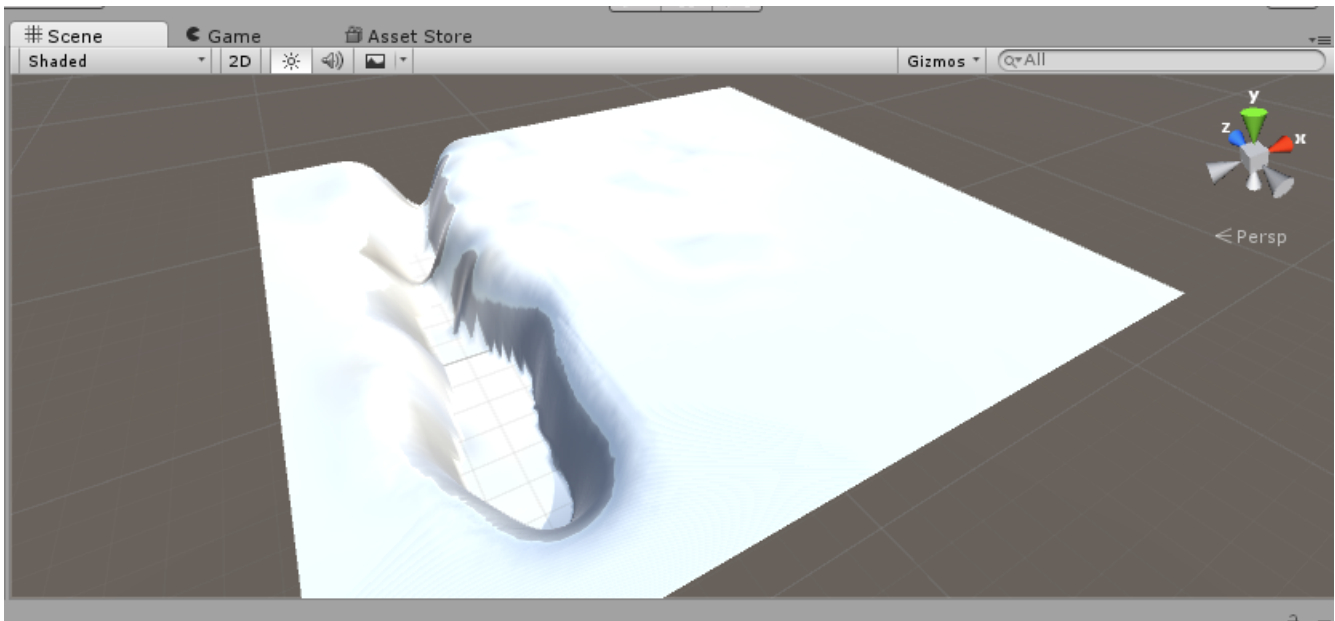


Painting height works much the same as raising the terrain. At the bottom of the settings you can see a “Height” option. This is the max height that the terrain will reach as you paint it. You can set this height yourself or you can hold SHIFT and click an area on the terrain to set the “sample” to that height. Try sampling one of your hills then paint the rest of the terrain that height. It is easier if you increase the brush size AFTER sampling. This way you can quickly paint the entire terrain.

Alternatively, you can press the “Flatten” button.

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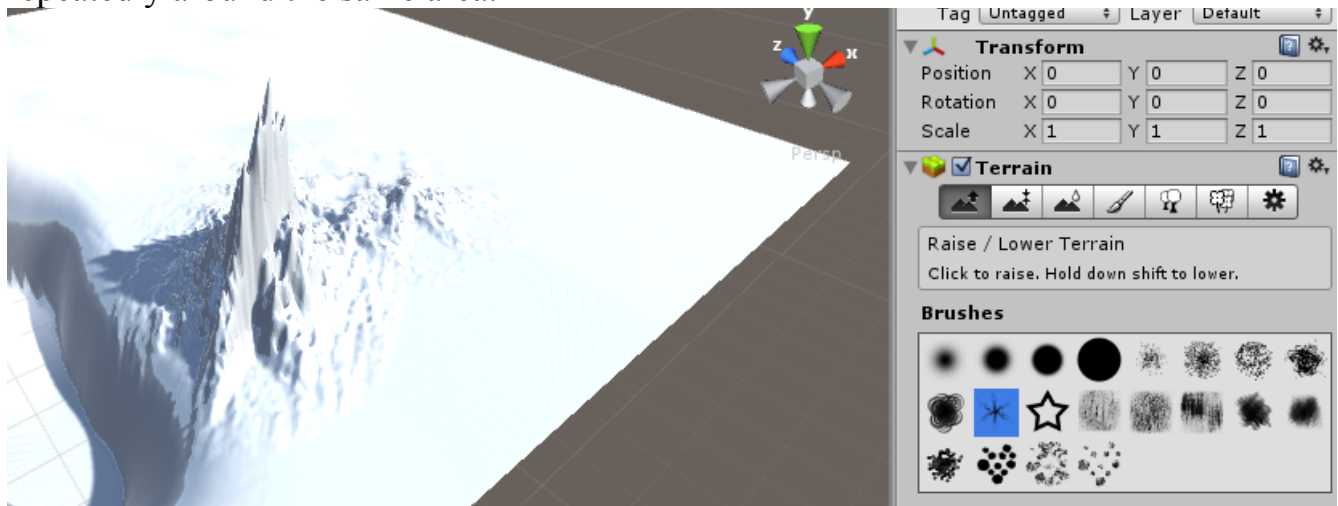
Once that is complete try putting a valley through it using the Raise / Lower Tool.



Smooth Height

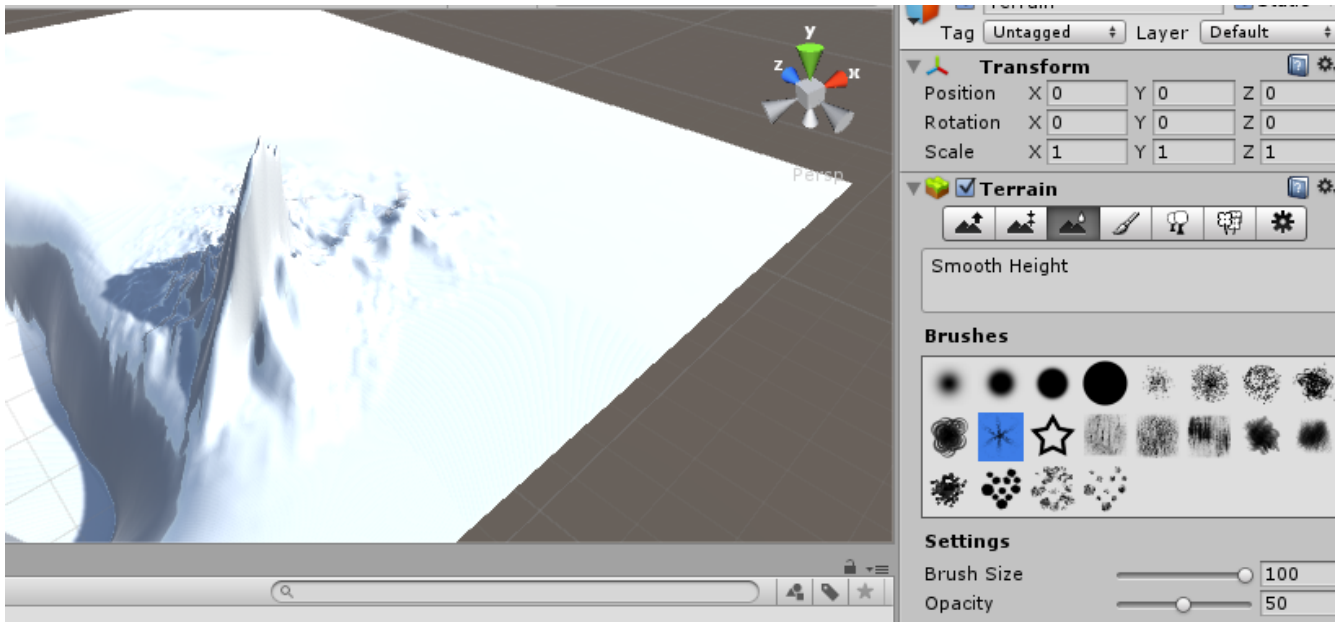
WARNING: Using this tool requires that Unity performs a number of processes every time you use it. It may slow down your computer considerably for several minutes after each use. If this concerns you, you may skip to “Paint Texture”.

This tool literally smooths your hills. Try creating a jagged spire somewhere on your terrain. Do this by using the Raise Tool and one of the less even brush shapes. Now click repeatedly around the same area.



Now you can switch to the Smooth Height tool and click and drag over this area to even out the heights.

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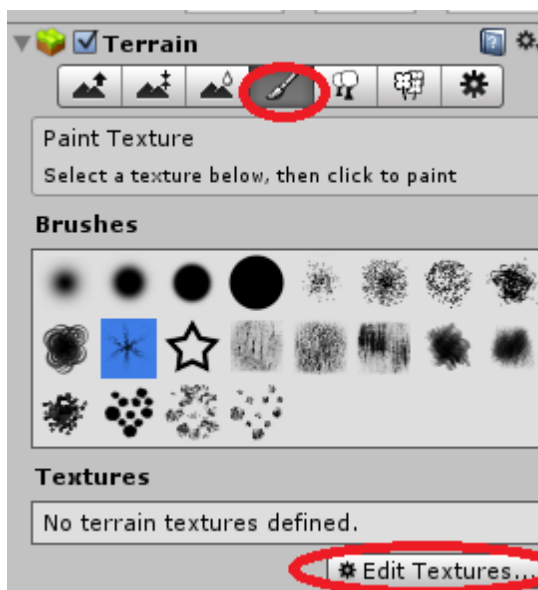


How quickly this works depends on the opacity of your brush.

Paint Texture

Now it's time to give your terrain some colour.

First you will need to **define** some textures. Begin by clicking the “Edit Textures” button.

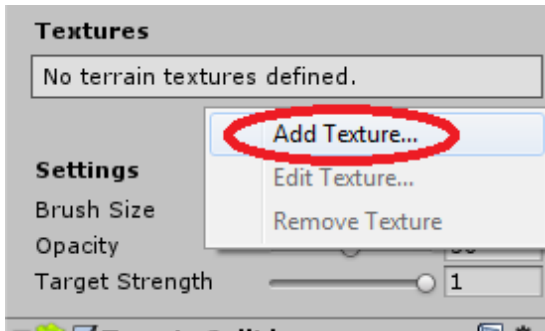


Define: In computer programming, the word “define” means to declare something (tell the compiler that it exists) and give it meaning so that it can be used (by the compiler).

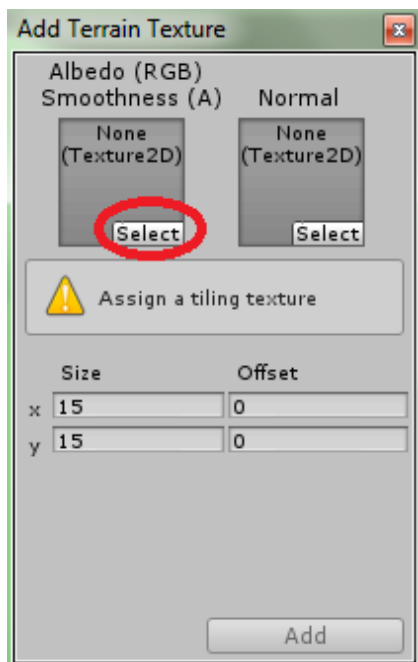
Compiler: A program that translates written code (like C# and JavaScript) into code that a computer can read (machine code).

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Click “Add Texture”.



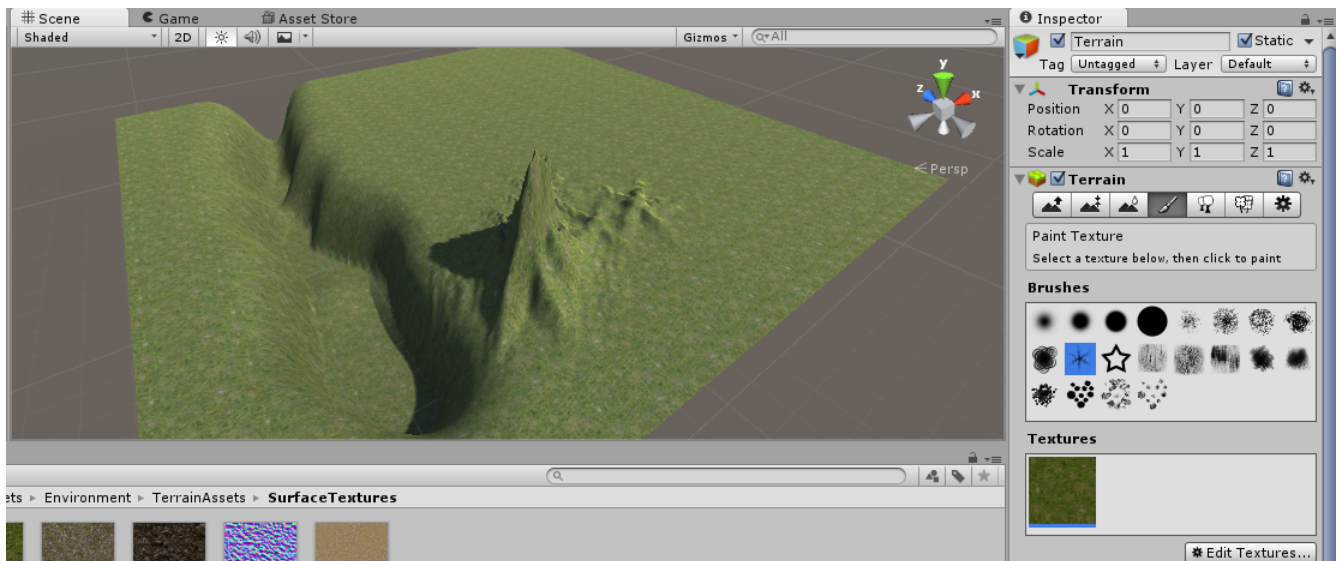
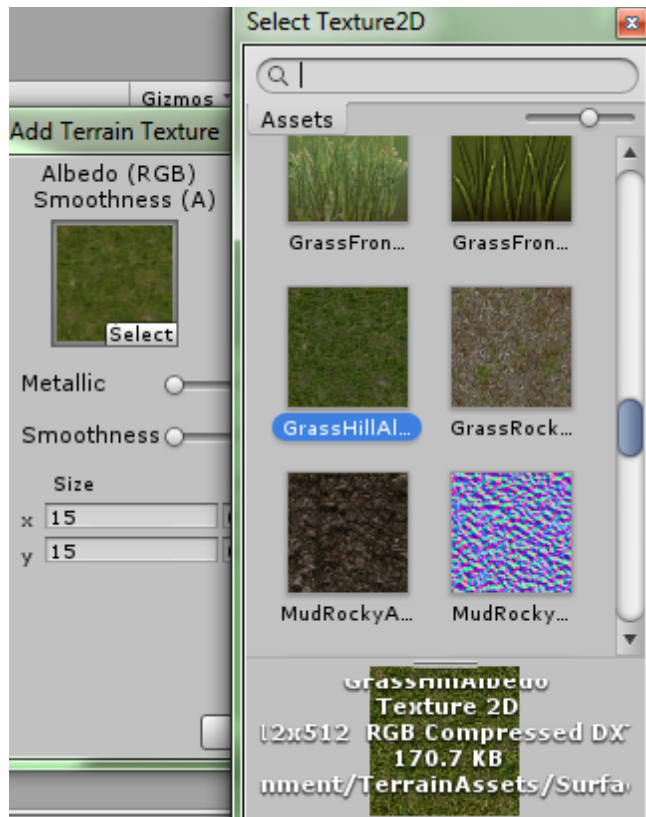
A window will come up and you will be given two options for adding a texture. Remember that “albedo” is the base texture while normal is the bump map. We want to add an albedo texture.



You'll be given a huge list of textures to choose from. Scroll down and find “GrassHillAlbedo”. This texture was imported with the “Environments” package. Double-click it, then click “Add” in the previous window.

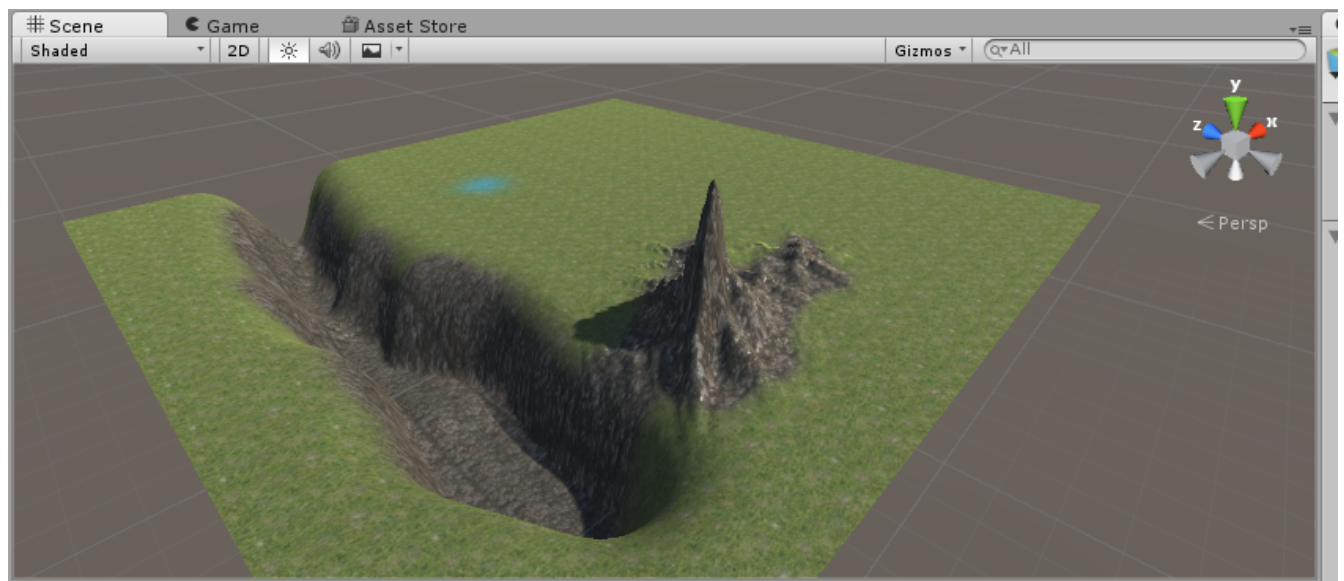
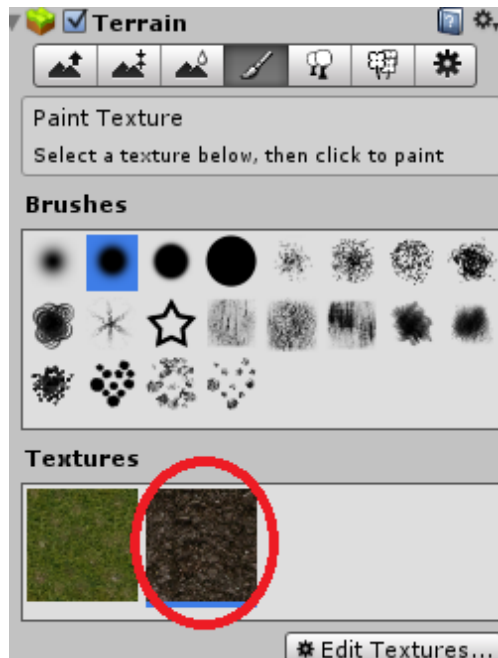
The added texture will appear in the Texture list. It will also automatically cover the terrain with it.

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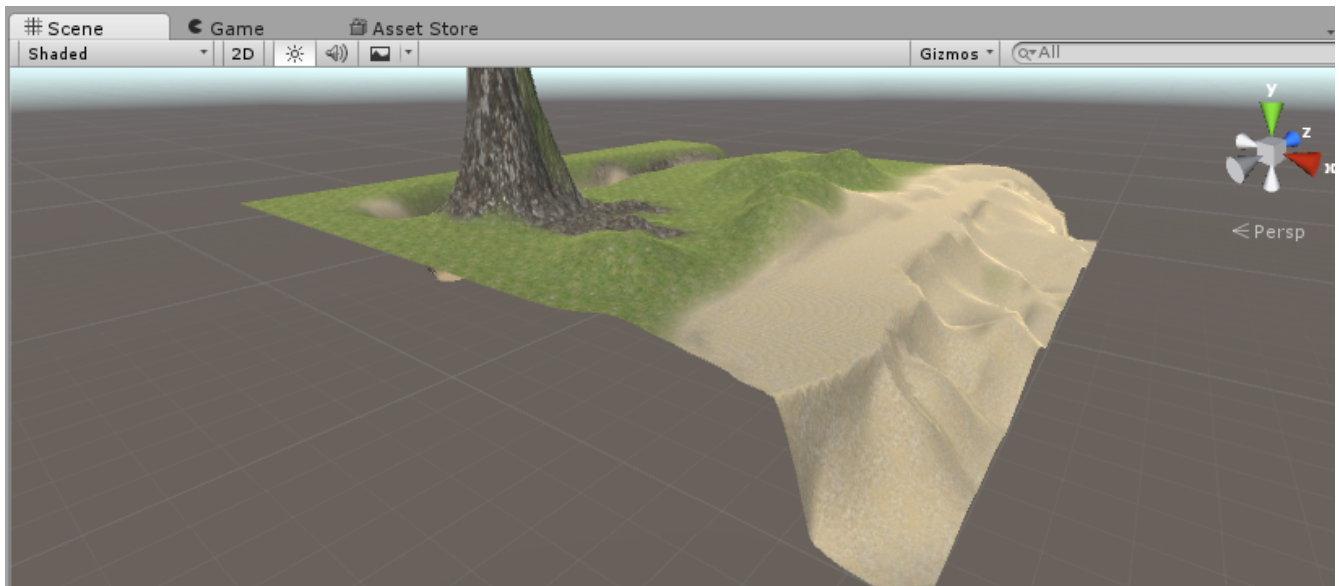
Try adding “MudRockyAlbedoSpecular” as well. It can be found very near to the previous texture. After adding it you can select it and paint with it.

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Try personalizing your terrain some more. In the next section we will be adding water so you may be interested in finding the sand texture and creating a beach.

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III – Additional Features

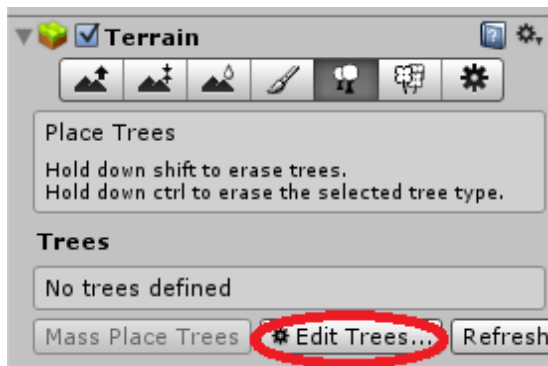
Trees

Just like how textures can be painted onto a terrain, trees and bushes can be painted as well. Remember that these trees and other details are not GameObjects. They are stored as information within the Terrain object.

In order to paint trees we will be using tree models contained in a folder called “SpeedTrees” that comes with the Environment package.

WARNING: The SpeedTree assets that come with the Environment package are problematic and can cause issues later while building your game. This issue will be addressed later in the appropriate tutorial. They are safe to use for now.

Mass amounts of trees will also slow down your game, so please keep that in mind.



Before adding trees you will need to define them just like you did with the textures.

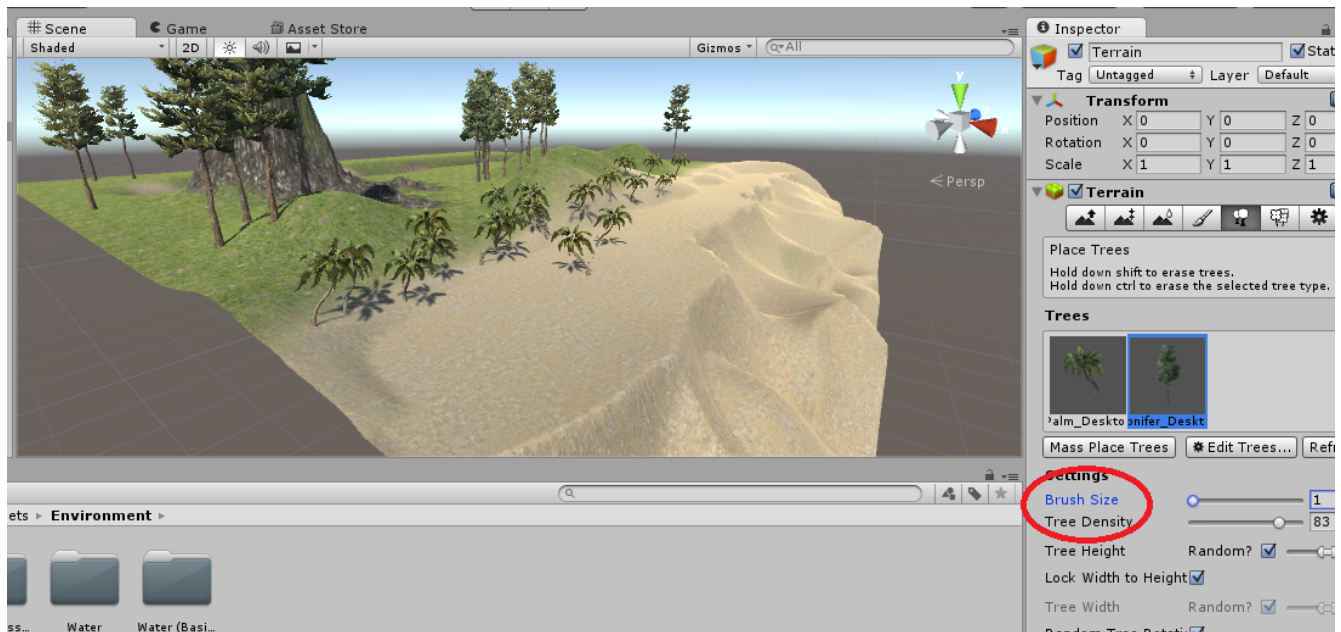
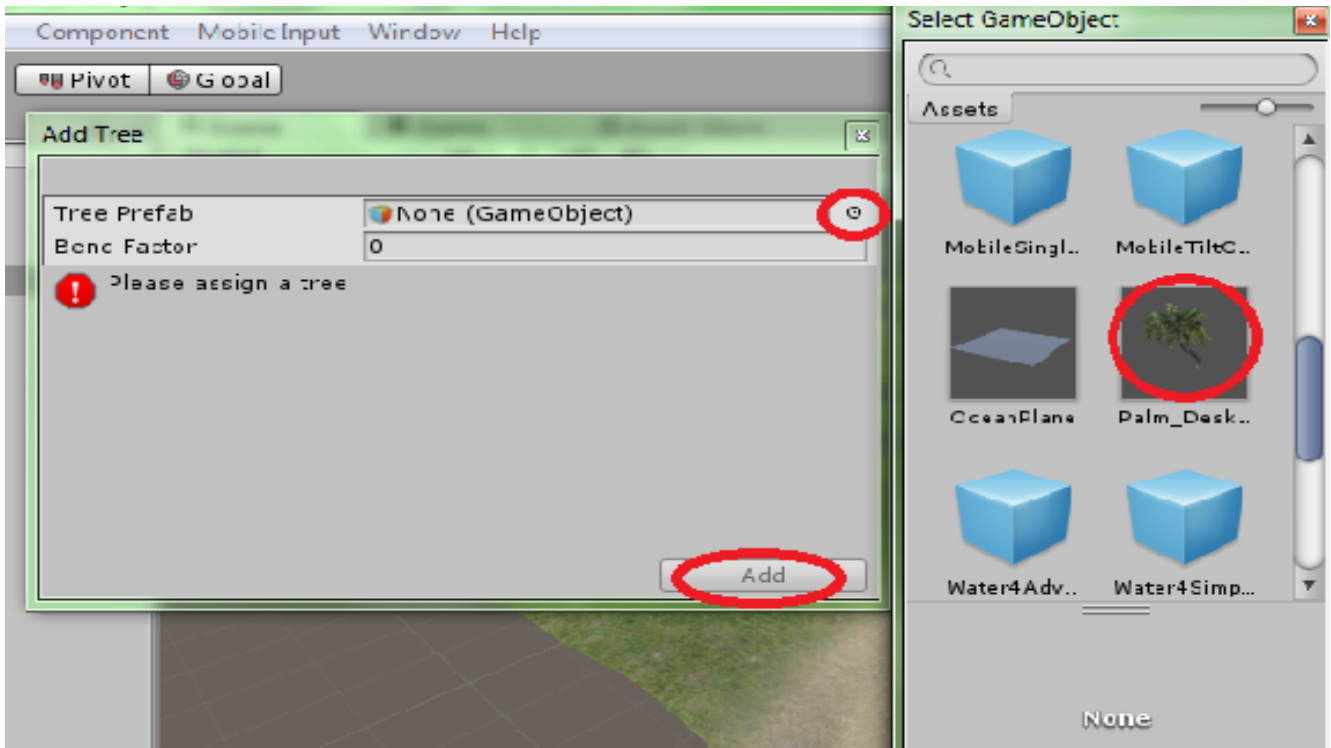
Click “Edit Trees” and then “Add Tree”.

Adding a tree requires that we assign a GameObject, or specifically a 3D asset to it. Click the small circle next to “Tree Prefab” to bring up a list of available assets. Remember that you can import your own tree assets and use them.

Double-click on one of the trees in this list and click “Add”, then select it just as you did with the terrain textures. You can then paint trees onto your terrain by clicking anywhere.

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Before painting you may want to adjust the settings. You can change the Brush Size to 1 to place one tree at a time. You can also change the density to adjust how close the trees should be placed to one another when the Brush Size is above 1.

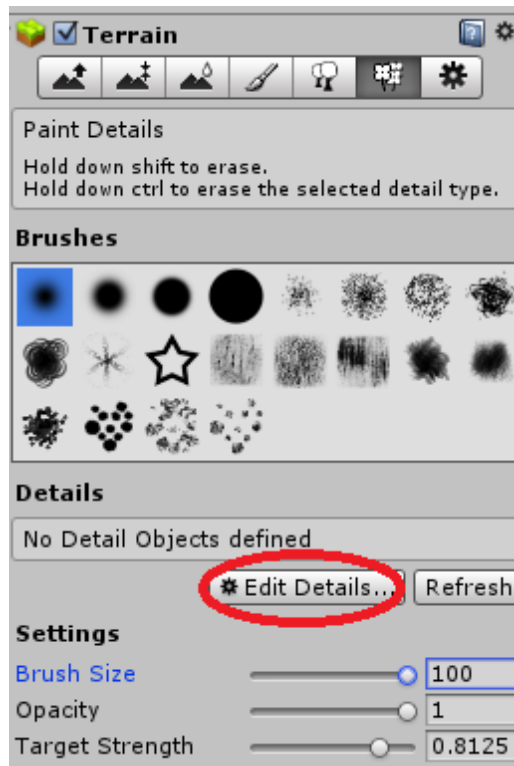


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Details

“Details” function similarly to trees. Details are generally smaller plants, like flowers and grass.

Same as before, go to “Edit Details” and click “Add Grass Texture”.



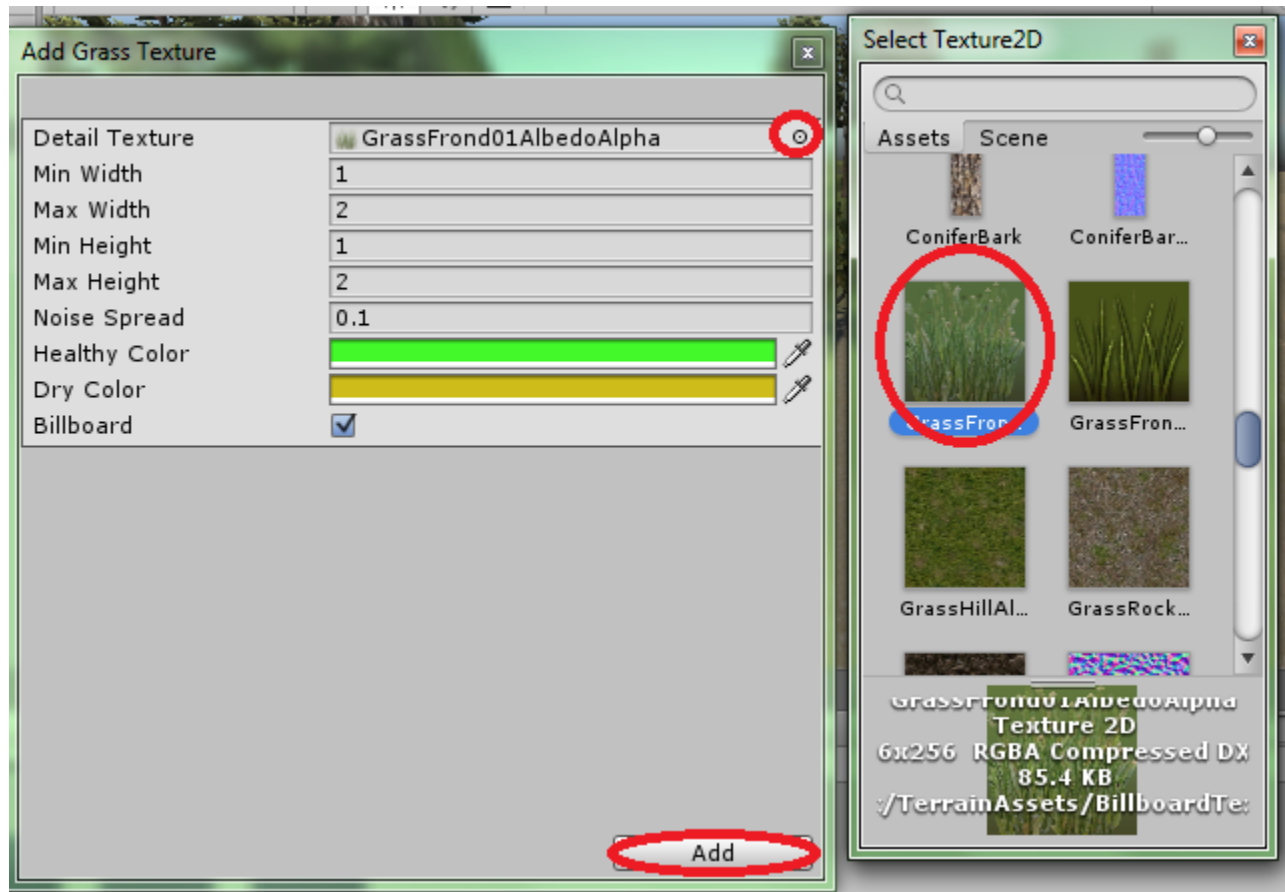
The options for adding grass appears to be much more complex than trees, but it's actually quite simple. The minimum and maximum width and height is just as it sounds. Each “grass” that is painted on will have a random width or height between these two numbers. The Noise Spread determines how varied the grass will be.

The two colours will together form a gradient. Healthy grass can be found closer to the centre of patches.

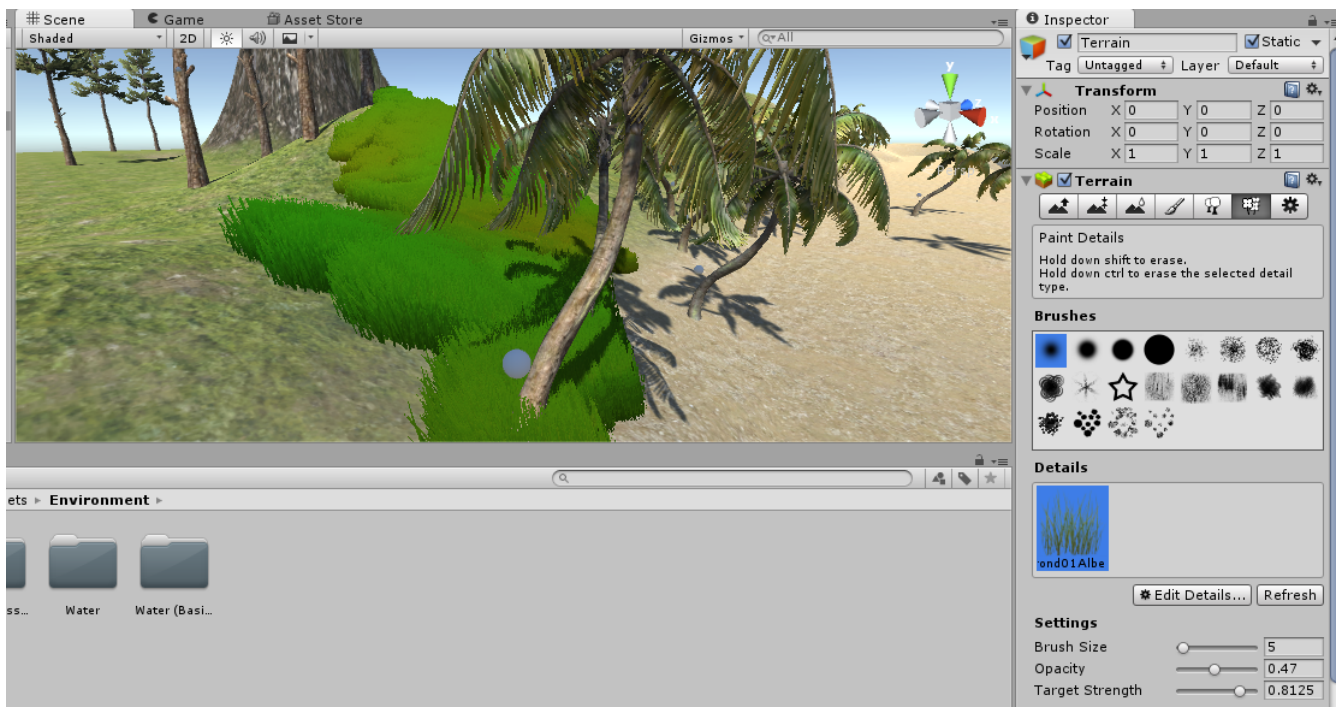
The Billboard option turns grass into 2D sprites that will always face the camera. This makes the game run faster, but smaller areas of grass may look strange with this option enabled.

At any rate, click the small circle next to “Detail Texture”. You can find grass textures near the terrain textures from earlier. Double-click on one, then click “Add”.

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Same as before, select the grass then click on your terrain in the Scene View to paint. Notice that you have to be quite close to grass in order to see it. This is done to speed up your game.



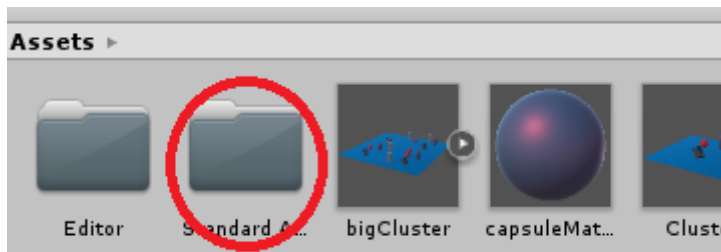
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Water

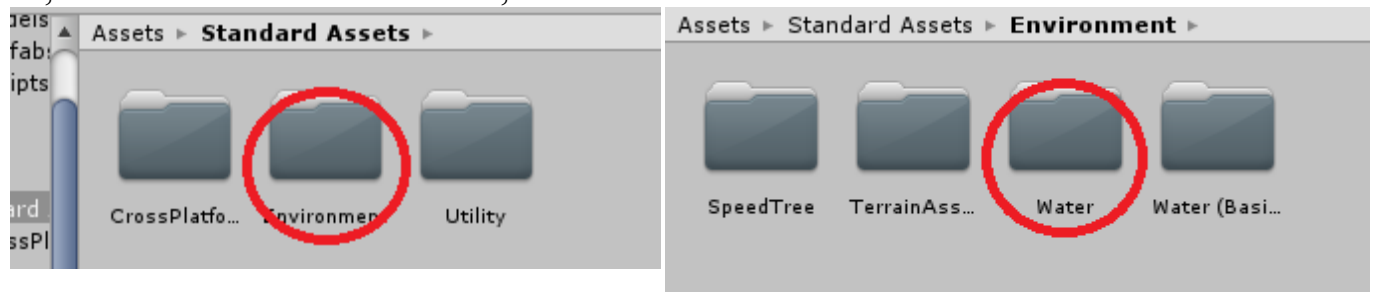
Water is not actually related to terrain, however one would generally place it in their scene at the same time as their terrain.

The Environments package comes with a number of different water GameObjects to use.

Double-click on the Standard Assets folder to open it.



Next, double-click on Environment, then Water.



“Water (Basic)” also provides a number of water models to use, but we will not be using them.

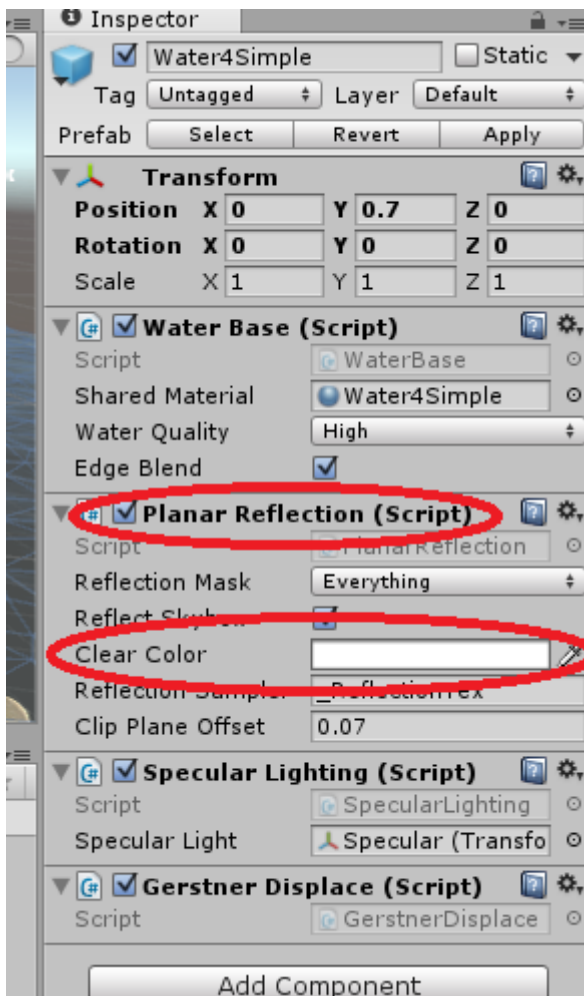
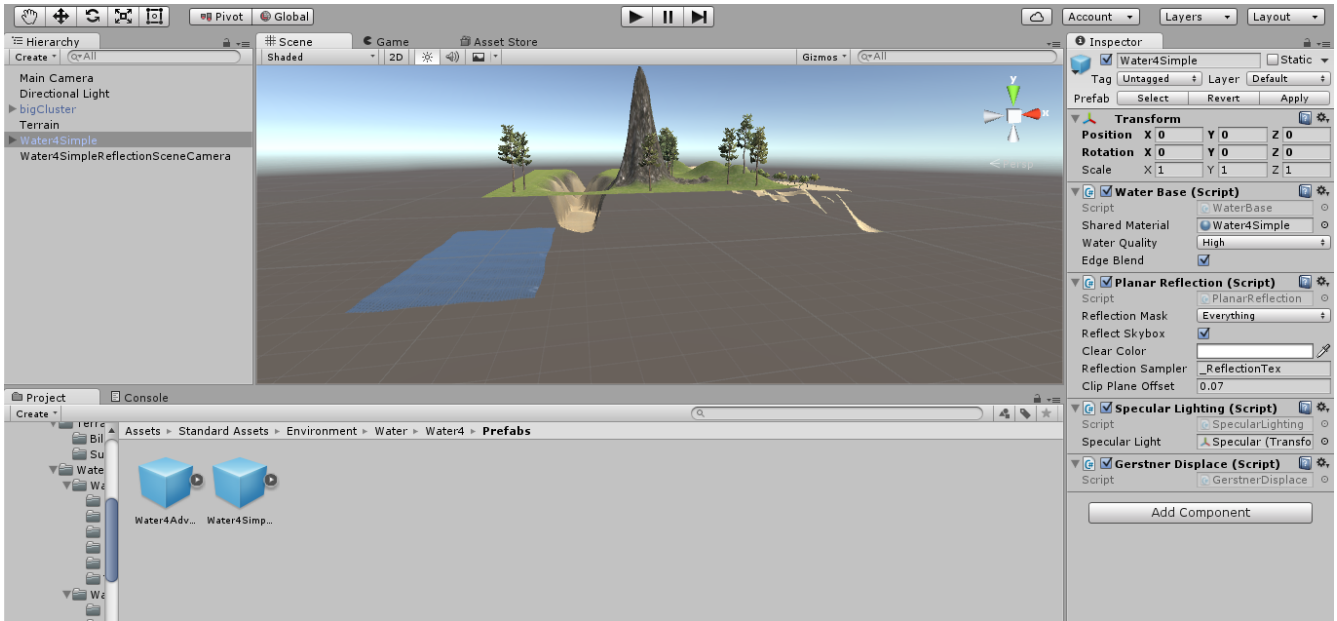
Finally, go to Water4 and Prefabs.

Here you will find a file called “Water4Simple.prefab”. Drag this into your hierarchy or into your scene view.

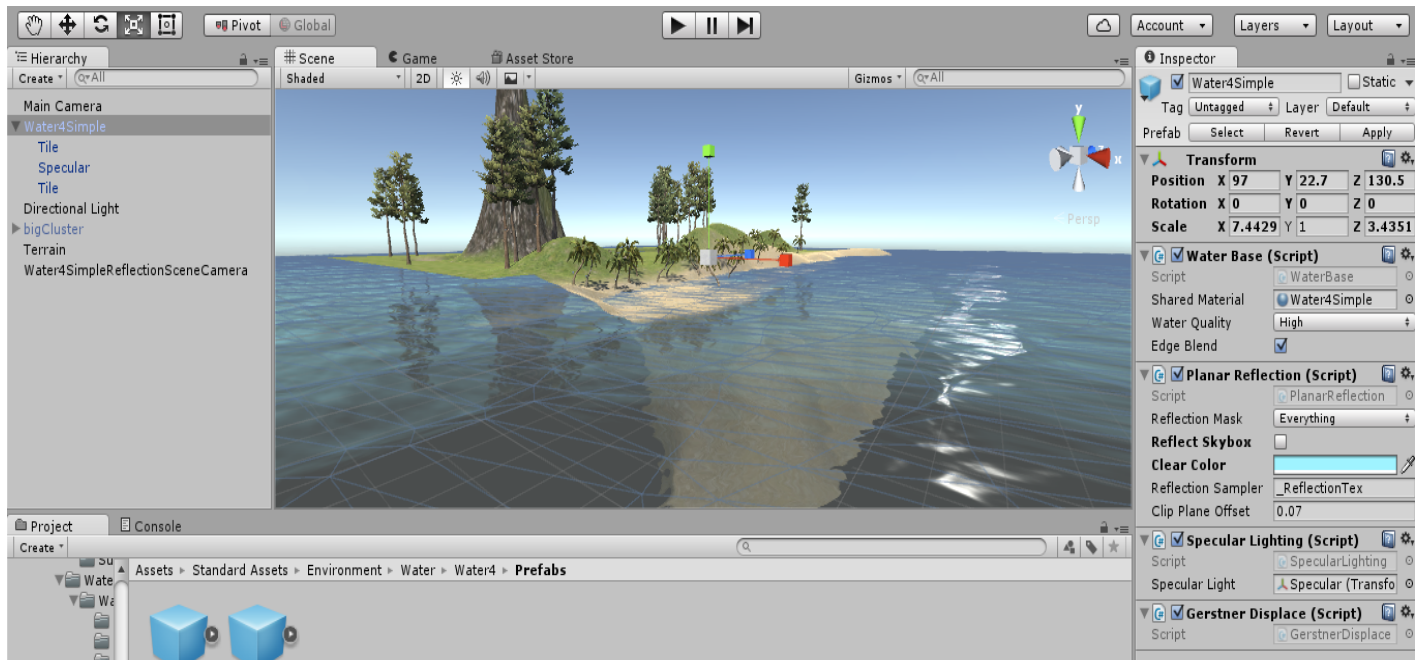
It likely won't be in the proper position. It also isn't large enough to cover the terrain. Drag it around and scale it using your object tools to make it fit the terrain properly. Remember that this is a GameObject and should be treated as such.

If you're interested in making your water a different colour, there is a script in the inspector called “Planar Reflection (Script)”. Under this is a colour-picker. You can use this to change the colour. You will need to uncheck “Reflect Skybox”.

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IV – Height Maps

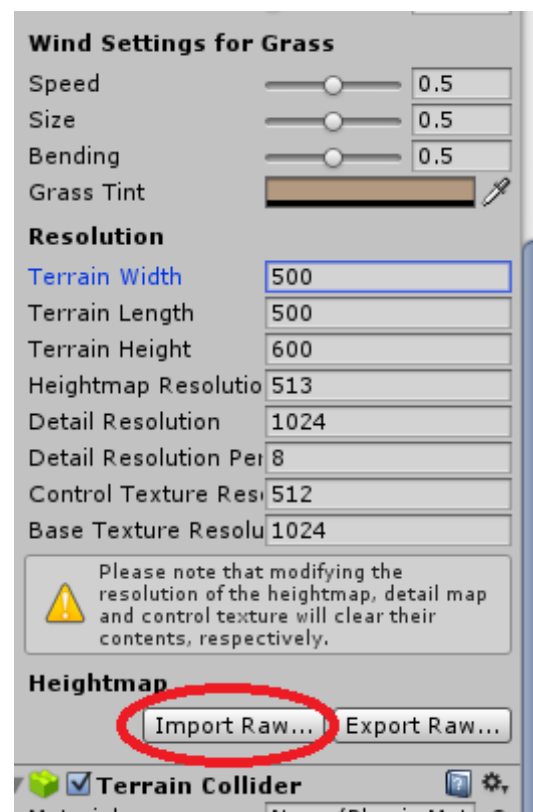
Note: This section requires the use of an image editing software capable of exporting .raw files. If you cannot access such software you can still continue reading if only to understand how height maps work.

A height map functions similarly to other “maps” used by Unity that determine what a texture should look like based on colouration, kind of like heat vision. Height maps in particular determine the height of a terrain based on a greyscale image. That is, an image that only contains shades of grey.

Black areas will be the minimum height (0) and white areas will be the maximum height (600 by default). Below is a 256x256 greyscale gradient. The dimensions do not need to match your terrain's size, however it is wise to use the proper ratio.



At the bottom of the settings in the inspector for terrains is an option that says “Import Raw...”. The “Export Raw...” button can be used to export a terrain's height map for editing purposes.

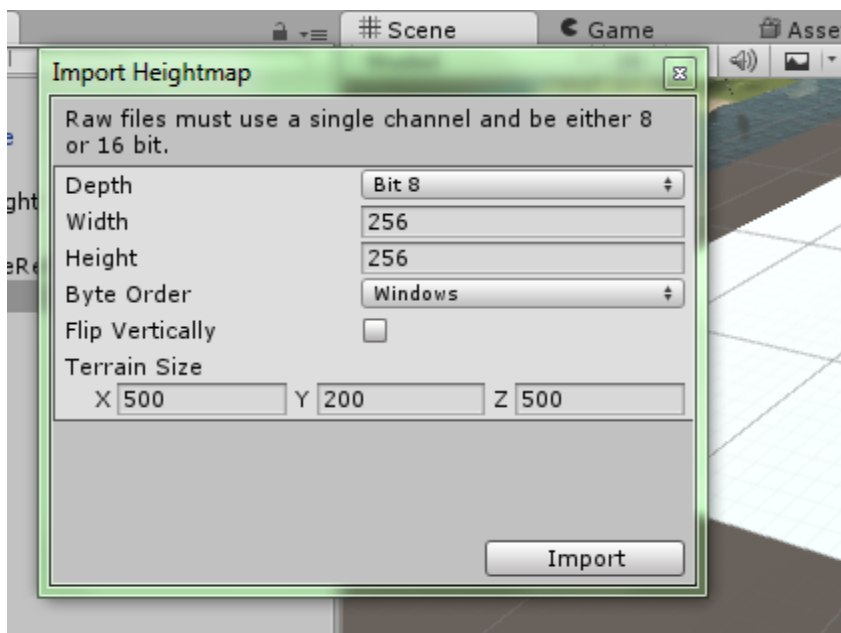
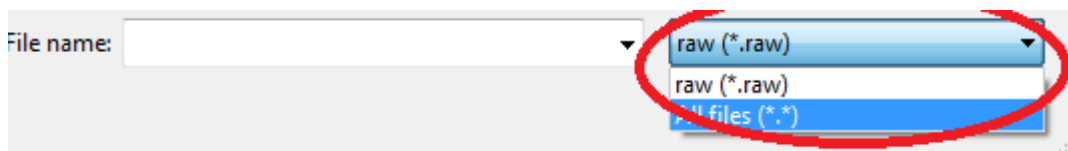


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Once you have selected your file a new window will come up. If you cannot find your file it may not use a **.raw extension**. If this is the case then you can change the file type that you are searching for to “All files”.

There are number of options in the new window that you will need to consider. First, the Depth corresponds to the colour depth of your image, so you will need to know whether you exported your image data as 8-bit or 16-bit. 16-bit is ideal, but certain programs can only export as 8-bit.

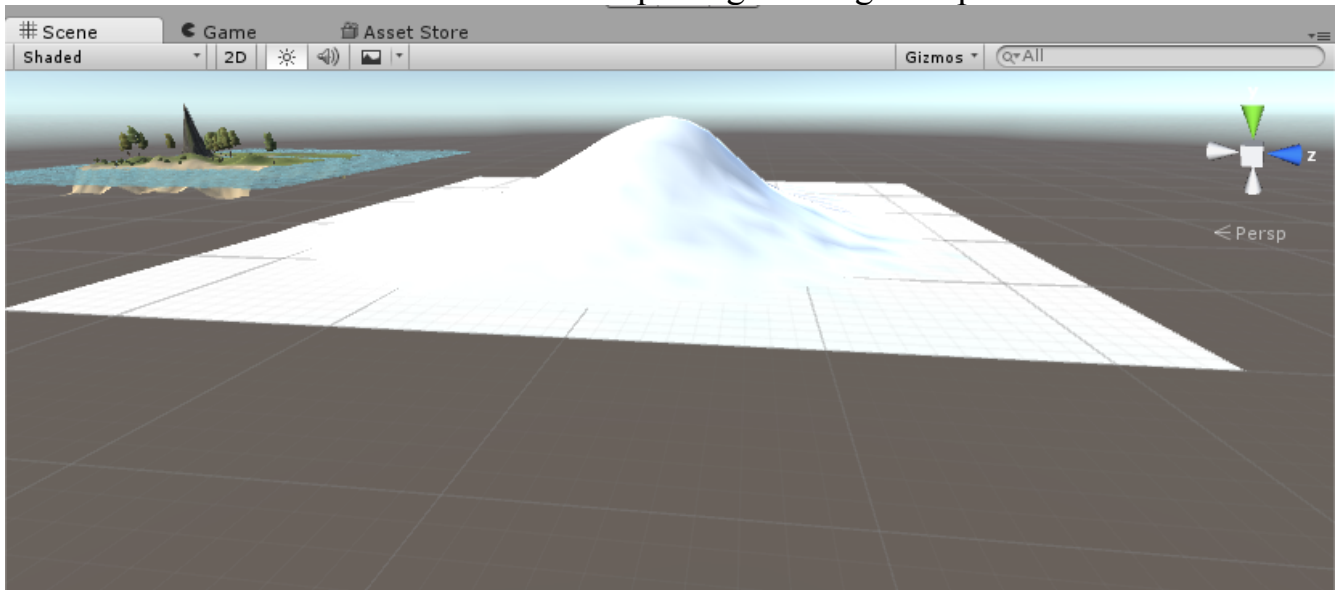
The Width and Height must match the dimensions of your image. Changing the Terrain Size will simply change the size of your terrain. For example, the terrain being used began with a width and length of 500 and a height of 600. The maximum height is now being changed to 200.



Extension: The last part of a file name (.png, .jpeg, .doc...) that denotes the file type.

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Here is what the terrain looks like after importing the height map.



This is the end of this tutorial. Before you close Unity, try bringing your cluster object back and place it somewhere on your terrain.

