

## Arcane Forest Environment

Thank you for buying this pack.

This pack provides assets to create desert scenes.

The problem solutions and tips provided below refer to the date of this writing (17.06.2013). As you read this, the problems may be obsolete by now because they are resolved by Unity.

### Line above grass

You may have encountered that sometimes there is a weird flickering line displayed above your grass textures and sometimes there is not. There are several threads on the Unity Forums dealing with this problem. I want to describe it a bit in depth now.

The reason for that line is the method Unity uses to handle the terrain detail textures internally. Unity takes all detail textures (both grass and detail mesh textures) and combines them into one or several texture atlases. That simply means that one texture is placed next to each other.

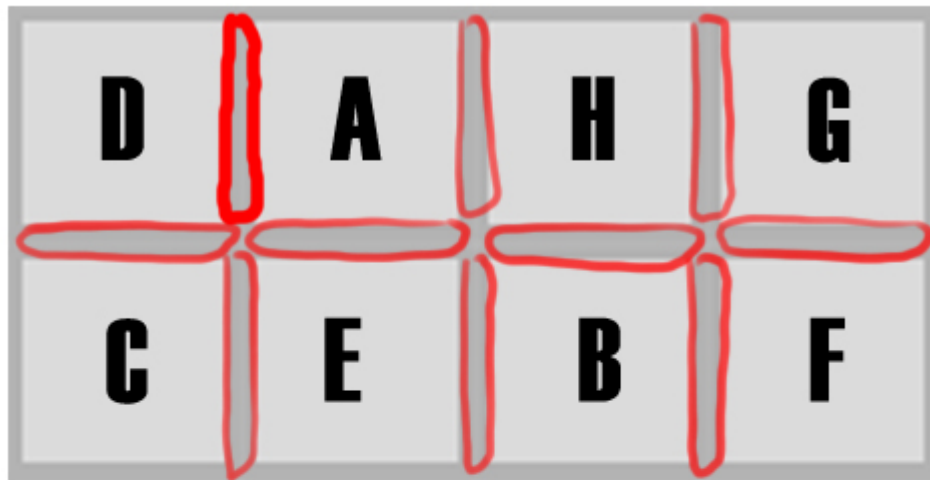


**8 single detail textures**



**combined into one texture atlas: textures are placed next to each other, in several lines. No space between the textures. Placement of the textures in the atlas is random.**

The problem is that Unity doesn't add some room between the textures in the atlas. Instead there is some overlapping on the borders of each texture. This means that the bottom of a texture in the first line of the atlas will become the top of a texture in the second line. And this causes the line above the grass in the game environment. Note: this also affects the left and right borders of each texture, not only top/bottom.



**These are the problematic areas, where the textures touch each other.**

The solution to this problem is pretty easy: Transparency on all borders of all terrain detail textures. This means there must be some empty (transparent) space on all borders. Remember: Not only the grass, but also the detail mesh textures need to have a transparent border.



The chessboard pattern in the pic above represents a transparent area. When the texture is done, save it as a PNG. This file format supports transparency. There are also other formats like Tiff or Targa that support an alpha channel. But for a simple grass or detail mesh texture I would recommend using PNG.

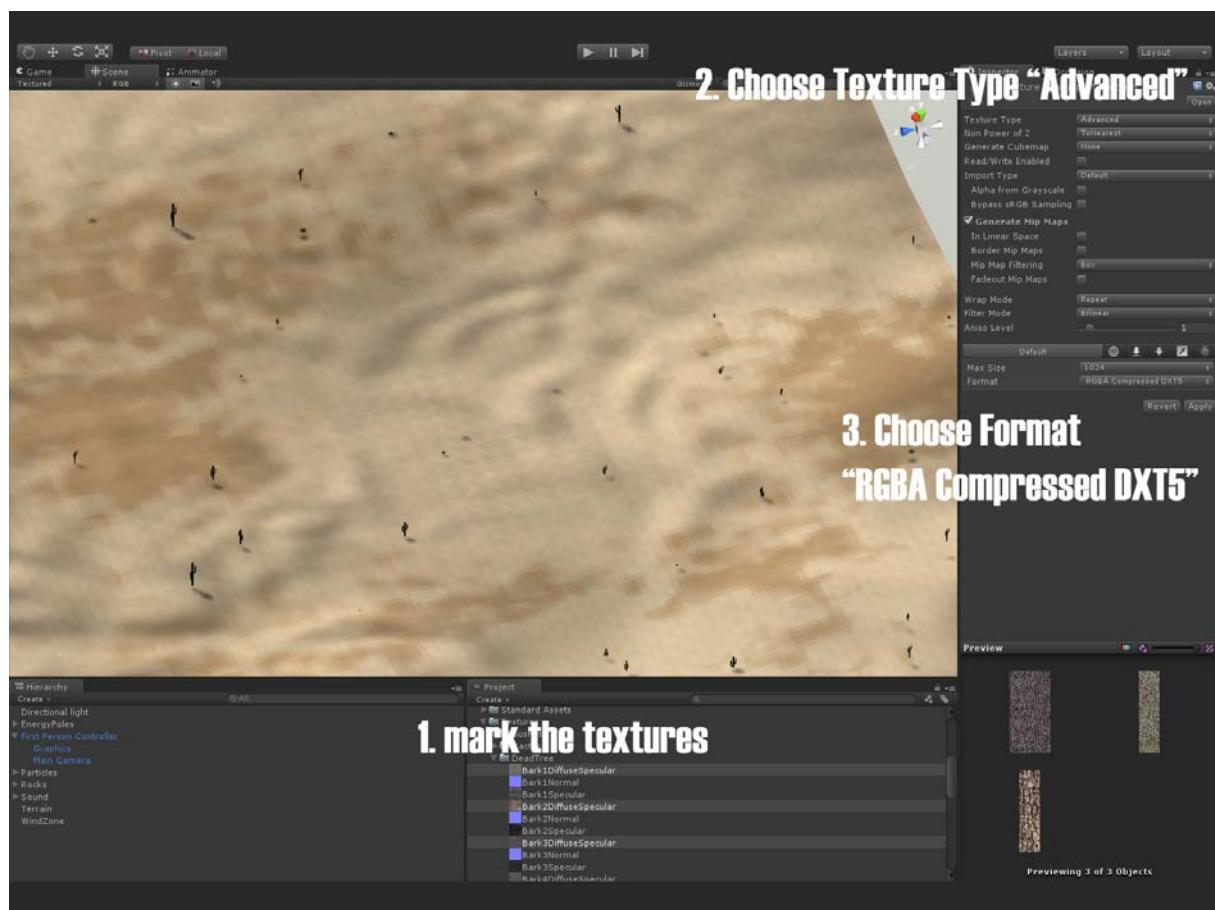
## Trees + Bushes

The trees in this pack are designed to work with Unity's terrain tool. They all use the Nature/Tree Soft Occlusion Bark Shader. This shader allows that the trees can be painted onto the terrain. They can also be mass placed (Terrain -> Mass Place Trees...)

The big advantage is that the trees are billboarded at a specific distance. That means the mesh tree is replaced with a low resolution 2D texture that always points into the direction of the camera. This is great for performance and decreases the tris count.

The disadvantage however is that the tree soft occlusion shader doesn't support normal and specular maps. So you will only have a simple diffuse map on your trees.

In case you don't want to use the tree soft occlusion shader but a bumped specular shader, the needed tree textures are provided. In the Textures/DeadTree Folder you will find normal maps. The specular maps are stored in the alpha channel of the diffuse map. To see specular effects, you must reimport the DiffuseSpecular textures. Mark the textures you want (holding CTRL + left click on several textures) so you can mass edit them.



The Specular maps are also provided separately to use with other shaders.

You might have wondered why bushes are floating weird above the ground when you place them as terrain detail meshes. That is because your bushes usually have transparent areas in their textures. And transparency is only displayed correctly if you choose "Grass" as render mode. But then the detail mesh is affected by the terrain wind settings for grass. And that causes the wild floating around.

The solution is placing your bushes as trees. Just add the bushes the same way you add a tree to the terrain tool. As bend factor I recommend 1 for trees and 1 – 2 for bushes. Then your trees and bushes will bend in the wind.

But for that you must set up a wind zone first. Go to GameObject/Create Other/Wind Zone and you have one in your scene.

Check here for more information: <http://docs.unity3d.com/Documentation/Components/class-WindZone.html>

**Important:** Use the Nature/Tree Soft Occlusion Leaves shader for your bushes, so you will benefit from the same advantages as trees (billboarding).

## Baking Dual Lightmaps

First: what are lightmaps and what do they do?

A lightmap is a texture that is blended over your scene. It contains baked shadow information. So its basically a texture to display shadows. But why should you use them.

Well, lightmaps are a big improvement in performance. Because shadows are one of the most performance heavy things in a scene at least when it comes to draw calls.

There are basically two ways to display shadows (and also lights): real -time or baked. Real time shadows do what they say. They are generated in real time, that means during runtime, when you play your scene. Depending on the number of objects in your scene this can cause a lot of draw calls. And most of them are unnecessary. In general you only need real-time shadows for dynamic, non-static objects, like e.g. your character or the enemies. But for all the static objects in your scene real-time shadows are unnecessary.

And this is where you want to use lightmaps. Since most of your level art is static you can bake their shadows (and also lights) into a lightmap texture that replaces the real-time shadows for these objects then.

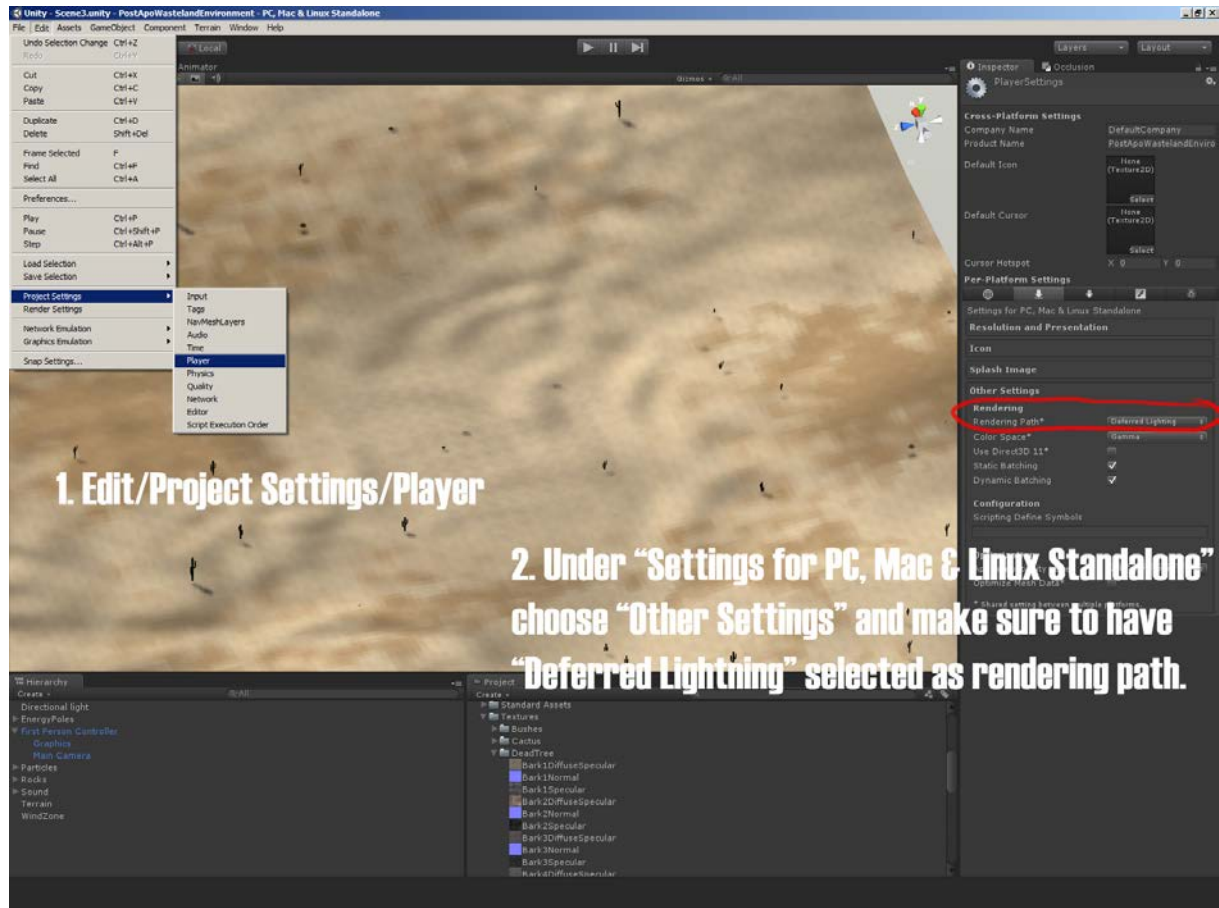
In Unity there are several types of lightmaps, but I will only describe baking dual lightmaps. Dual lightmaps support real-time shadows in a defined area around the camera and baked shadows beyond this area. They also support normal and specular maps.

For more information you may also check the Unity Docs:

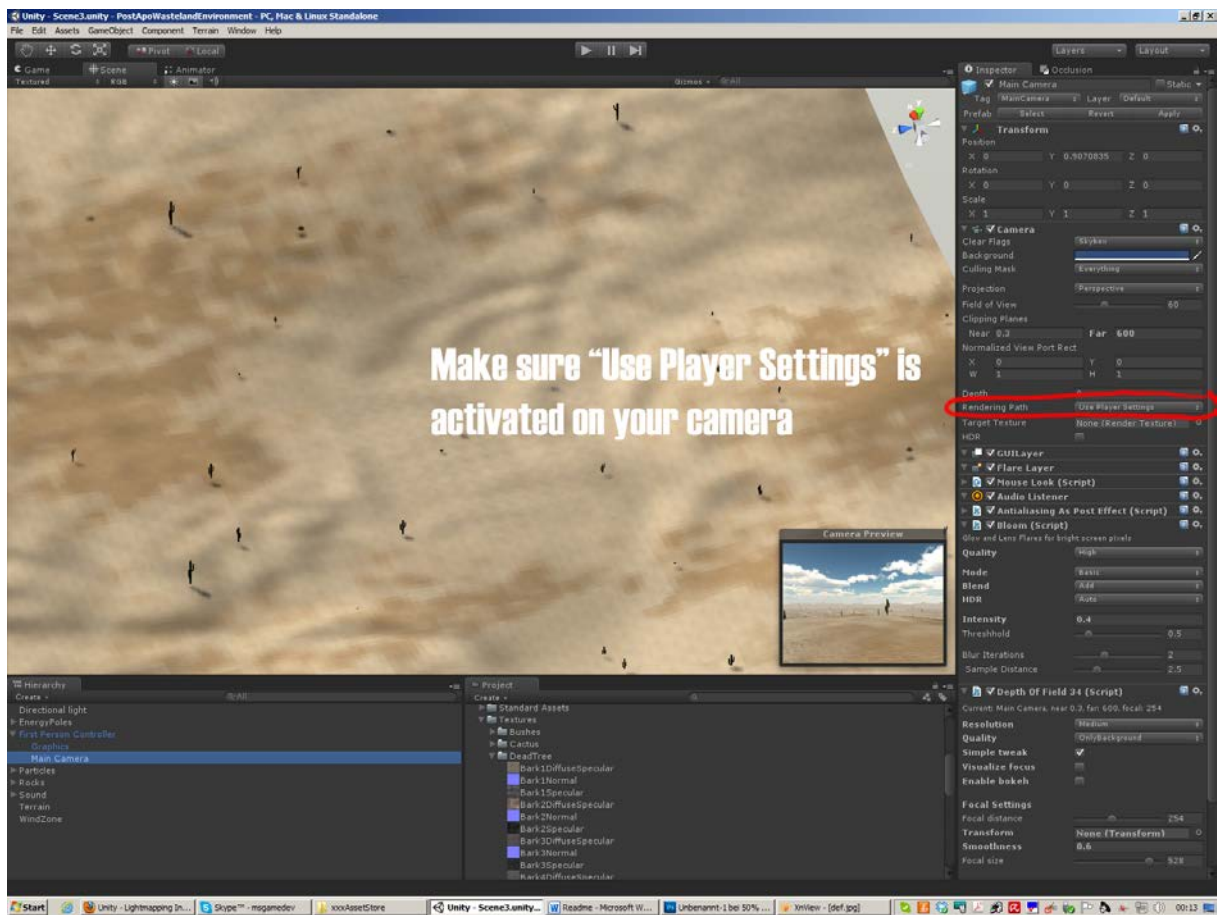
<http://docs.unity3d.com/460/Documentation/Manual/LightmappingInDepth.html>

## The Setup

First go to Edit/Project Settings/Player. In the inspector on the right side, chooses “Settings for PC, Mac & Linux Standalone”. Now open the tab “Other Settings”. Under rendering path choose “Deferred Lighting”.

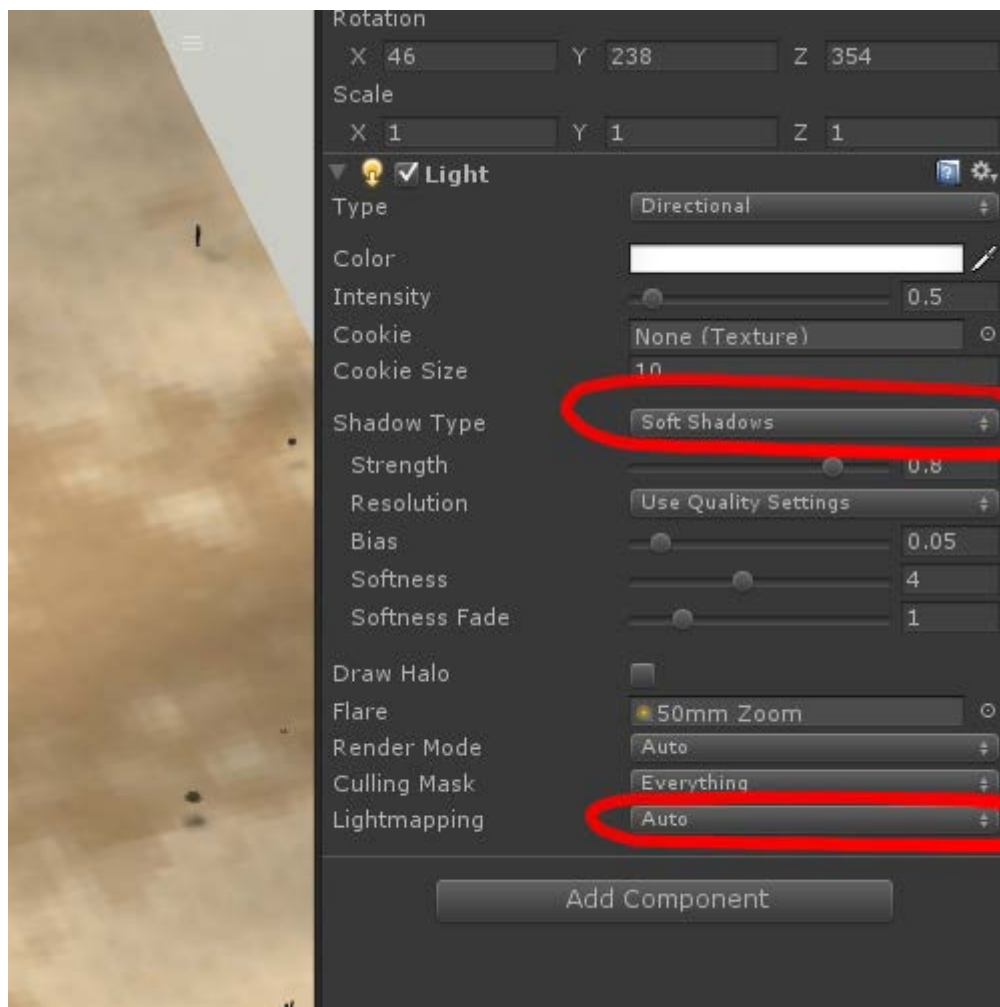


Now, make sure, that on your camera under rendering path “use player settings” is activated.





For this tutorial I use one directional light in the scene, but you can have of course more lights (and also colored ones) in your scene. Make sure, all lights in your scene have the following settings.

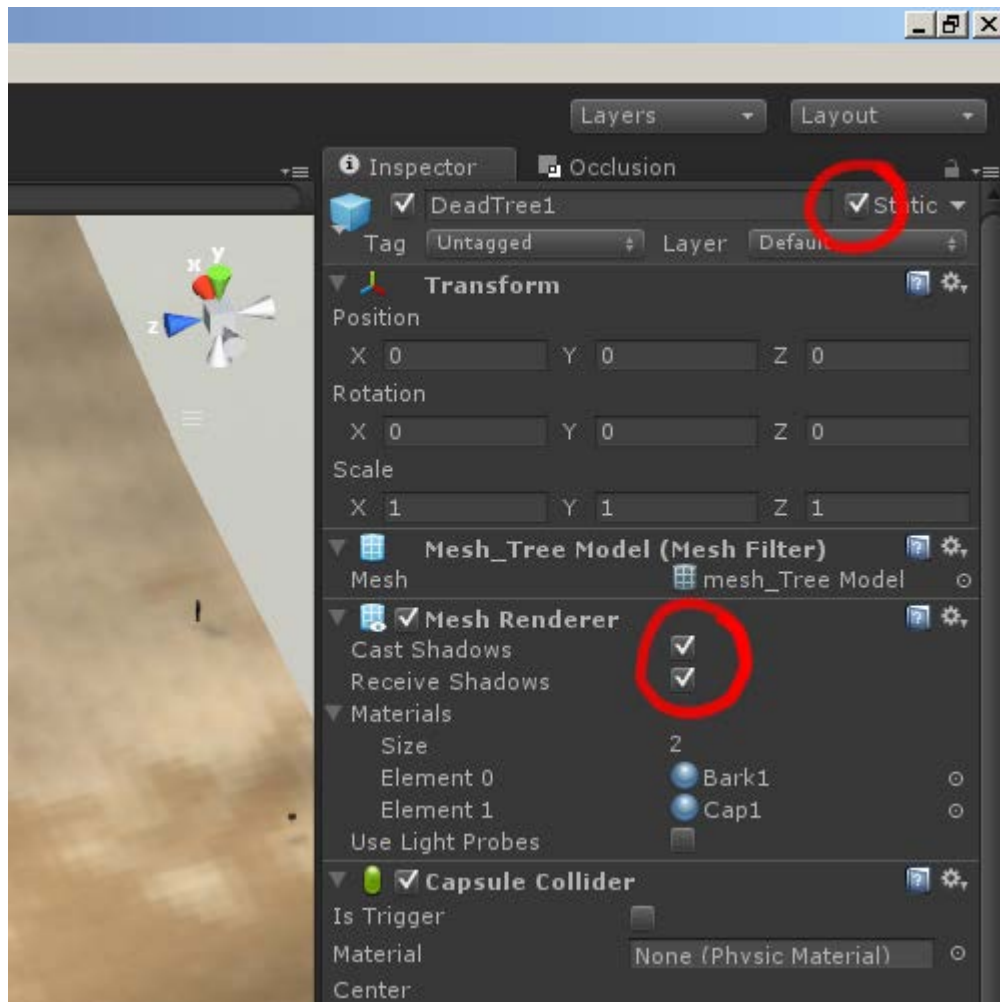


Under shadow type choose either hard or soft shadows. The lightmapping mode must be set to "Auto".

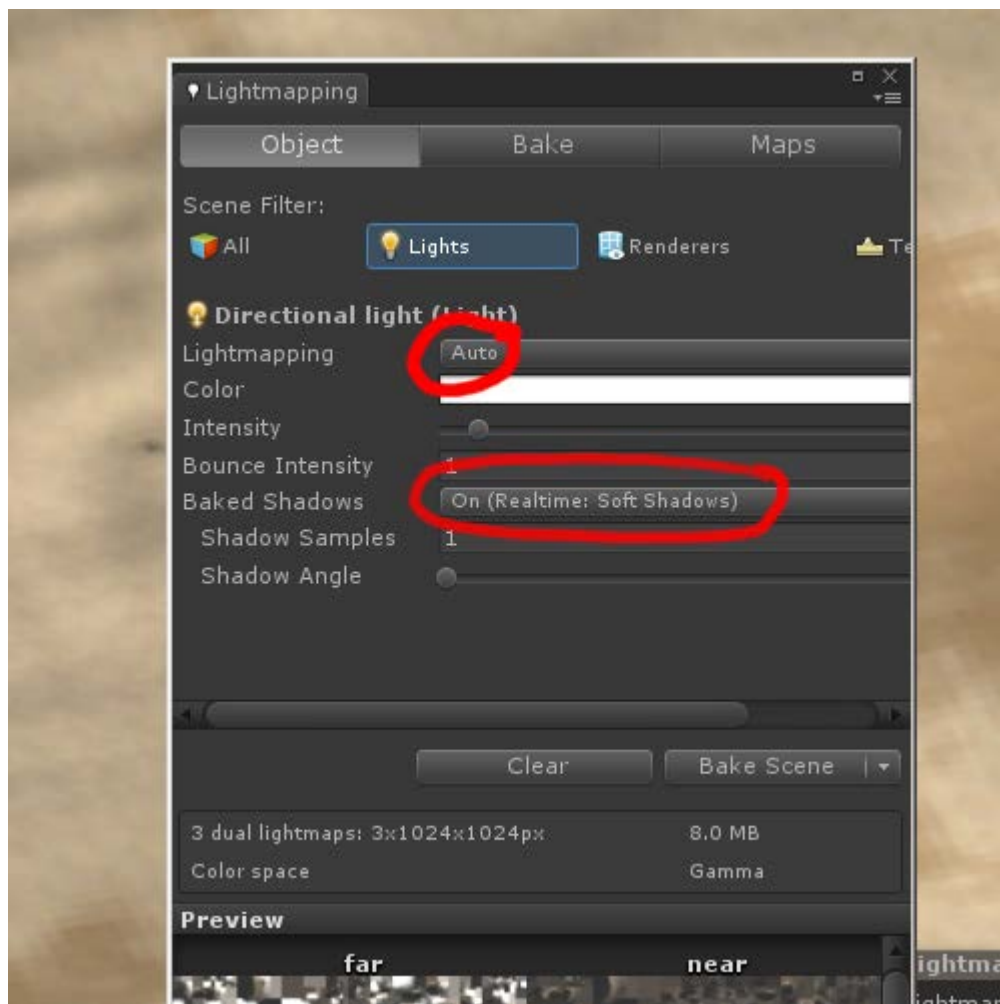
The next important thing is, that all meshes that should cast/receive a shadow in your scene must be marked as “Static”. To mark them as static check the box in the top right corner of the inspector if you have one or more objects selected.

**Important:** Also the cast/receive shadow boxes in the mesh renderer component must be activated.

**Important:** Also don't forget to mark your light(s) and the terrain as static.

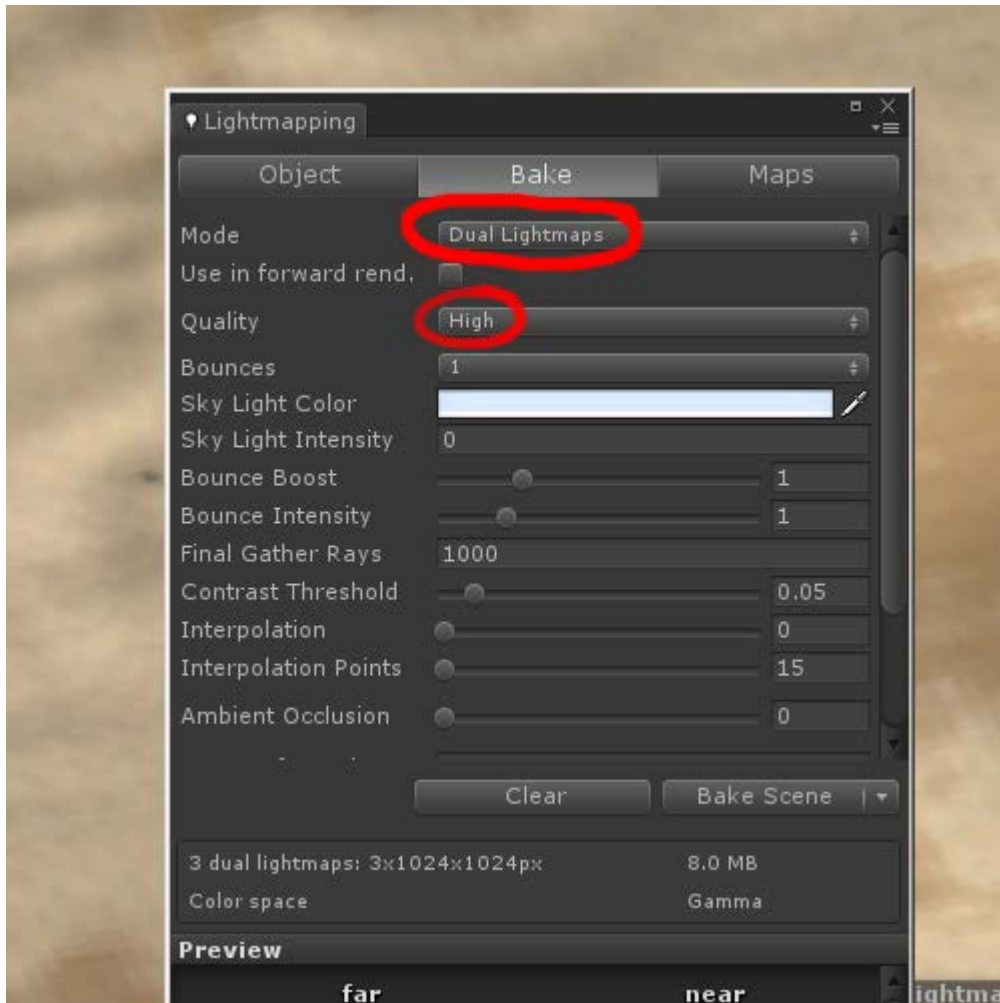


Now you are ready to bake the lightmap. Go to Window/Lightmapping and the lightmap window will pop up. In the “Object” tab choose “Lights” and mark your light(s) in the project hierarchy, just to make sure that the light settings are correct (on all your lights).



Now go to the “Bake” tab. As mode choose “Dual Lightmaps”. Under “Quality” choose either “low” for bake tests (or if you want to have low res lightmaps) or “high” for your final lightmap bake.

You can play around with the other values to figure out what they do. But if you leave them alone you will also get a good result.

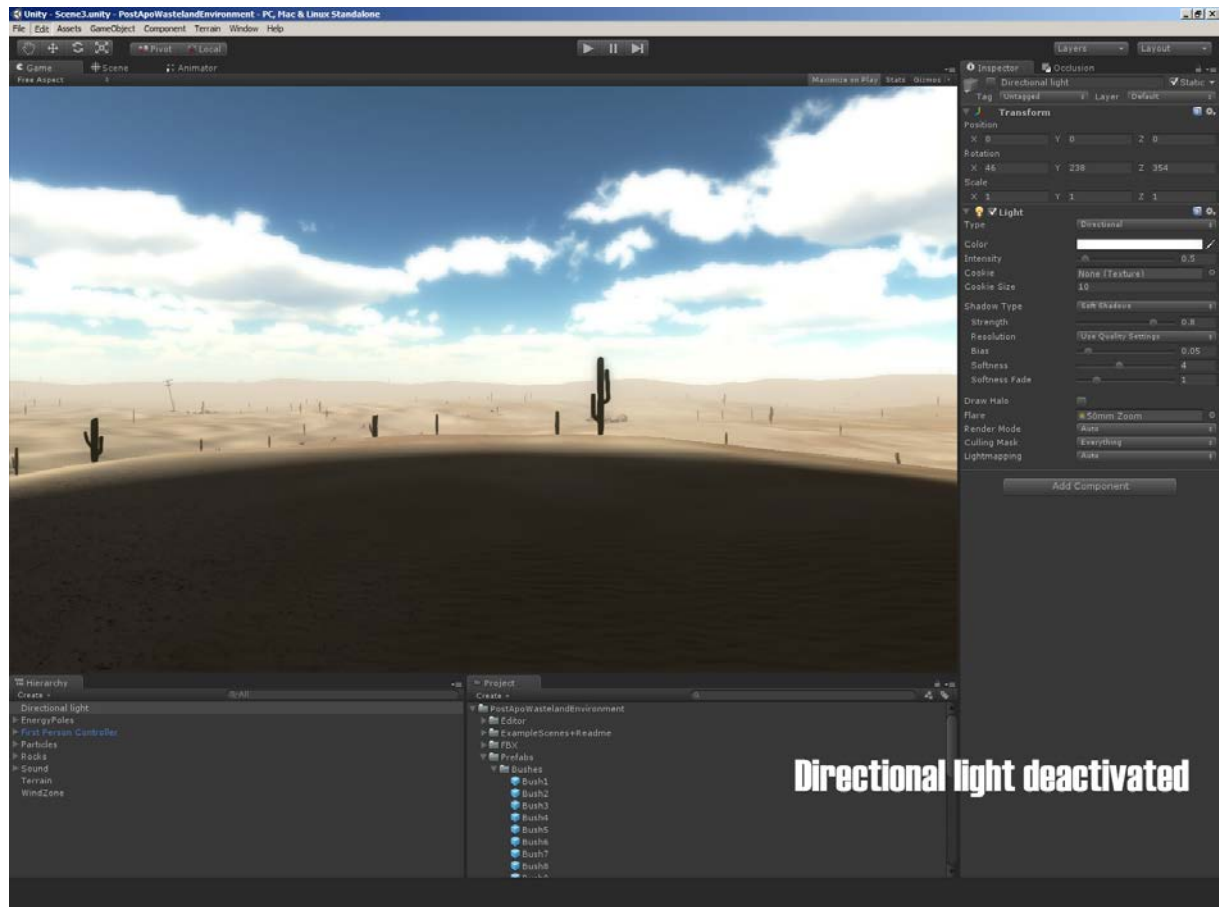
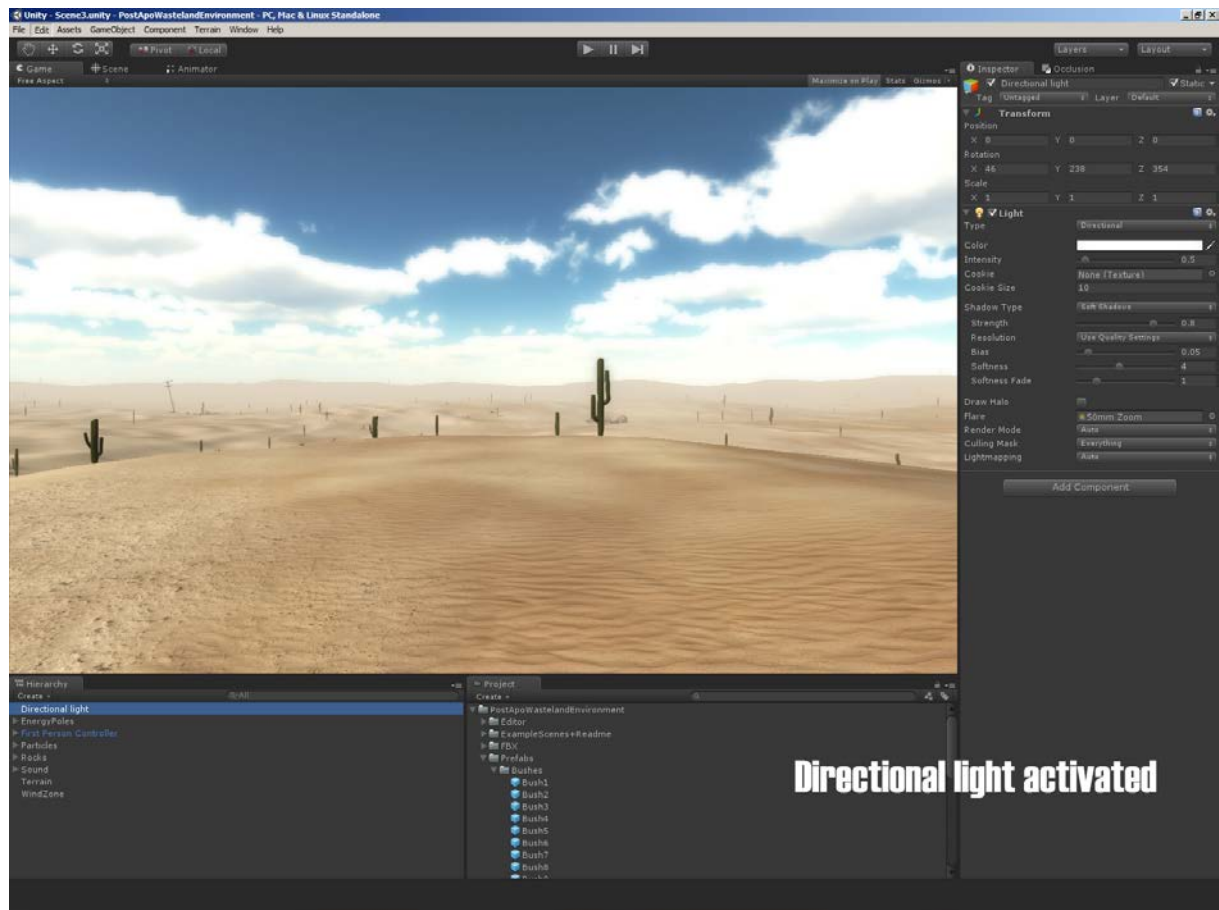


Now hit “Bake Scene” and your lightmap will be baked. You can see the progress in the bottom right corner, where a progress bar is displayed during the baking process.

Once the baking process is finished you can test if all is correct. Therefore you must go to the game view and deactivate the directional light in your scene. You should now see a dark circle on the ground. If you activate the directional light again, the circle should disappear.

Beyond the dark circle the lightning should look correctly.

This visible dark circle is directly related with the next chapter “Performance Optimization”

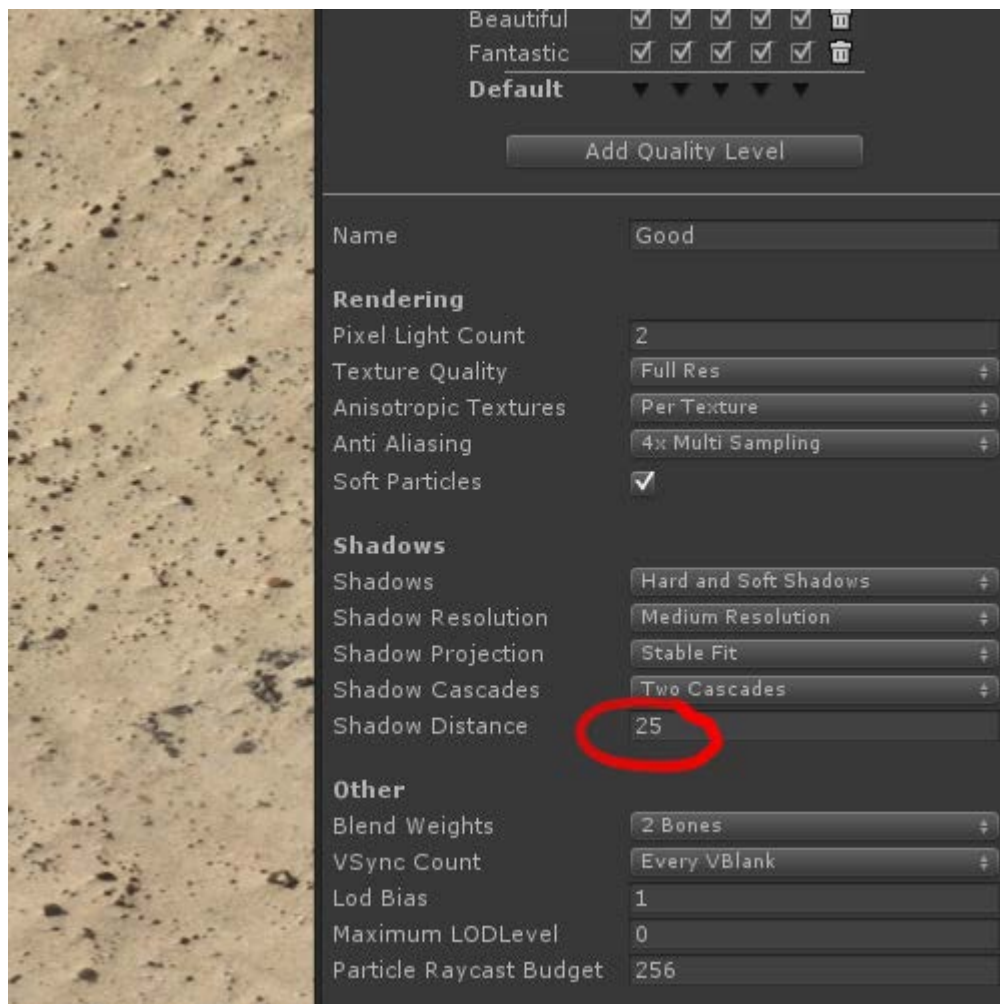


## Performance Optimization

### Shadow Distance

One of the most performance heavy impacts is the number of (real-time) shadows displayed on the screen. Therefore it's obviously the best to reduce the number of shadows. This can be done under Edit/Project Settings/Quality. In the inspector on the right you see now the quality settings. Any changes you make here usually have an impact on the performance so be careful.

Check here for more information: <http://docs.unity3d.com/Documentation/Components/class-QualitySettings.html>



The shadow distance value defines a radius around your camera. All real-time shadows that are in this radius are displayed. All shadows that are beyond that radius are not rendered (but they are replaced by lightmap shadows, if you have baked a lightmap).

If this value is reduced, your performance will get better, because you will have lesser draw calls. But note that dynamic objects (like the player character) won't cast a shadow if this value is too low, even if you use a lightmap. Remember. Lightmaps can't be used for dynamic (moving) objects. So you may not want to set this value to zero. A good value for 1<sup>st</sup> or 3<sup>rd</sup> person games is something between 20-30, depending on your scene.

Also this value defines the size of the dark circle at the end of the lightmap tutorial above.

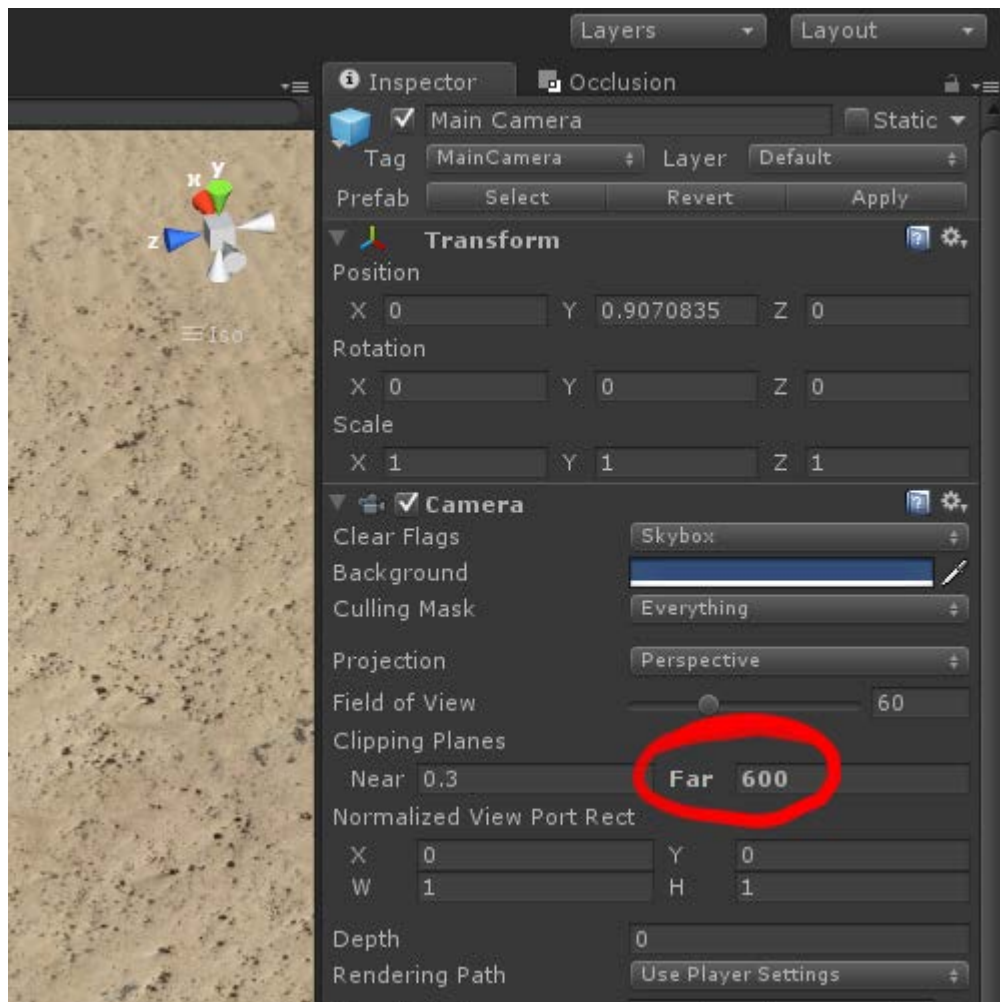


## Camera Far Clipping Plane

The far clipping plane of the camera defines the distance at which the camera doesn't render anymore. E.g. for a canyon level, where the player never leaves the canyons, the far clipping distance must not be 1000. But for a flat open terrain you might want to have such a far sight. This all depends on your specific scene.

In general, the smaller this value is, the better your performance will be, because less is rendered.

Again: adjust this value to what your level needs.



## LOD

LOD stands for “Level of Detail”. This means that details of objects that are far away from the camera can’t be seen. So it makes no sense to render detailed objects all the time. Therefore far away objects are replaced by less detailed ones. If the camera comes closer the low detailed objects are replaced by higher detailed ones.

<http://docs.unity3d.com/Documentation/Manual/LevelOfDetail.html>

Most models in this pack are already setup as Unity LOD Group Prefabs. This is a pro-only feature and won’t work with the free version.

But there are also other script solutions available out there. Or you can also make your own script that simply switches between the LOD stages when a specific distance from the camera is reached.

This model pack provides LOD 1 and LOD 2 stages for rocks and the druid circle.

## IMPORTANT

Please be aware that every LOD stage has its own material/texture map by default. E.g. all LOD 0 rocks share the same texture map, all LOD 1 rocks have their own texture map, etc.

It is possible to use LOD 1 or LOD 2 stages separate from the LOD groups as meshes. Therefore the LOD 1 and LOD 2 textures have also a 4096 resolution. The LOD meshes must be unparented from the LOD groups to be used separately.

But if you want to use the LOD groups of the rocks/druid circle, you can replace the LOD1 / LOD2 material with the corresponding LOD 0 material. All LOD stages use the same material/texture map then. This is better for performance because only one material will be used and only one texture map is loaded into the texture memory instead of three.

To replace the LOD1 / LOD2 materials, go to the Prefabs/rocks or Prefabs/DruidCircle folders. Expand the rock/druid circle prefabs until the LOD stages are listed. Now mark all LOD 1 and LOD 2 objects with left clicking while holding down CTRL. If all objects are marked, expand the material entry in the mesh renderer component in the inspector window on the right.

Go to FBX/DruidCircle/Materials or FBX/Rocks+Stones/Materials. Drag and drop the “DruidCircle” or “RocksStones” material into the material entry of the LOD meshes you have marked. Of course the “DruidCircle” material must be assigned to the druid circle LOD meshes and the “RocksStones” material to the rock LOD meshes. Now all LOD stages will use the same material/texture map.

**Please note:** The textures of the LOD 0 materials are made for the LOD 0 stages, so there will be some texture seams on the LOD 1 and LOD 2 stages. But this is not a problem because the LOD1 / LOD2 meshes are only seen from a distance. Only if the transition from LOD 0 to LOD 1 is at a really close distance these seams might be visible.

If there are problems with visible seams you can always change back the LOD 0 materials on the LOD meshes to the LOD1 / LOD2 materials.

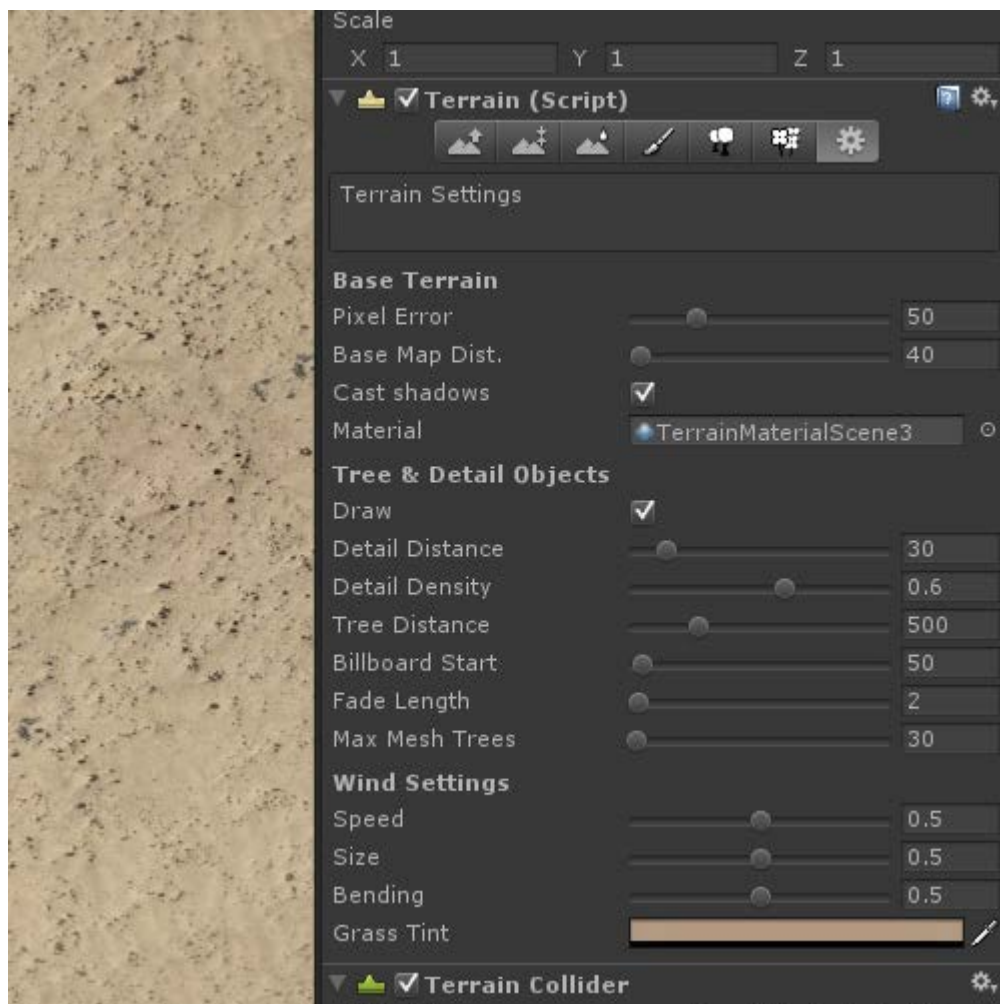


## Terrain options

The terrain options can also drastically change your performance. I don't want to discuss them in-depth, you can check out the information here:

<http://docs.unity3d.com/Documentation/Components/terrain-OtherSettings.html>

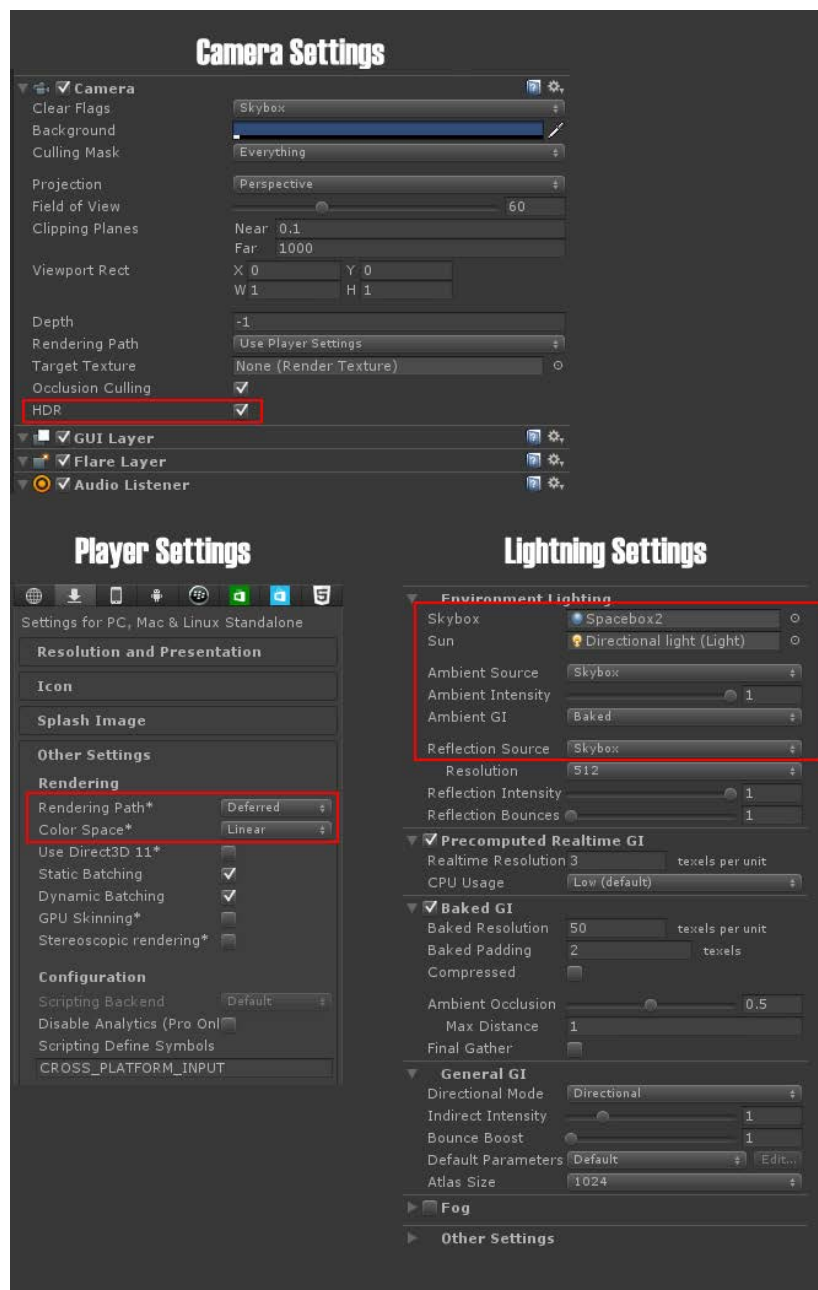
Just to give you some numbers, the following settings are quite performance friendly:



## A quickstart to physical based rendering (PBR)

These models have PBR textures that work with the Unity standard shader (specular setup). To enable PBR shading in your project the following steps are needed.

- Go to Edit/Project Settings/Player
- Rendering path must be “Deferred”, color space must be “Linear”
- Make sure the “HDR” checkbox on your camera is enabled
- The skybox should use a Unity 5 HDR ready material (e.g. skybox/6 sided)
- The actual lightning settings depend on how you want the lightning to be. But if you want the skybox to be the source of the ambient light you can use the following lightning settings. Ofc you’re free to play around with the lightning settings to achieve different results. “Continuous baking” should be enabled to see changes immediately.



## **Music and Sound**

The Sound files in this pack are from Freesound.org and Opengameart.org. They are all licensed under the CC0 public domain license. The music themes are both from Steven O'Brien and licensed under a CC-by license. They are free for commercial work; just make sure to credit Steven O'Brien.

Also check out his work on soundcloud: <https://soundcloud.com/stevenobrien>

## **Contact Information**

You can contact me here: [msgdi@yahoo.de](mailto:msgdi@yahoo.de). Please include your invoice number.

I always appreciate ratings/reviews on the asset store if you think this pack deserves it. Thank you.