Desert Environment

Thank you for buying this pack.

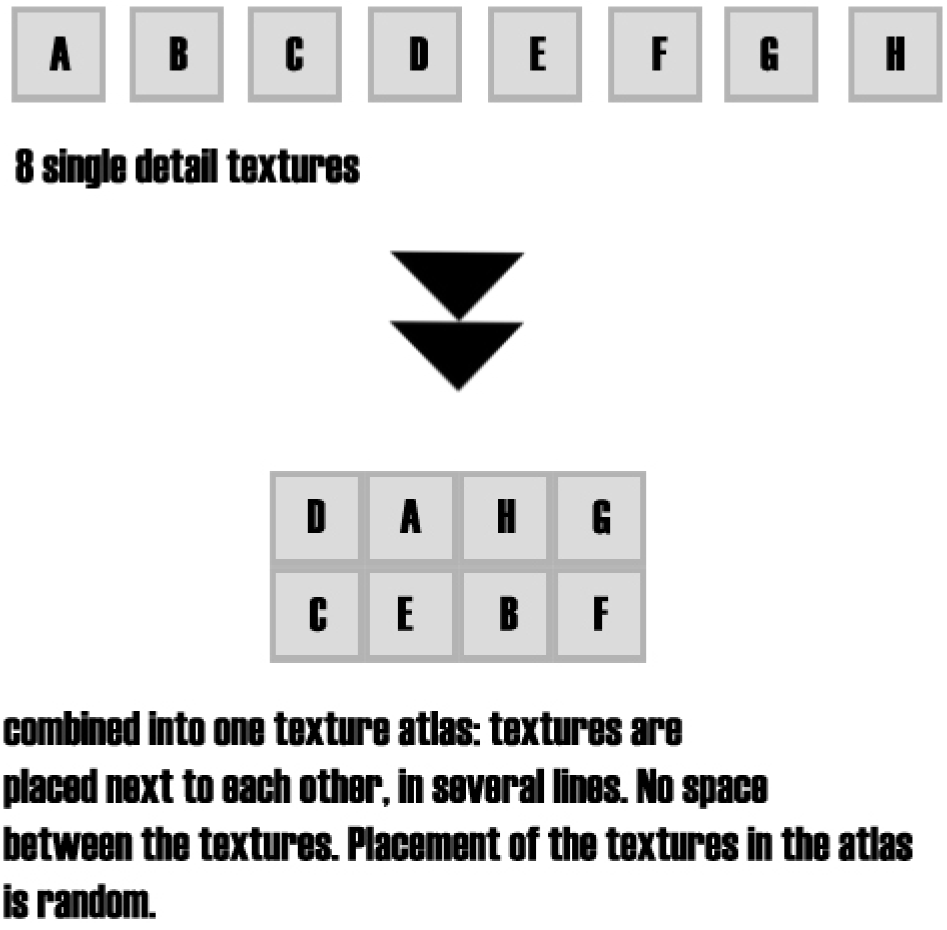
This pack provides assets to create desert scenes.

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

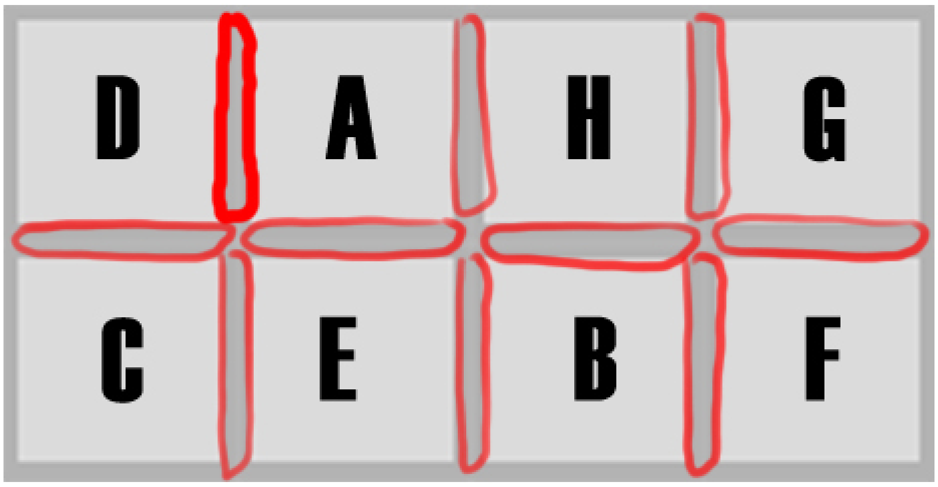
You may have encountered that sometimes there is a weird flickering line displayed above your grass textures and sometimes there is not. There are several threads on the Unity Forums dealing with this problem. I want do describe it a bit in depth now.

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.



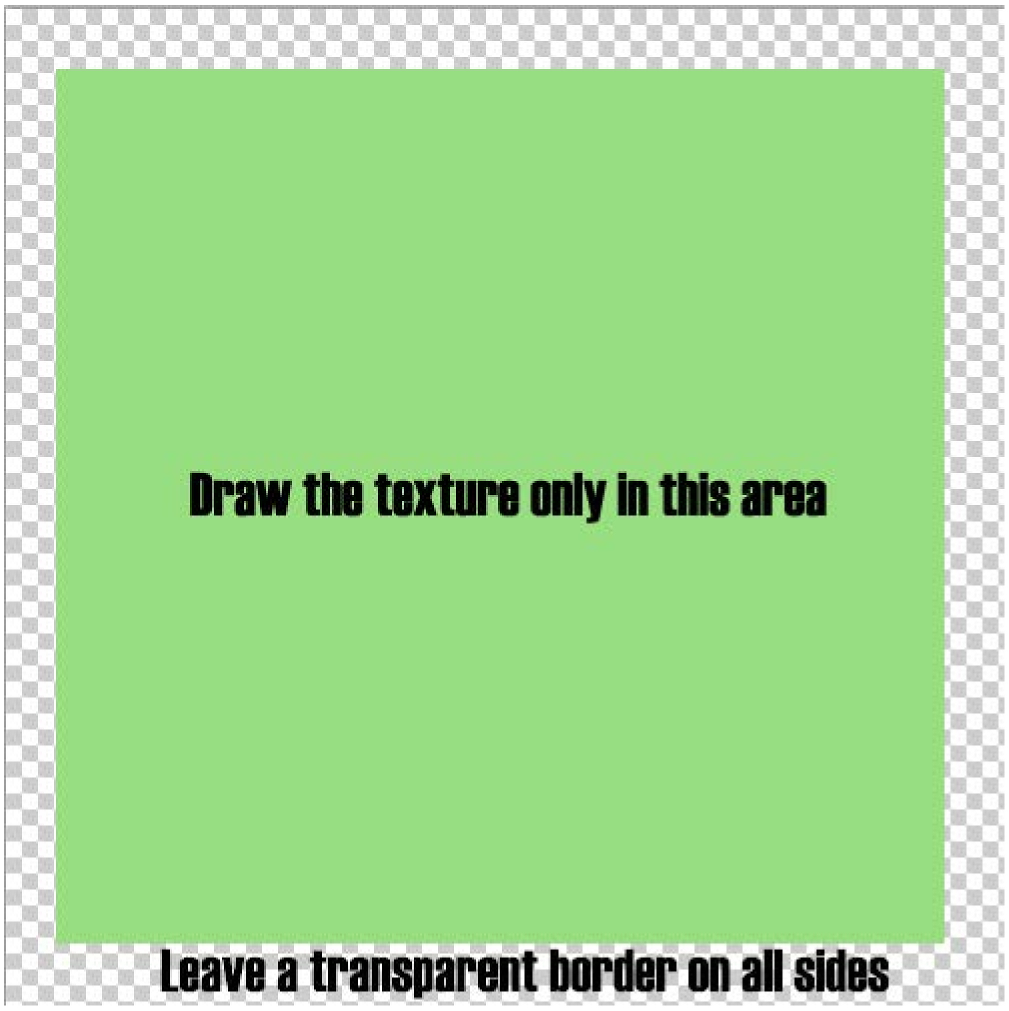
combined into one texture atlas: textures are placed next to each other, in several lines. No space between the textures. Placement of the textures in the atlas is random.

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.


Draw the texture only in this area
Leave a transparent border on all sides

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.

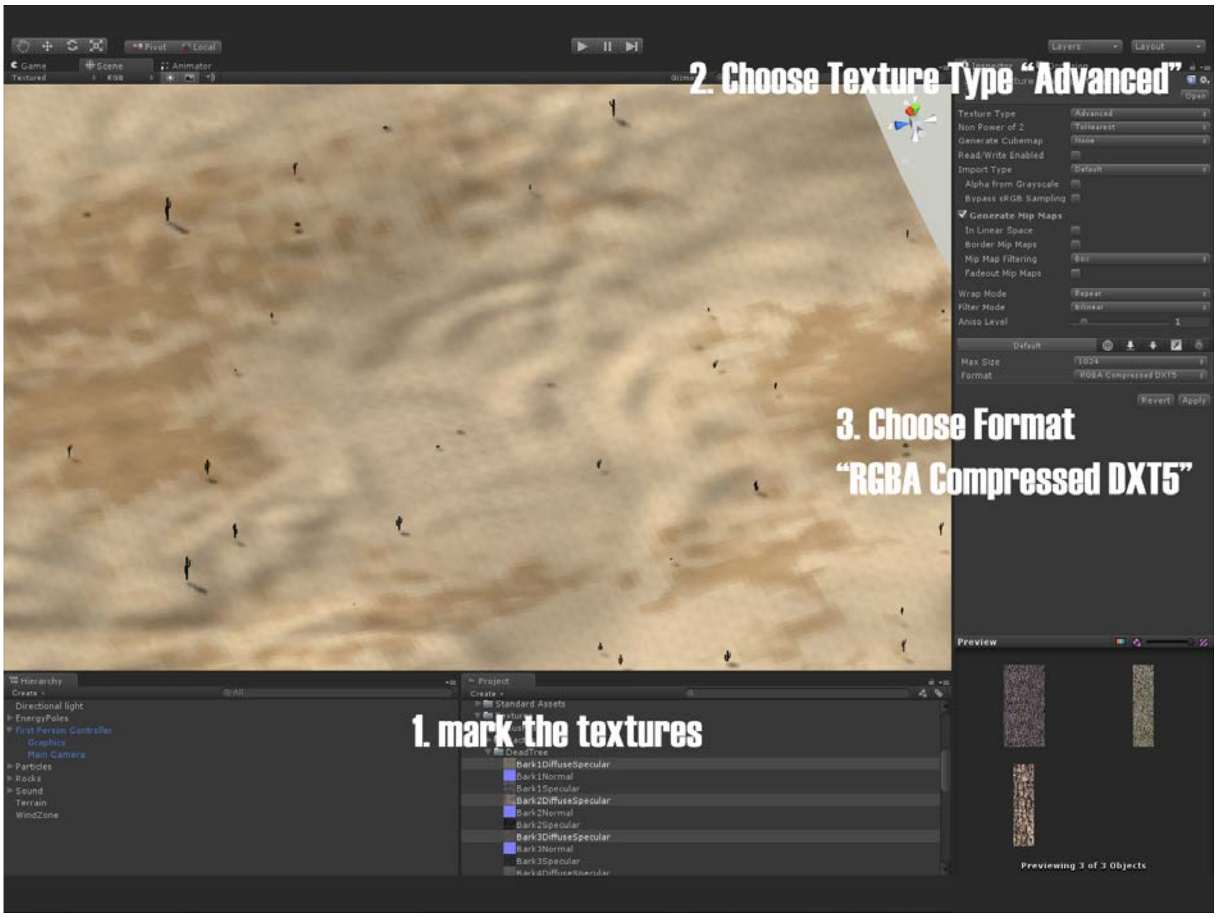
Trees + Bushes

The trees in this pack are designed to work with Unitys 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 an 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.



Texture Type: Advanced
Non Power of 2: ToNearest
Generate Cubemap: None
Import Type: Default
Generate Mip Maps ✓
Mip Map Filtering: Box
Wrap Mode: Repeat
Filter Mode: Bilinear
Aniso Level: 1
Max Size: 1024
Format: RGBA Compressed DXT5

DeadTree
Bark1DiffuseSpecular
Bark1Normal
Bark1Specular
Bark2DiffuseSpecular
Bark2Normal
Bark2Specular
Bark3DiffuseSpecular
Bark3Normal
Bark3Specular
Bark4DiffuseSpecular

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?

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.

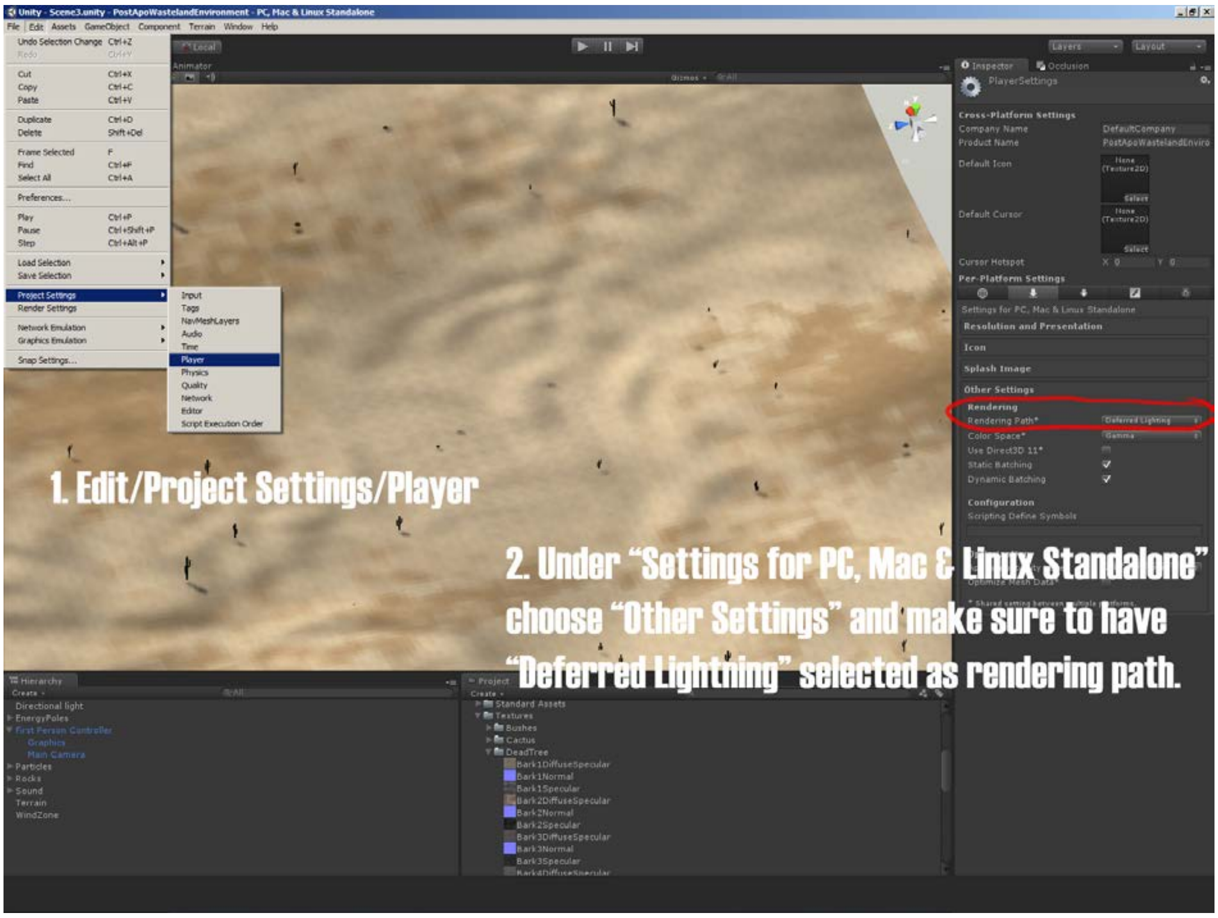
In Unity there are several types of lightmaps, but I will only describe baking dual lightmaps. Dual lightmaps support real-time shadows in a defined area around the camera and baked shadows beyond this area. They also support normal and specular maps.

For more information you may also check the Unity Docs:

http://docs.unity3d.com/Documentation/Manual/LightmappingInDepth.html

The Setup

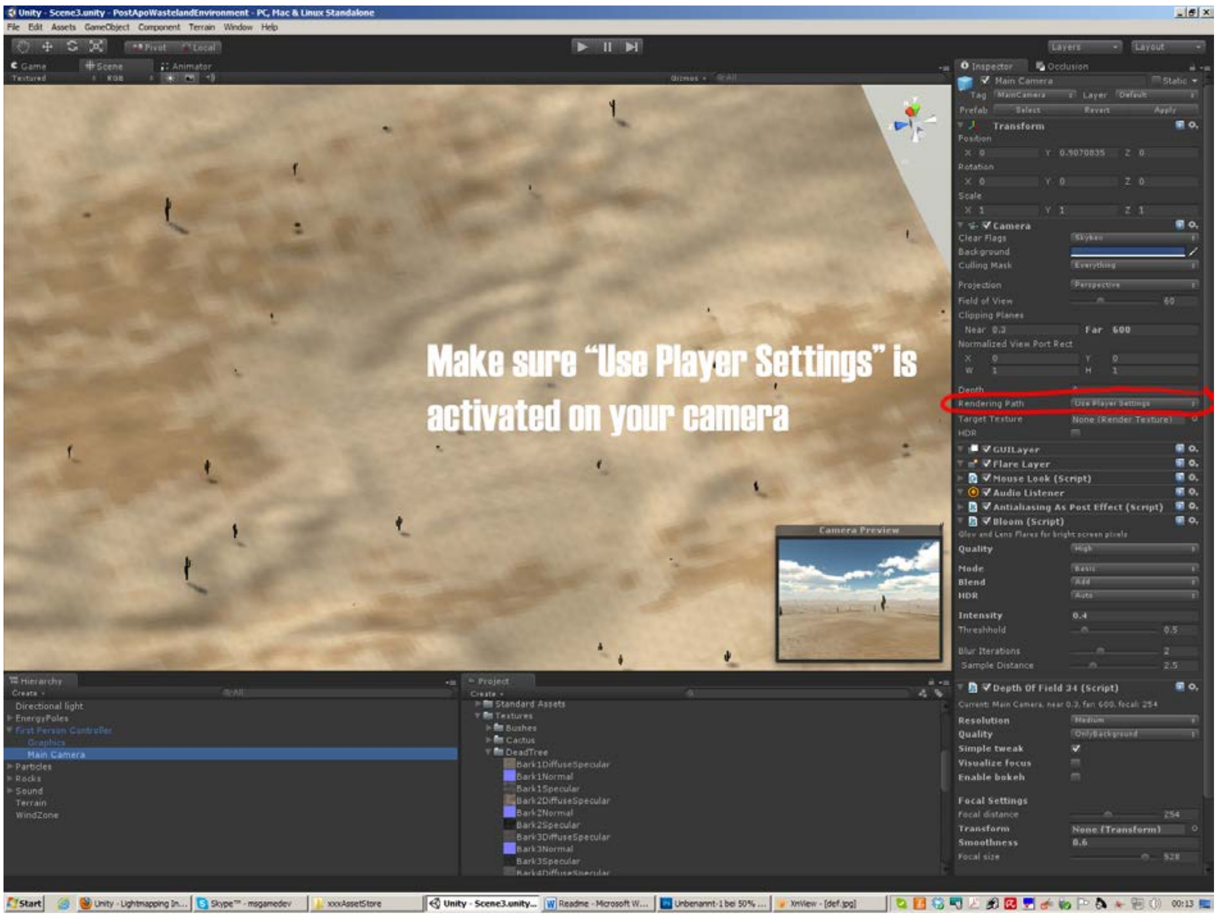
First go to Edit/Project Settings/Player. In the inspector on the right side, chooses “Settings for PC, Mac & Linux Standalone”. Now open the tab “Other Settings”. Under rendering path choose “Deferred Lightning”.


1. Edit/Project Settings/Player

2. Under “Settings for PC, Mac & Linux Standalone” choose “Other Settings” and make sure to have “Deferred Lightning” selected as rendering path.

Cross-Platform Settings
Company Name: DefaultCompany
Product Name: PostApoWastelandEnviro
Cursor Hotspot: X 0 Y 0
Settings for PC, Mac & Linux Standalone
Other Settings
Rendering
Rendering Path*: Deferred Lighting
Color Space*: Gamma
Use Direct3D 11*: ☐
Static Batching: ✓
Dynamic Batching: ✓

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

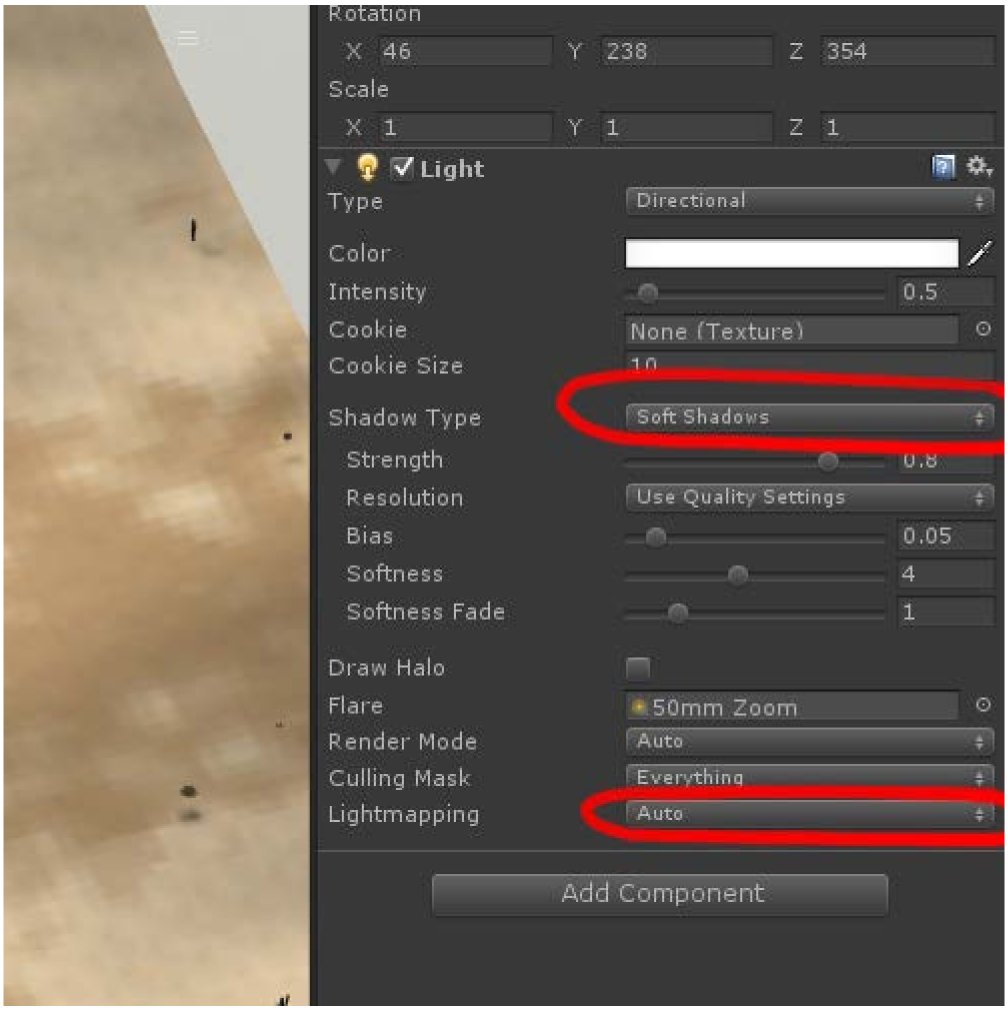


Make sure “Use Player Settings” is activated on your camera

```
Main Camera
Tag MainCamera    Layer Default
Transform
Position  X 0  Y 0.9070835  Z 0
Rotation  X 0  Y 0  Z 0
Scale     X 1  Y 1  Z 1
Camera
Clear Flags        Skybox
Culling Mask       Everything
Projection         Perspective
Field of View      60
Clipping Planes    Near 0.3   Far 600
Normalized View Port Rect  X 0  Y 0  W 1  H 1
Depth              0
Rendering Path     Use Player Settings
Target Texture     None (Render Texture)
GUILayer
Flare Layer
Mouse Look (Script)
Audio Listener
Antialiasing As Post Effect (Script)
Bloom (Script)
Glow and Lens Flares for bright screen pixels
Quality            High
Mode               Basic
Blend              Add
HDR                Auto
Intensity          0.4
Threshhold         0.5
Blur Iterations    2
Sample Distance    2.5
Depth Of Field 34 (Script)
Current: Main Camera, near 0.3, far: 600, focal: 254
Resolution         Medium
Quality            OnlyBackground
Simple tweak       ✓
Visualize focus
Enable bokeh
Focal Settings
Focal distance     254
Transform          None (Transform)
Smoothness         0.6
Focal size         528
```

Unity - Scene3.unity - PostApoWastelandEnvironment - PC, Mac & Linux Standalone
Inspector
Occlusion
Camera Preview
Hierarchy
Project

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.



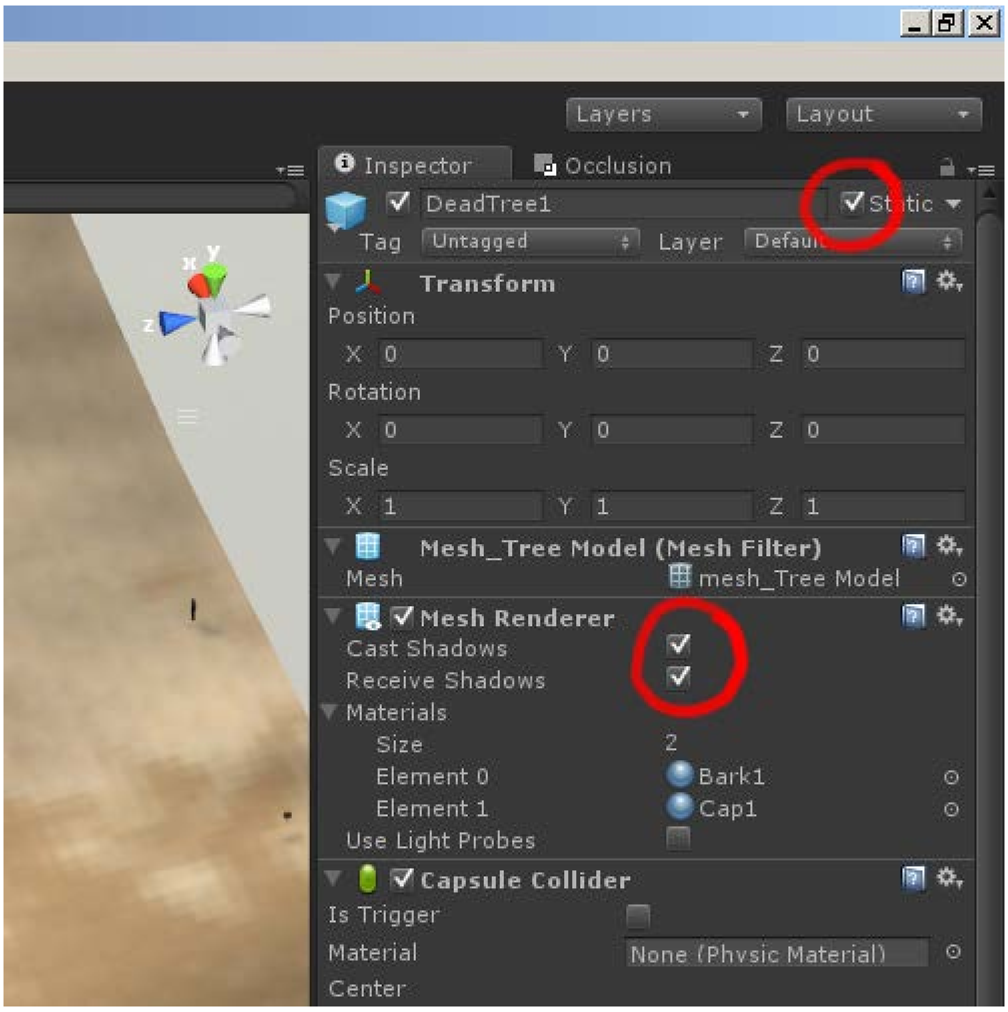
```
Rotation
  X 46        Y 238       Z 354
Scale
  X 1         Y 1         Z 1
Light
Type                 Directional
Color
Intensity            0.5
Cookie               None (Texture)
Cookie Size          10
Shadow Type          Soft Shadows
  Strength           0.8
  Resolution         Use Quality Settings
  Bias               0.05
  Softness           4
  Softness Fade      1
Draw Halo
Flare                50mm Zoom
Render Mode          Auto
Culling Mask         Everything
Lightmapping         Auto
```

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

The next important things 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.



DeadTree1 ✓ Static
Tag Untagged Layer Default

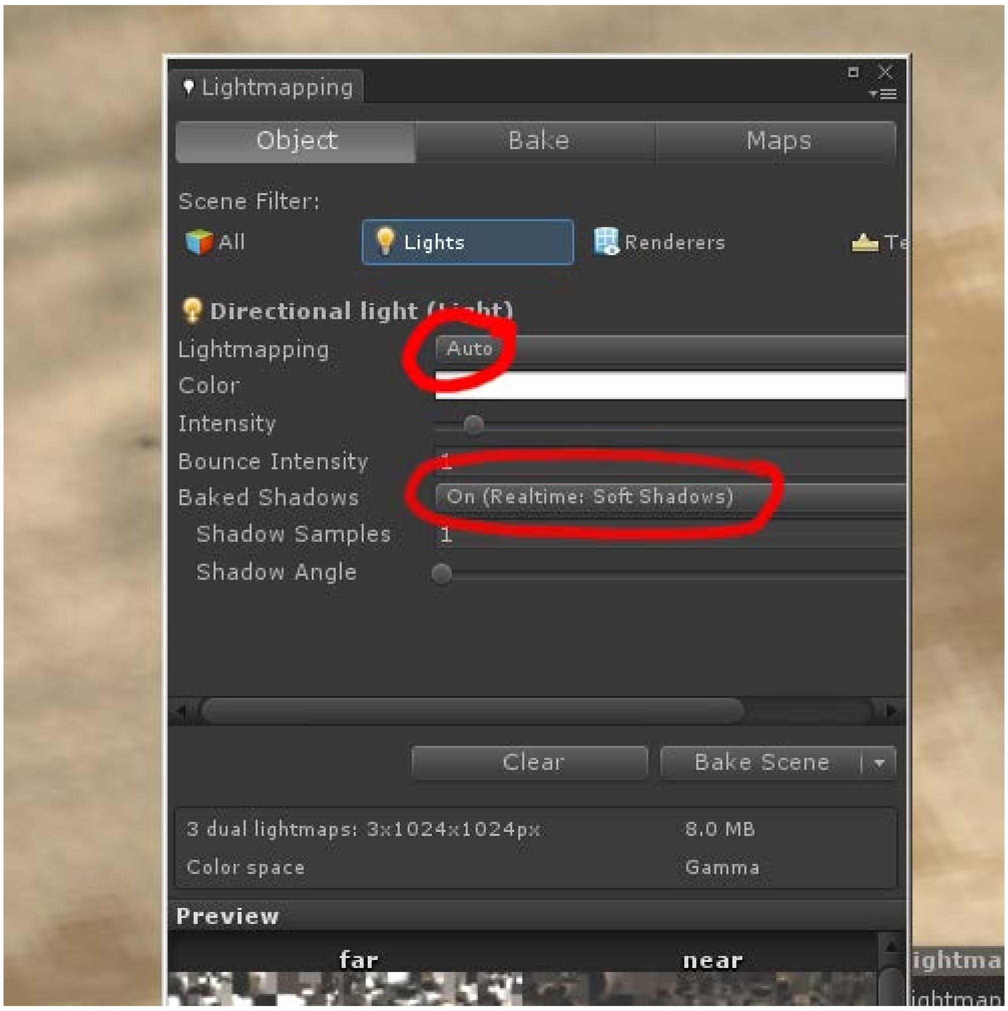
Transform
Position
X 0 Y 0 Z 0
Rotation
X 0 Y 0 Z 0
Scale
X 1 Y 1 Z 1

Mesh_Tree Model (Mesh Filter)
Mesh mesh_Tree Model

✓ Mesh Renderer
Cast Shadows ✓
Receive Shadows ✓
Materials
Size 2
Element 0 Bark1
Element 1 Cap1
Use Light Probes

✓ Capsule Collider
Is Trigger
Material None (Physic Material)
Center

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 again the light settings are correct (on all your lights).

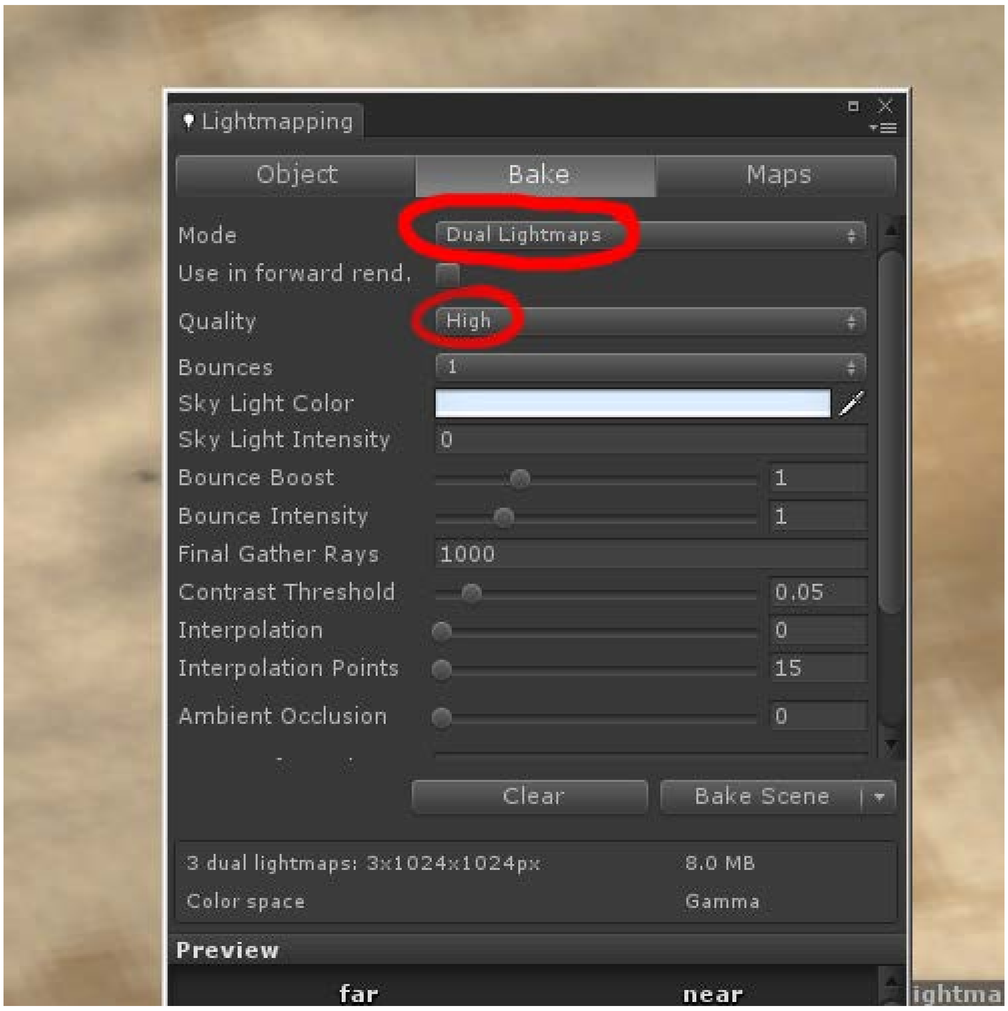


Directional light (Light)
Lightmapping Auto
Color
Intensity
Bounce Intensity 1
Baked Shadows On (Realtime: Soft Shadows)
Shadow Samples 1
Shadow Angle

3 dual lightmaps: 3x1024x1024px 8.0 MB
Color space Gamma

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.



Lightmapping

Object | Bake | Maps

Mode	Dual Lightmaps
Use in forward rend.	
Quality	High
Bounces	1
Sky Light Color	
Sky Light Intensity	0
Bounce Boost	1
Bounce Intensity	1
Final Gather Rays	1000
Contrast Threshold	0.05
Interpolation	0
Interpolation Points	15
Ambient Occlusion	0

Clear | Bake Scene

3 dual lightmaps: 3x1024x1024px	8.0 MB
Color space	Gamma

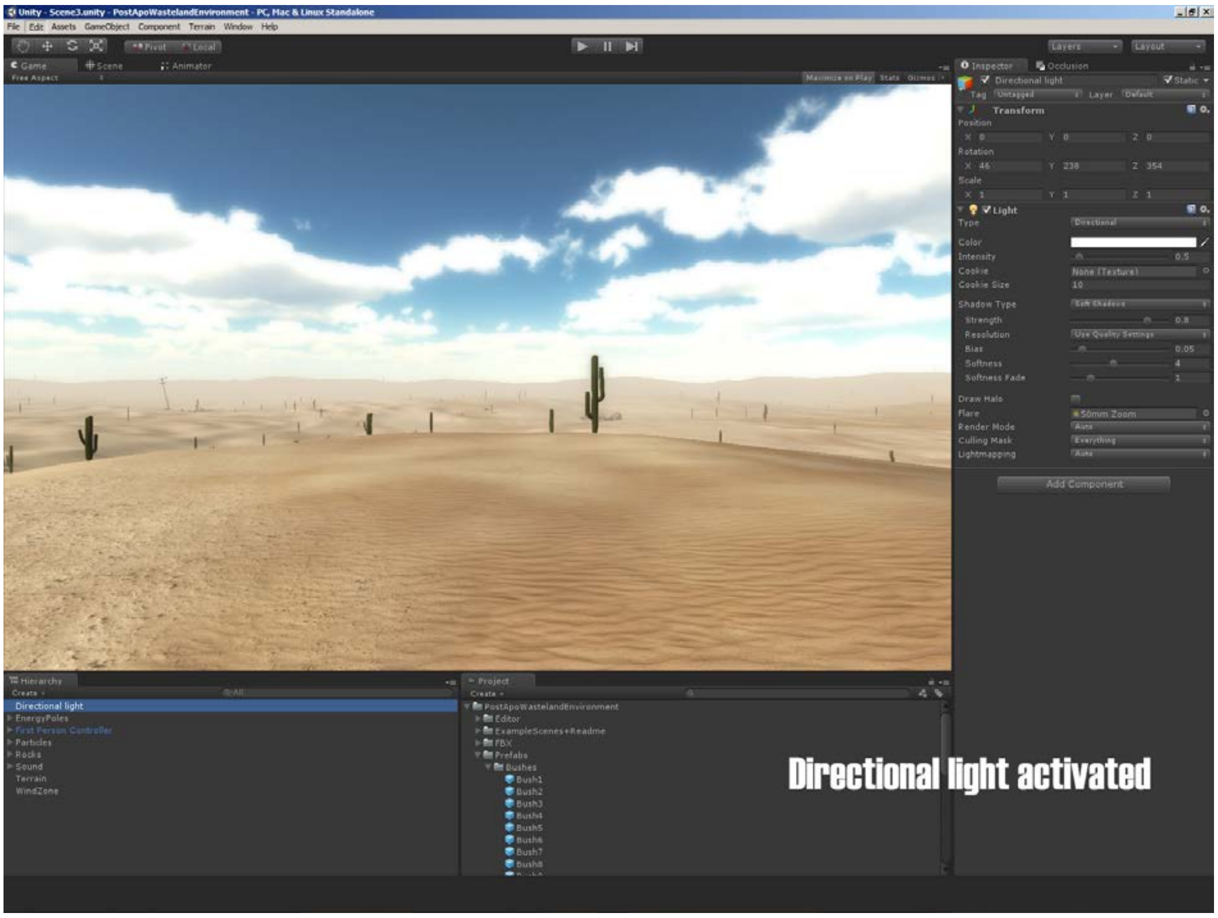
Preview

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”

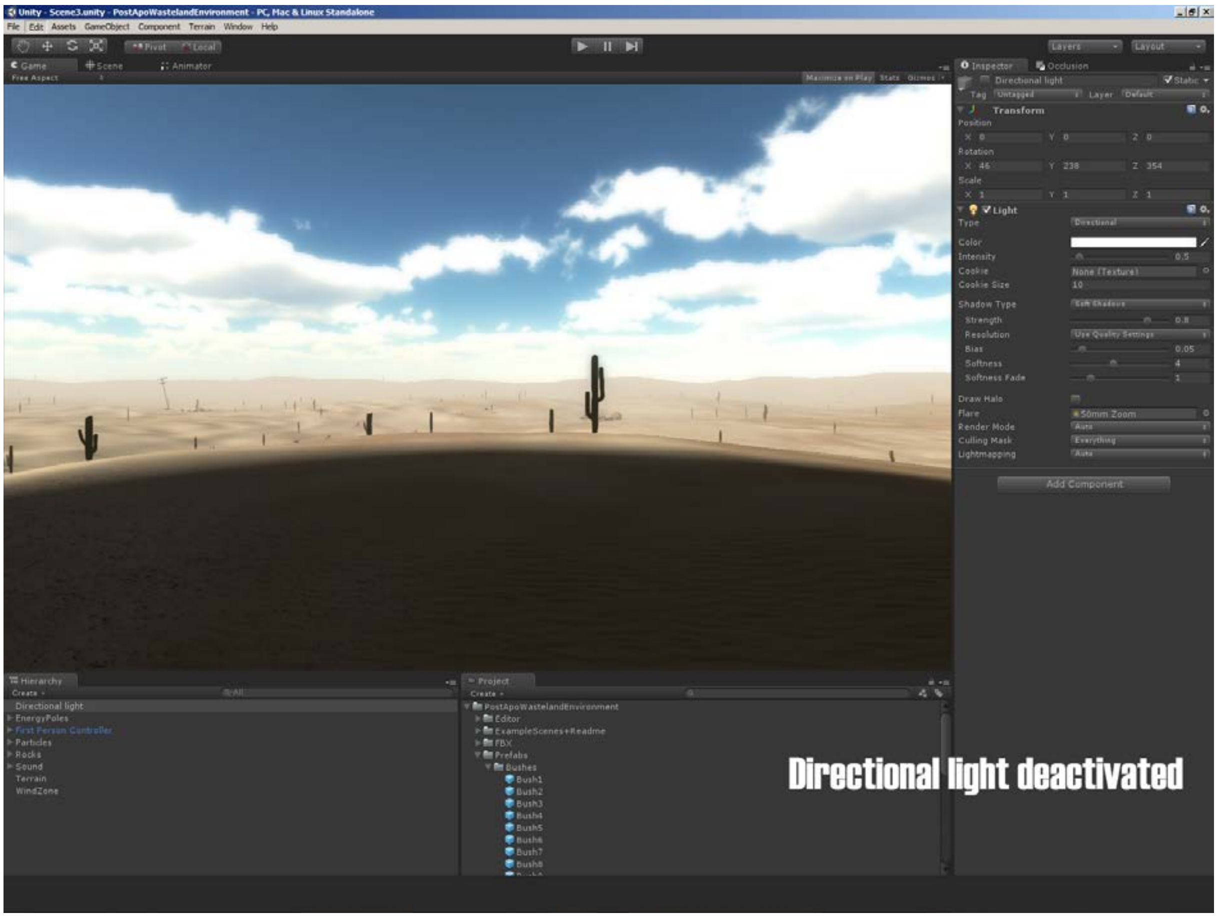

Unity - Scene3.unity - PostApoWastelandEnvironment - PC, Mac & Linux Standalone
File Edit Assets GameObject Component Terrain Window Help
Game
Scene
Animator
Inspector
Occlusion
Hierarchy
Project
Add Component

Directional light ✓ Static
Tag Untagged Layer Default

Transform
Position X 0 Y 0 Z 0
Rotation X 46 Y 238 Z 354
Scale X 1 Y 1 Z 1

✓ Light
Type Directional
Intensity 0.5
Cookie None (Texture)
Cookie Size 10
Shadow Type Soft Shadows
Strength 0.8
Resolution Use Quality Settings
Bias 0.05
Softness 4
Softness Fade 1
Draw Halo
Flare 50mm Zoom
Render Mode Auto
Culling Mask Everything
Lightmapping Auto

Directional light activated


Unity - Scene3.unity - PostApoWastelandEnvironment - PC, Mac & Linux Standalone
File Edit Assets GameObject Component Terrain Window Help
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Scene
Animator
Inspector
Occlusion
Hierarchy
Project
Add Component

Directional light ✓ Static
Tag Untagged Layer Default

Transform
Position X 0 Y 0 Z 0
Rotation X 46 Y 238 Z 354
Scale X 1 Y 1 Z 1

✓ Light
Type Directional
Intensity 0.5
Cookie None (Texture)
Cookie Size 10
Shadow Type Soft Shadows
Strength 0.8
Resolution Use Quality Settings
Bias 0.05
Softness 4
Softness Fade 1
Draw Halo
Flare 50mm Zoom
Render Mode Auto
Culling Mask Everything
Lightmapping Auto

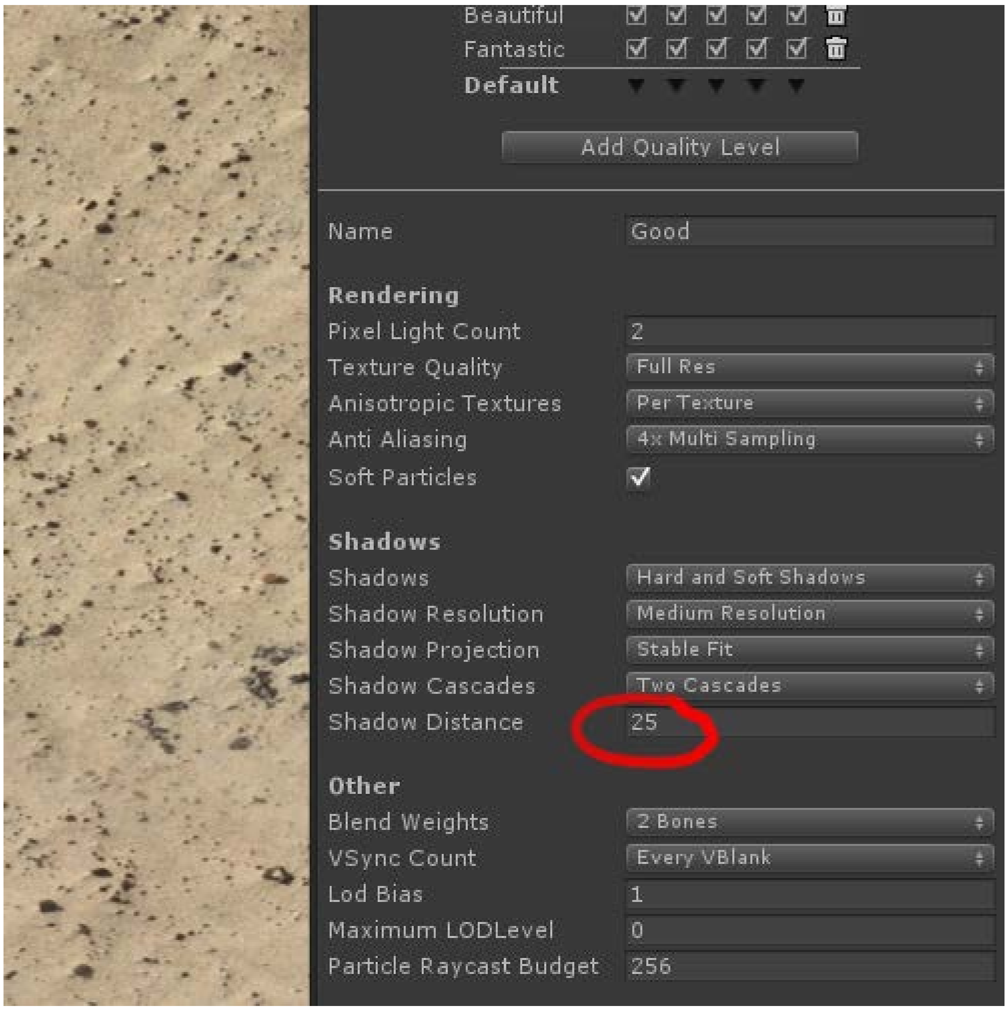
Directional light deactivated

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



Name	Good
Rendering	
Pixel Light Count	2
Texture Quality	Full Res
Anisotropic Textures	Per Texture
Anti Aliasing	4x Multi Sampling
Soft Particles	✓
Shadows	
Shadows	Hard and Soft Shadows
Shadow Resolution	Medium Resolution
Shadow Projection	Stable Fit
Shadow Cascades	Two Cascades
Shadow Distance	25
Other	
Blend Weights	2 Bones
VSync Count	Every VBlank
Lod Bias	1
Maximum LODLevel	0
Particle Raycast Budget	256

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 1st or 3rd person games is something between 20-30, depending on your scene.

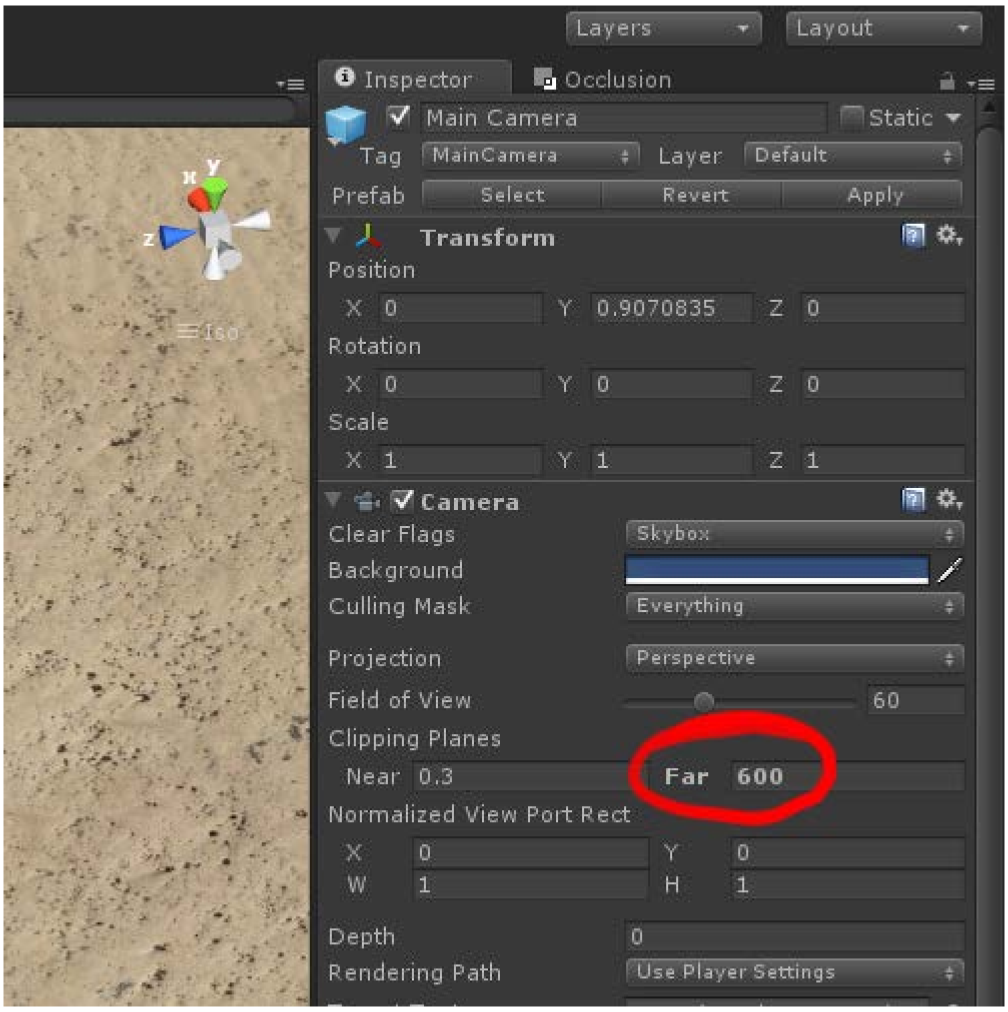
Also this value defines the size of the dark circle at the end of the lightmap tutorial above.

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.



Layers | Layout

Inspector | Occlusion

Main Camera | Static

Tag: MainCamera | Layer: Default

Prefab: Select | Revert | Apply

Transform

Position: X 0 | Y 0.9070835 | Z 0

Rotation: X 0 | Y 0 | Z 0

Scale: X 1 | Y 1 | Z 1

Camera

Clear Flags: Skybox

Background

Culling Mask: Everything

Projection: Perspective

Field of View: 60

Clipping Planes: Near 0.3 | Far 600

Normalized View Port Rect: X 0 | Y 0 | W 1 | H 1

Depth: 0

Rendering Path: Use Player Settings

Terrain Splat maps

The number of terrain textures used on a terrain also has an impact on the performance. Unity combines 4 textures into one splat map. The more splat maps you have the bigger is the impact on performance. With that said you shouldn't use 5 or 9 terrain textures, because this last texture will open up a new splat map for the terrain.

I recommend to not use more than 8 terrain textures (2 splat maps).

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

The rocks and cliffs 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.

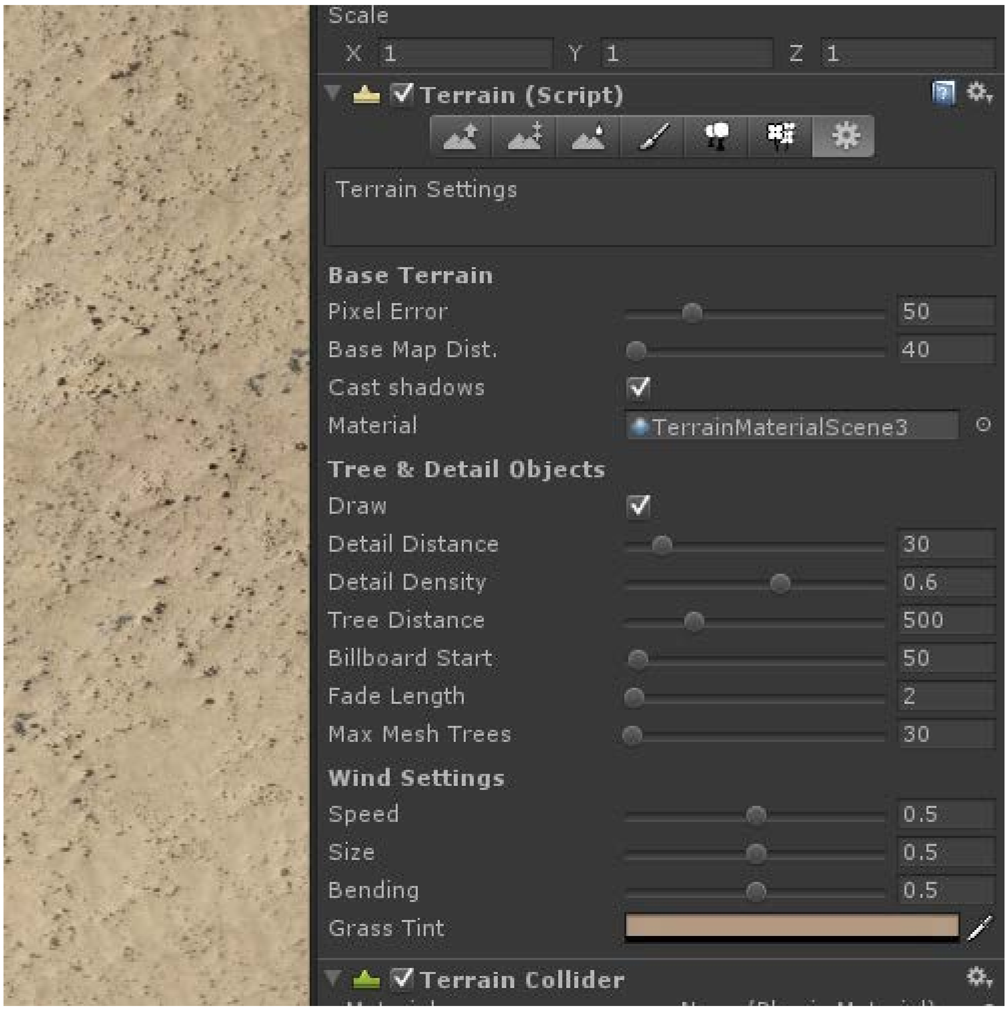
This model pack provides LOD 1 and LOD 2 stages for every rock and cliff.

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:



Scale

X 1 Y 1 Z 1

Terrain (Script)

Terrain Settings

Base Terrain

Pixel Error	50
Base Map Dist.	40
Cast shadows	✓
Material	TerrainMaterialScene3

Tree & Detail Objects

Draw	✓
Detail Distance	30
Detail Density	0.6
Tree Distance	500
Billboard Start	50
Fade Length	2
Max Mesh Trees	30

Wind Settings

Speed	0.5
Size	0.5
Bending	0.5
Grass Tint	🟫

Terrain Collider

Contact Information

You can contact me here: msgdi@yahoo.de