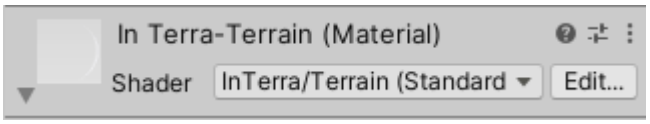
InTerra

DOCUMENTATION

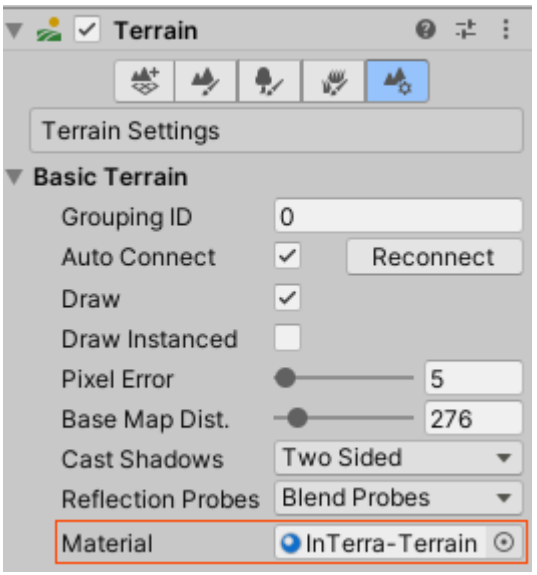
1. TERRAIN SHADERS

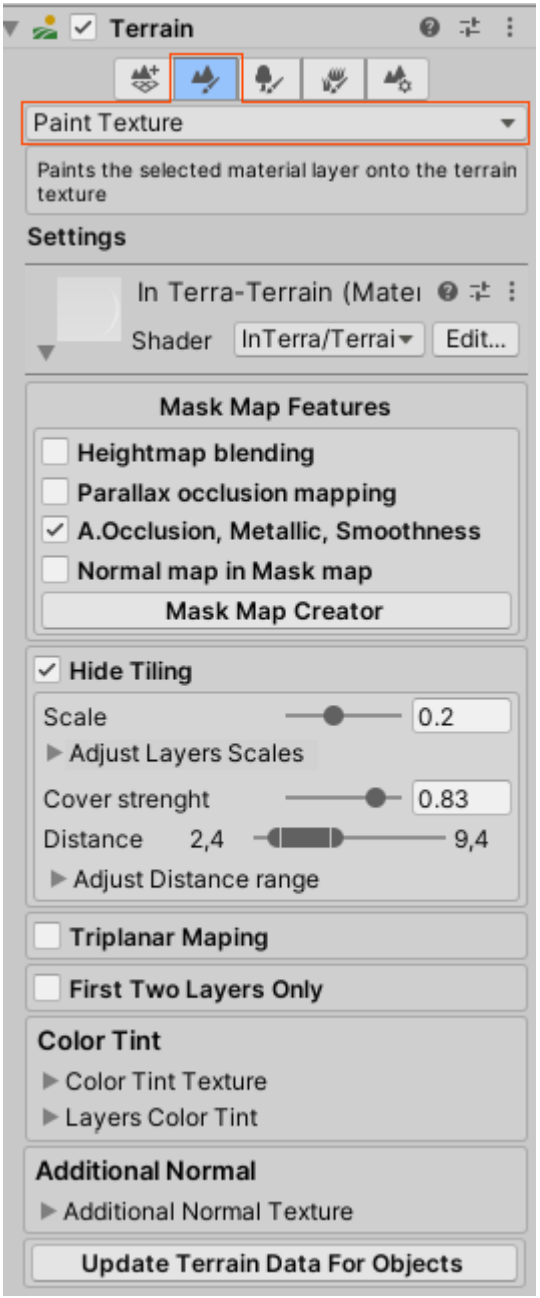
The Terrain shaders can be found in:
InTerra/Terrain (Standard With Features)
InTerra/Diffuse/Terrain (Diffuse With Features)
InTerra/URP/Terrain (Lit With Features)
InTerra/HDRP/Terrain (Lit With Features)
InTerra/HDRP Tessellation/Terrain (Lit With Features)



You can select the Material with Terrain shader in **Terrain settings**

After selecting the Material, the settings for the Terrain shader is in **Paint Terrain** under **Paint Texture** selection.





1.1 MASK MAP FEATURES

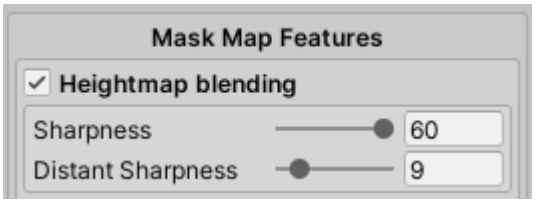
Mask Map Features are available only for Standard shader, for the Diffuse shader there is only Heightmap blending available!

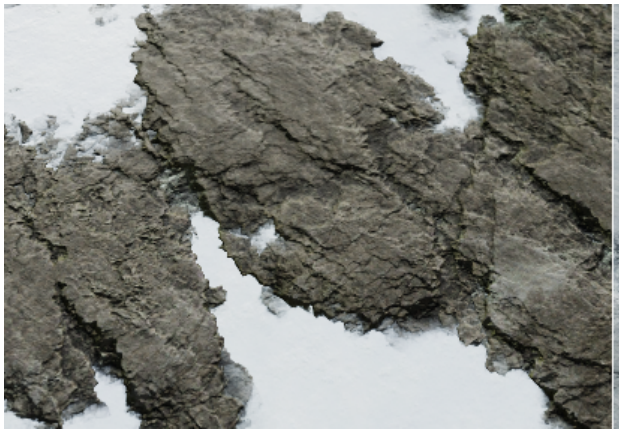
1.1.1 Heightmap blending

Textures transition based on heightmaps.

The heightmap textures are taken from the **Blue channel** of the Terrain **Mask maps** for **Standard** shader and in **Alpha channel** of **Diffuse(Albedo) Texture** for **Diffuse shader**. This feature works only with the first Terrain shader pass (four Layers for **Built-in** and **URP,** eight for **HDRP**) - also if there are more than one pass the feature will be set off for **Terrain Base Map**.

Sharpness - Sharpness of the textures transitions.
Distant Sharpness - Sharpness of the textures transitions for the distant area setted in **Hide Tiling** - it is available only if **Hide Tiling** is set on.



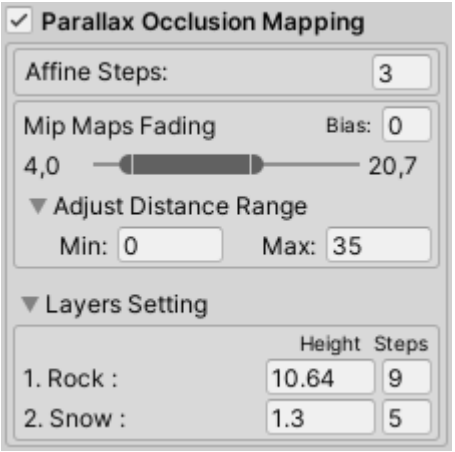


Heightmap blending ON

Heightmap blending OFF

1.1.2 Parallax Occlusion Mapping

An illusion of 3D effect created by offsetting the textures depending on heightmaps.
The heightmap textures are taken from the **Blue channel** of the Terrain **Mask maps**



Affine Steps: Number of steps to affine the search - the higher number, the more smooth transition between steps will be, but also the higher number will increase performance heaviness.

Mip Maps Fading - Mip maps levels fading. The fading will start at the distance of the minimum value of the slider and end at the maximum value of the slider.

Bias - Minimal Mip map level where the fading will start.

Adjust Distance range - Setting of minimum and maximum values for fading slider.

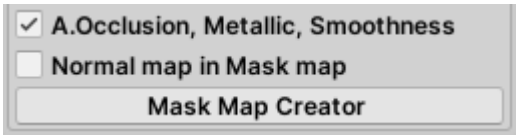
Layers Setting

Height : The value of the height illusion.
Steps: Each step is creating a new layer for offsetting. The more steps, the more precise the parallax effect will be, but also the higher number will increase performance heaviness.
If you set the **zero** the parallax effect will not be applied.

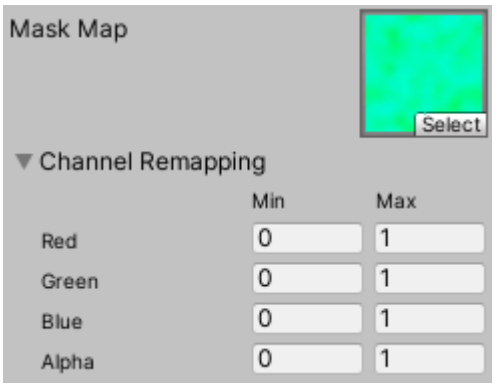
The **Parallax** effect will not be applied on **front** and **side** projection of **Triplanar Mapping** because of performance heaviness.

Parallax Occlusion Mapping ON **Parallax Occlusion Mapping OFF**

1.1.3 A.Occlusion, Metallic, Smoothness



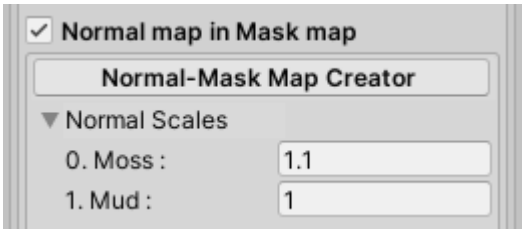
This option applies Ambient occlusion (green channel), Metallic (red channel) and Smoothness (alpha channel) from Mask map.
This option is available only If the **Normal map in Mask map** is not set on.



You can easily create the Mask Map in **Mask Map Creator**.

The values can be adjusted in **Channel Remapping** in the **Layer setting.**

1.1.4 Normal map in Mask map



This option is for improving performance.

If you choose this option, the Mask Map Channels have to include:

Red - A.Occlusion
Green - Bitangent(Green channel from Normal map)
Blue - Heightmap
Alpha - Tangent(Red channel from Normal map)

You can easily create this map in **Normal-Mask Map Creator.**
Smoothness map will be taken from the **Diffuse(Albedo) Alpha channel.**

This Mask map has to be set in Import Settings **Texture Type** as **Default** and **sRGB(Color Texture)** has to be unchecked!

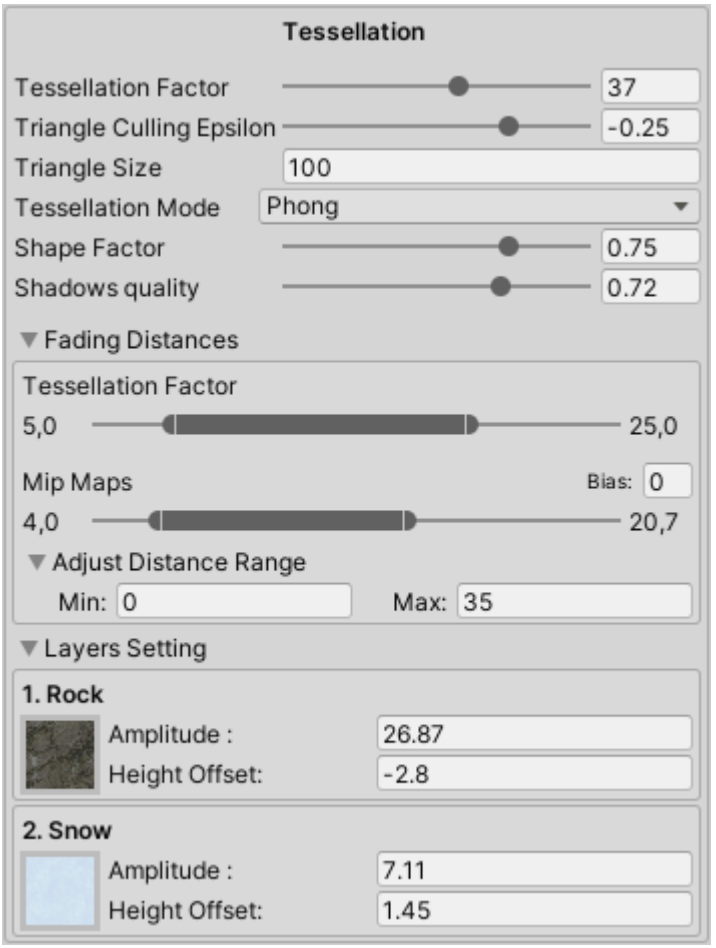
Green and Alpha channels are chosen for normal channels because of providing better quality, blue channel of normal maps can be calculated and there is no need to store it in the texture.

The map color values can be adjusted in **Channel Remapping** in the **Layer setting**, but because there is no need to adjust normal values as channels and because of consistency, the **Green channel always adjusts A.Occlusion and the Blue adjusts Heightmap.**

There is also an option to set **Normal Scales** because if the Normal map is not selected, the option of setting it in Layer settings is not available.

1.1.5 Tessellation

(Available only for HDRP)



Tessellation Factor - Controls the strength of the tessellation effect. Higher values result in more tessellation. Maximum tessellation factor is 15 on the Xbox One and PS4.

Triangle Culling Epsilon - Controls triangle culling. A value of -1.0 disables back face culling for tessellation, higher values produce more aggressive culling and better performance.

Triangle Size - Sets the desired screen space size of triangles (in pixels). Smaller values result in smaller triangles. Set to 0 to disable adaptative factor with screen space size.

Tessellation Mode - Specifies the method HDRP uses to tessellate the mesh. None uses only the Displacement Map to tessellate the mesh. Phong tessellation applies additional Phong tessellation interpolation for smoother mesh.

Shape Factor - Controls the strength of Phong tessellation shape (lerp factor).

Fading Distances - Sliders for setting the **Tessellation Factor** fading and **Mip maps** levels fading. The fading will start at the distance of the minimum value of the slider and end at the maximum value of the slider.

Bias - Minimal Mip map level where the fading will start.

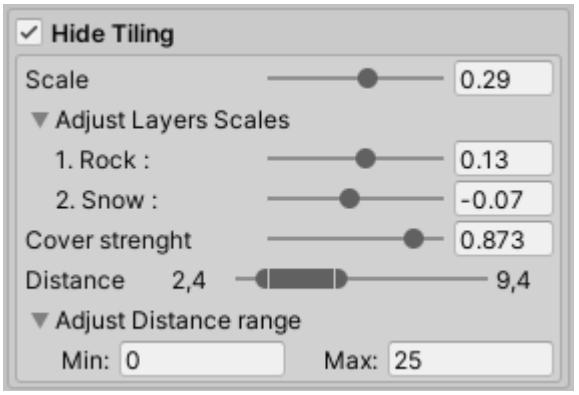
Adjust Distance range - Setting of minimum and maximum values for both distance sliders.

Layers Setting

Amplitude - Amplitude of the Height Map (Blue channel in **Mask Map**).
Height Offset - Height offset for Layer displacement.

1.2 HIDE TILING (HIDING TEXTURE REPETITION)

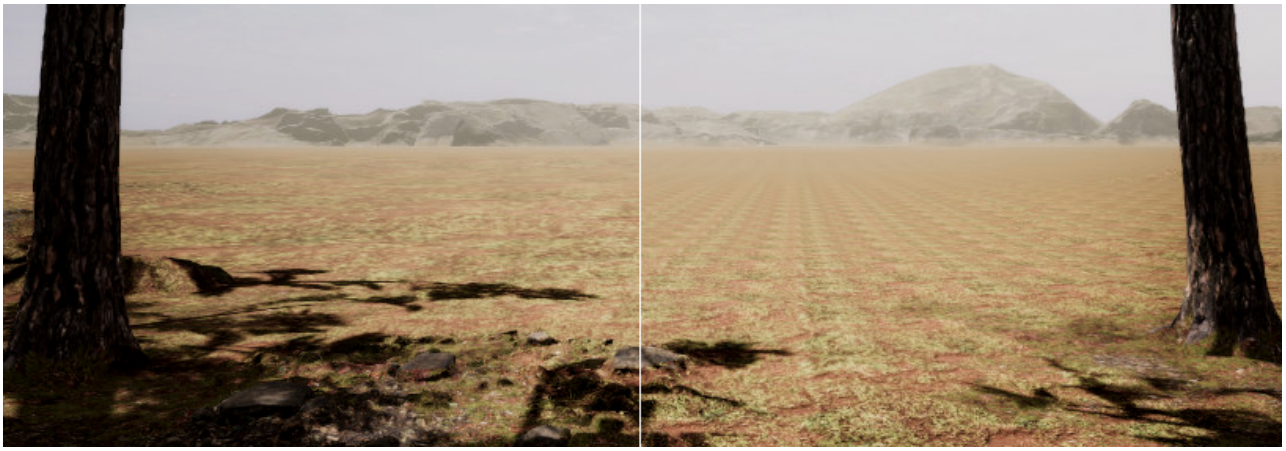
This feature hides texture repetition by covering the texture by its scaled up version in the given distance from the camera.



Scale - This value is multiplying the scale of the Textures in the distant area.
Adjust Layers Scales - Adjusting the scales of each Layer individually.

Cover strength - Strength of covering the Terrain textures in the distant area.

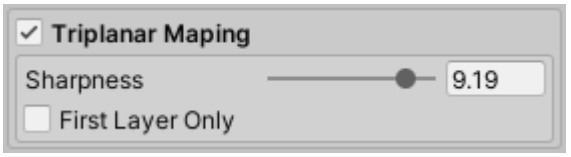
Distance - The distance where the covering will start. The closer the sliders are, the sharper is the transition.
Adjust Distance range - Setting of minimum and maximum values for Distance slider.



Hide Tiling ON **Hide Tiling OFF**

1.3 TRIPLANAR MAPPING (STEEP SLOPES TEXTURING)

This feature is for steep slopes texturing - the textures will not be stretched. This option has a bigger performance impact because all Terrain textures have to be sampled three times - Top, Front and Side.



Sharpness - This value adjusts the sharpness between Top, Front and Side texturing.

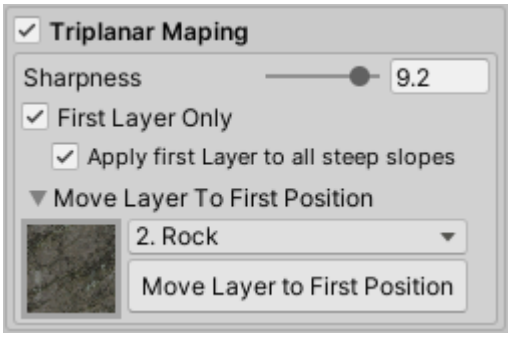
Because of the performance impact this option will be applied only on the first Terrain shader pass (four Layer in **Built-in** and **URP**, eight in **HDRP**) and the triplanar features will be applied on **Terrain Base map** only if you do not have more than one pass and you are using "**First Layer Only"** - otherwise the calculation would be too heavy and the Base map would become pointless.

Triplanar Mapping ON

Triplanar Mapping OFF

1.3.1 First Layer Only

This option is for performance reasons and if checked only first Layer will be sampled as triplanar.



1.3.2 Apply First Layer to all steep slopes

All the steep slopes will be automatically textured with the first Layer.

1.3.3 Move Layer to First position

Here you can easily move the Terrain Layer to the first position - just select the Layer and press “Move Layer to First Position”.

1.4 FIRST TWO LAYERS ONLY

This option is just for performance reasons and if checked, the terrain shader will be sampling only the first two Terrain Layers.

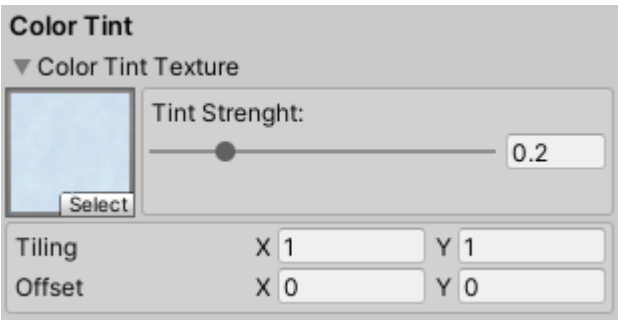
1.5 COLOR TINT

1.5.1 Color Tint Texture

The Texture that will cover the whole Terrain and will affect the color tint.

Tint Strength: Value of how strong the tint will be.

Tiling and Offset for color tint texture.



1.5.2 Layers Color Tint

Here you can adjust the color tint for Terrain Layers.

1.6 ADDITIONAL NORMAL

Additional normal texture will cover the whole Terrain and will affect the normals.

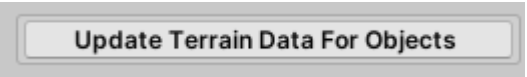
Normal Strength: Value of how strongly the normal will be applied.

Tiling and Offset for additional normal texture

Starting Distance: Distance where the additional normal texture will start showing.

1.7 UPDATE FOR INTEGRATED OBJECTS

By pressing **“Update Terrain Data For Objects”** all Materials using **Object into Terrain Integration** shader will recheck on which Terrain are placed and take the actualised data from that Terrain.



1.7.1 Auto Updates

The update for Objects also happen automatically at various events, for example when the Terrain Heightmap is discarded because it is the Render Texture, or if you do some changes in Object or Terrain GUI, but if you want to specify it more closely, you can do it in the file In**Terra_Setting** in ***Script*** folder.

There are three variables:

DisableAllAutoUpdates - This will cause that there will be no auto updates at all.

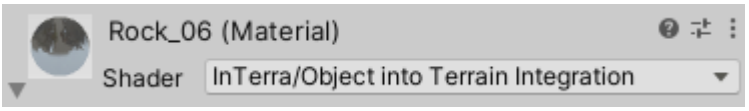
DictionaryUpdate - When false the auto update will be sending the Terrains data only to Materials that are included in the dictionary. Dictionary update requires check on all renderers and will be updated only via click on the **Update Terrain Data for Objects** in Terrain GUI or **Update Terrain Data** in Object GUI.

ObjectGUICheckAndUpdateAtOpen - At opening of GUI for Object shader there will be check if any render with this Material is on wrong Terrain or outside of Terrain, if this bool is false this check will be done only if you open the **Objects Info** foldout.

2. OBJECT SHADERS

The shaders for Objects can be found in:

InTerra/Object into Terrain Integration
InTerra/Diffuse/Object into Terrain Integration (Diffuse)
InTerra/URP/Object into Terrain Integration
InTerra/HDRP/Object into Terrain Integration
InTerra/HDRP Tessellation/Object into Terrain Integration Tessellation



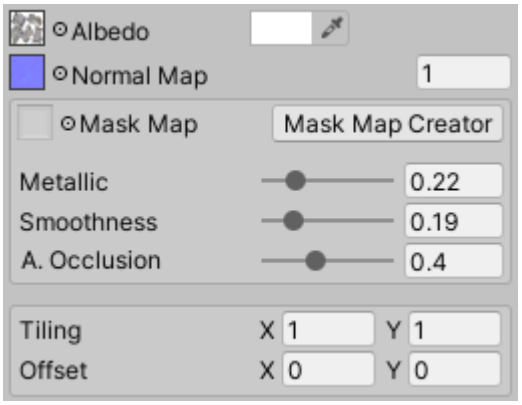
These shaders are providing various options for the visual integration of Objects into Terrain.

IMPORTANT NOTE:
For **URP** or **HDRP** the **Shader Variant Limit** has to be set at least to **1538.**

Object into Terrain Integration Shader **Unity Standard Shader**

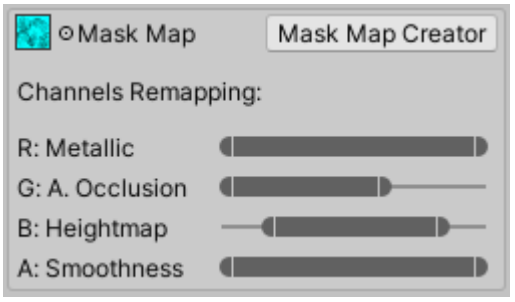
2.1 OBJECT TEXTURING

Albedo - Color (RGB) texture and the color tint
Normal map - Normal map texture and normal scale
Mask map (not available for diffuse shader) :
- **Red channel** - Metallic
- **Green channel** - Ambient Occlusion
- **Blue channel** - Heightmap
- **Alpha channel -** Smoothness



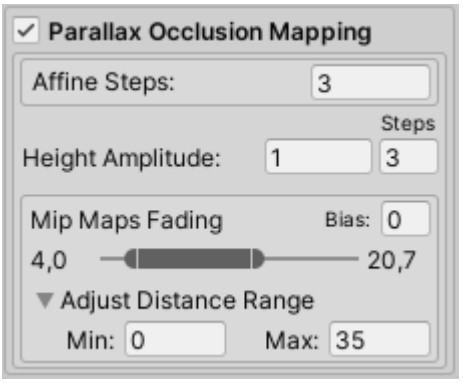
Mask map Creator button open window where you can quickly create the mask map.
Tiling and Offset for the main textures

If Mask Map texture is not selected, you can set Metallic, Smoothness and Ambient Occlusion with a value otherwise you can use Channels Remapping for adjusting the values.



Diffuse shader
For Diffuse shader the mask map is not available, but if Albedo texture has an alpha channel, the alpha channel will be used as a heightmap and there will be remapping for the heightmap.

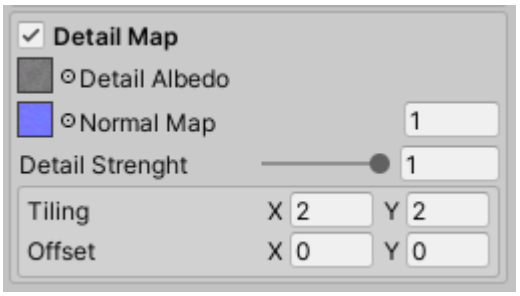
Parallax Occlusion Mapping
(not available for diffuse shader)
An illusion of 3D effect created by offsetting the texture depending on heightmap.
Affine Steps: Number of steps to affine the search - the higher number, the more smooth transition between steps will be, but also the higher number will increase performance heaviness.
Height Amplitude: The value of the height illusion.
Steps: Each step is creating a new layer for offsetting. The more steps, the more precise the parallax effect will be, but also the higher number will increase performance heaviness.



Note: ***Mip Maps Fading*** *setting is taken from the Terrain setting if the Terrain has* ***Parallax Occlusion Mapping*** *enabled, in which case it is not available in Object setting.*

Mip Maps Fading - Mip maps levels fading. The fading will start at the distance of the minimum value of the slider and end at the maximum value of the slider.
Bias - Minimal Mip map level where the fading will start.
Adjust Distance range - Setting of minimum and maximum values for fading slider.

Detail Map



Detail albedo - Secondary color texture.
Normal map - Secondary normal map texture.
Detail Strength - Strength of detail textures.

Tiling and Offset for Detail textures.

Emission

Emission Map - Color map texture for emission and emission color.

Tiling and Offset for emission color map texture.

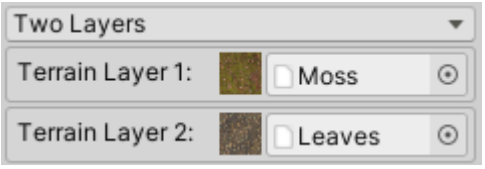
Exposure weight **(HDRP only)** - Controls how the camera exposure influences the perceived intensity of the emissivity. A weight of 0 means that the emissive intensity is calculated ignoring the exposure; increasing this weight progressively increases the influence of exposure on the final emissive value.

Global illumination - Specifies how the light that this Material emits affects the contextual lighting of other nearby GameObjects. There are three options:
• **Realtime**: Unity adds the emissive light from this Material to the **Realtime** Global Illumination calculations for the Scene. This means that this emissive light affects the illumination of nearby GameObjects, including ones that are moving.
• **Baked**: Unity bakes the emissive light from this Material into the static Global Illumination lighting for the Scene. This Material affects the lighting of nearby static GameObjects, but not dynamic GameObjects. However, Light Probes still affect the lighting of dynamic GameObjects.
• **None**: The emissive light from this Material does not affect Realtime lightmaps, Baked lightmaps, or Light Probes in the Scene. It does not illuminate or affect other GameObjects. The Material itself does have the emission color.

2.2 TERRAIN LAYERS

For performance reason, there are three shader variants for object integration:

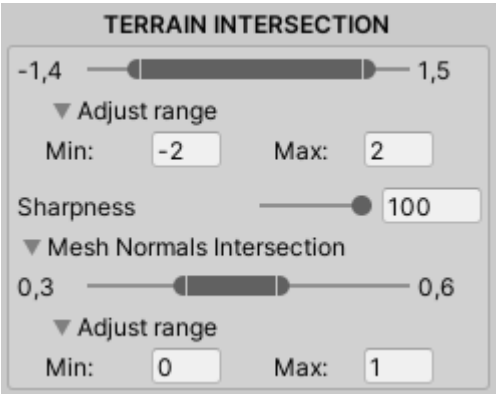
One Layer - Integration just with one selected Terrain Layer. This variant has the smallest impact on performance



Two Layers - Integration with two selected Terrain Layers.

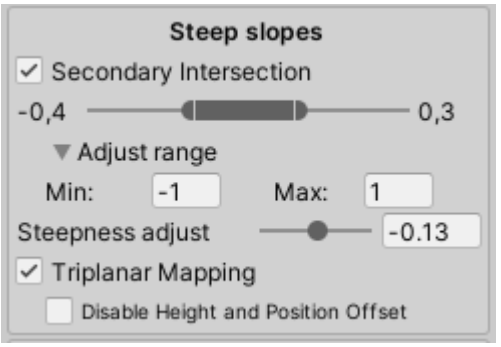
One Pass - Integration with Layers of one selected Terrain shader pass. This variant has the biggest impact on Performance, although you may need less Materials in some areas where you are mixing more Layers and so there can be less draw calls.
The pass in **Built-in** and **URP** has four Layers, in **HDRP** it depends on the number of your Layers, so if you do not have more than four Layers then only four Layers will be sampled, otherwise eight Layers will be sampled.
(For now HDRP has just one pass, so you cannot choose the number of pass)

2.3 TERRAIN INTERSECTION



The first slider is for setting the height of Terrain textures intersection - the closer the sliders are, the sharper is the transition.
Adjust range - Setting minimum and maximum values for intersection slider.
Sharpness - Sharpness of Object-Terrain heightmap blending textures transition.
Mesh Normals Intersection - Setting the height of intersection of terrain's and object's mesh normals.

2.3.1 Steep slopes

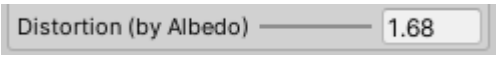


Secondary Intersection - This option allows you to set intersection for steep slopes separately. The slider works the same way as the **Terrain Intersection** but only applies to the steep slopes.

Steepness adjust - this value adjusts the angle that will be considered as **steep**.

Triplanar Mapping - This option will cause the Terrain texture to be sampled three times - Top, Front and Side. The textures on steep slopes of Object will not be stretched.

Disable Height and Position Offset - Front and Side projection of Terrain textures are offset by position and height to fit the Terrain texture as much as possible, but in some cases, for example if there is too steep slope of terrain, it can get stretched because of it and it is better to disable the offsetting. This may lead to some more or less visible seam.



Distortion - This value distorts stretched texture on steep slopes, this is useful if you don't want to use **Triplanar mapping** which is more performance heavy. Distortion is calculated by Albedo Texture and it doesn't work with a single color. This setting is available only if **Triplanar Mapping** is not enabled.

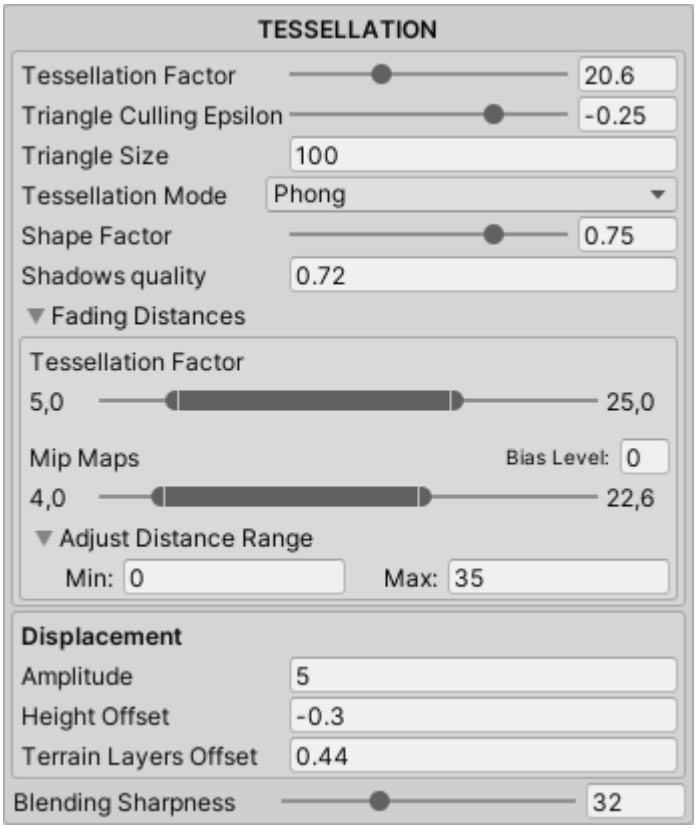
All functions in Steep slopes depend on correctly calculated Objects mesh normals!

2.3.2 Disable Hide Tiling (For Material Only)

If the Terrain **Hide Tiling** is set on, this option will turn it off only for the Material to prevent additional samplings and calculations. This may cause some more or less visible seams in the distant area.

2.3.3 Tessellation

(Available only for HDRP)



Tessellation Factor - Controls the strength of the tessellation effect. Higher values result in more tessellation. Maximum tessellation factor is 15 on the Xbox One and PS4.

Triangle Culling Epsilon - Controls triangle culling. A value of -1.0 disables back face culling for tessellation, higher values produce more aggressive culling and better performance.

Triangle Size - Sets the desired screen space size of triangles (in pixels). Smaller values result in smaller triangles. Set to 0 to disable adaptative factor with screen space size.

Tessellation Mode - Specifies the method HDRP uses to tessellate the mesh. None uses only the Displacement Map to tessellate the mesh. Phong tessellation applies additional Phong tessellation interpolation for smoother mesh.

Shape Factor - Controls the strength of Phong tessellation shape (lerp factor).

Note: *The **Fading Distances** setting for **Tessellation Factor** and **Mip maps** levels and the setting for **Shadows quality** is taken from the Terrain setting if the Terrain has InTerra shader with Tessellation.*

Fading Distances - Sliders for setting the **Tessellation Factor** fading and **Mip maps** levels fading. The fading will start at the distance of the minimum value of the slider and end at the maximum value of the slider.

Bias - Minimal Mip map level where the fading will start.

Adjust Distance range - Setting of minimum and maximum values for both distance sliders.

Displacement

Amplitude - Amplitude of the Height Map (Blue channel in **Mask Map**).
Height Offset - Height offset for displacement.
Terrain Layers Offset - Offset for Terrain Layers displacement.

Blending Sharpness - Heightmap blending sharpness between Terrains and Objects Textures for Tessellation.

2.3.4 Multiple Terrains Materials

(This feature is currently Beta!)

This section is available only for projects with multiple Terrains in one scene, it can help with creating needed Materials and synchronizing their properties.

Each Material created by this tool will be in format
of Base Name (Original name of the Material), underscore and Terrain name, each Material will have Tags with the Base name and Terrain name, so in case you would accidentally rename the Material it will help to resolve possible issues.

Note: *You cannot use this tool if some Terrains in one scene have the same name or if some of the Terrain names contain characters that are not allowed in file name.*
The tool is also not available when there are some instanced Materials with InTerra ***Object into Terrain Integration*** *shader.*

Base Name of Material - By default this name is the original name of the Material from which the set of Materials was created, but it can be changed.

Material Tags - This fold-out shows Material tags and allows you to change the Terrain Name tag if needed.

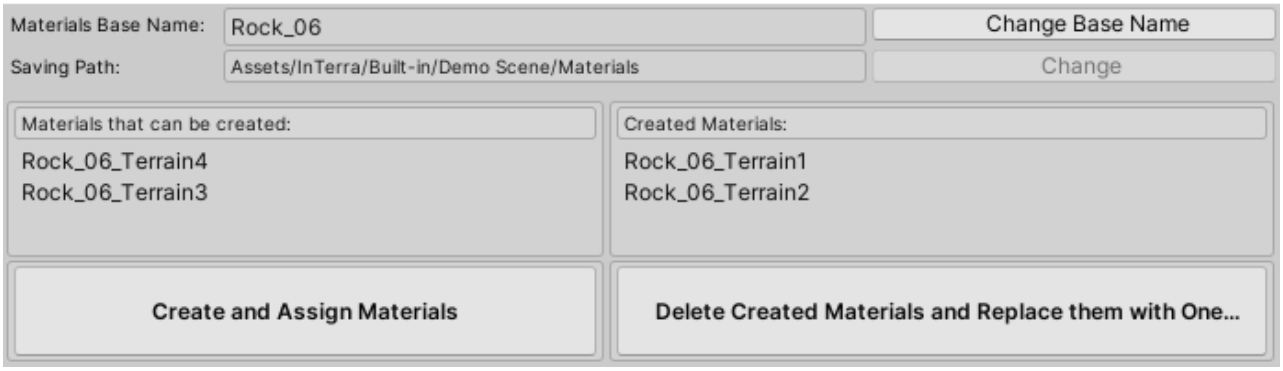
Related Materials - This List contains all Materials with the same Base name Tag as selected Material.

Copy Properties to Related Materials - This button will copy the properties from currently selected Material to all Materials that are in **Related Materials** list.

Reassign Related Materials - This button will check position of all Objects using currently selected Material and all the related Materials and if some Object was moved to different Terrain the proper Material will be assigned if the Material exists.

Create, Rename, Delete… - This button opens the window **Multiple Terrains Materials Creator** for creating Materials for all Terrains where the Objects using currently selected Material (or Materials with same Base name) are placed.

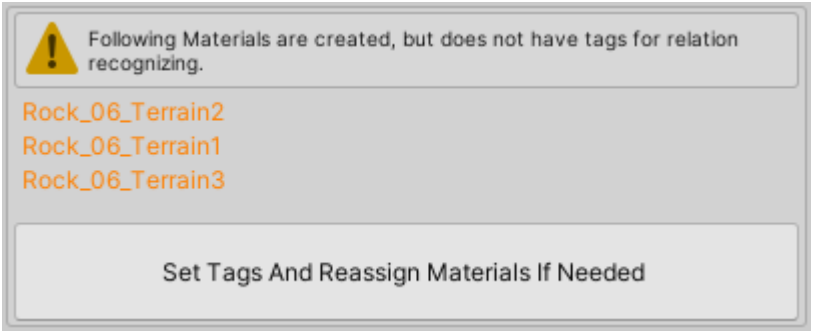
Multiple Terrains Materials Creator



Change Base Name - Allows you to change the Base name of the Material and will also change all the created Materials names.

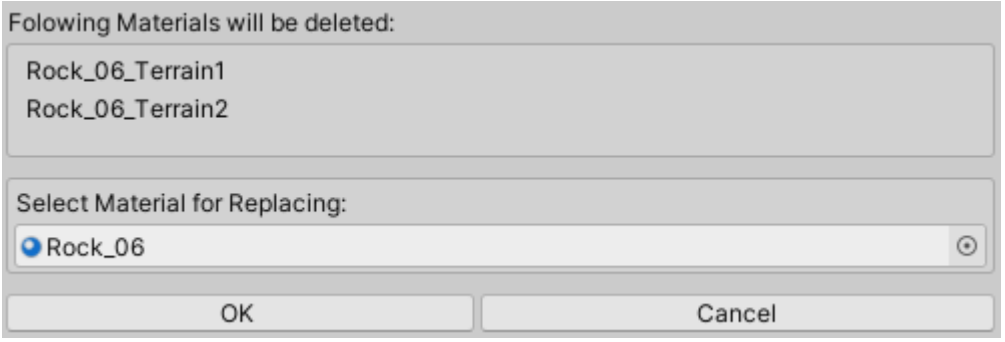
Create and Assign Materials - This button will create the Materials in the "*Materials that can be created*" list and will assign them to Objects that are using the selected Material or Objects that have the Materials with the same **Base name** Tag.

If you have already created Materials and the name has needed format, there will be possibility to add the Materials needed Tags so you can use them with the ***Multiple Terrains Materials*** tool.



Set Tags And Reassign Materials If Needed - This button will add the *Multiple Terrains Materials* Tags to the Material and will reassign the Materials if needed.

Delete Created Materials and Replace them with One… - This button opens the window where you can select the Material that will replace all created Materials that will be deleted. This step cannot be undone, but it is easy to recreate the Materials again.
For avoiding the inconsistency you cannot select Materials that belong to different set of Materials with different Base name.



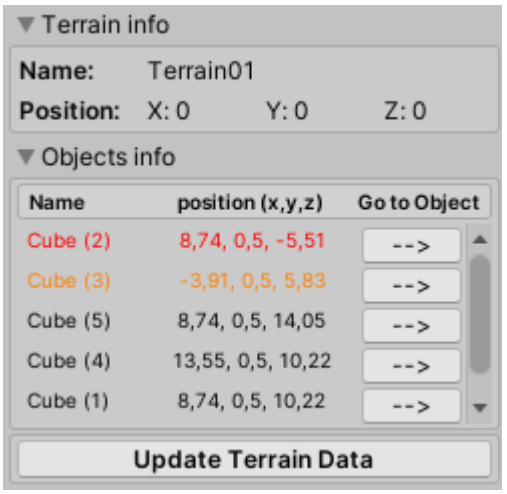
2.3.5 Terrain info

Information of Terrain the Material is blended with. The Terrain is determined by the average position of all objects that are using this Material.

2.3.6 Objects info

List of all Objects using the Material and their positions. Red text labels mean that the Object is outside of any Terrain.
Orange text labels mean that the Object is on different Terrain than the Material is receiving data from.

The buttons in the “Go To Object” column will select and focus Object.



2.3.7 Update Terrain Data

All Materials using **Object into Terrain Integration** shader will recheck on which Terrain are placed and take the actualised data from that Terrain.

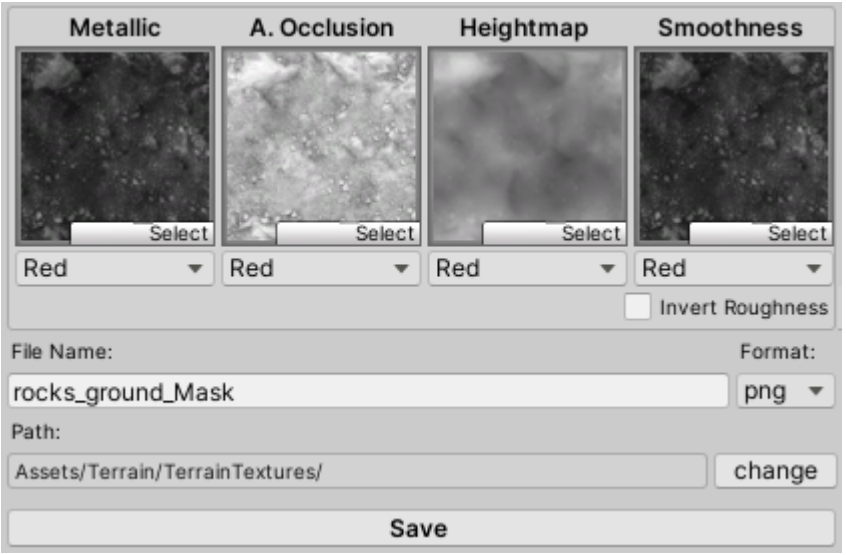
2.4 OBJECTS ON MULTIPLE TERRAINS

There is no special setting, but you cannot use one Material on multiple Terrains. One Material can receive data only from one Terrain which is determined by the average position of all Objects using the Material, so for multiple Terrains you will need a copy of Material for each Terrain.

You can use the 2.3.4 Multiple Terrains Materials for creating needed sets of Materials.

3. MASK MAP CREATOR

The Mask Map creator can be opened from the Terrain Material setting in **Mask Map Features** (if the "**Normal map in Mask map"** is not enabled) or from the Object Material setting, where the button for opening is right next to the Mask Map selection.



Simply select the needed texture map and choose the channel where your map is stored if it is placed in a specific channel.
There is no need to select all the maps, but at least one has to be selected.
If you have a **Roughness** texture instead of **Smoothness** you can select the **Roughness** one and check the "**Invert Roughness**" which will convert it into **Smoothness**.
You can choose the format PNG or TGA for the output file.
The path is setted the same as the location of the first texture you selected, but you can choose another one by pressing the "**change**" button.

Output Texture channels info:
Red - Metallic map
Green - Ambient Occlusion
Blue - Heightmap
Alpha - Smoothness map

3.1 NORMAL-MASK MAP CREATOR

The **Normal-Mask Map creator** can be opened from the Terrain Material setting in Mask Map Features when the **Normal map in Mask map** is enabled.

! IMPORTANT !
The output Texture of **Normal-Mask Map Creator** has to be set in Import Settings **Texture Type** as **Default** and **sRGB(Color Texture)** has to be unchecked!
(This setting is automatically applied if you save the Texture to your actual projects Asset folder.)

Output Texture channels info:
Red - A.Occlusion
Green - Bitangent(Green) from Normal map
Blue - Heightmap
Alpha - Tangent(Red) from Normal map.