Map Lab

Operation Manual

All information provided in this document is subject to change without notice and does not represent a commitment on the part of &U ASSETS. The software described by this document is subject to a License Agreement and it is not meant to be copied to other media. No part of this document may be copied, reproduced or otherwise transmitted or recorded, for purposes other than the explicit by the customer, without prior written permission by &U ASSETS.

Content

&u - Assets

1 External Libraries

cloo.unity.dll

The cloo.unity library is based on the Cloo framework. The branch is maintained by &u Assets. Cloo is an open source, easy to use, managed library which enables .NET/Mono applications to take full advantage of the OpenCL framework.

Copyright ©2009 - 2011 Fatjon Sakiqi.

MIT License

cloo.template.dll

OpenCLTemplate is a tool designed to allow programmers to quickly develop GPU accelerated software using C# and OpenCL technologies.

GNU Lesser GPL

pthreadVC2.dll

POSIX threads library for Microsoft Windows defines an application programming interface (API) for writing multithreaded applications.

Copyright © 1998 John E. Bossom
Copyright ©1999,2006 Pthreads-win32 contributors
Copyright © 2001,2006 Ross P. Johnson

GNU Lesser GPL

2   Overview

Map Lab is an advanced PBR texture generator for artists, game developers and map crafters. Map Lab provides an easy way to craft PBR materials out of plain images. The powerful layer system allows a fast and solid way to control and fine-tune the different maps. All pixel operations are done in 32 bits per channel guaranteeing high-quality output textures.

2.1   Output Maps

2.1.1   Albedo
The albedo map controls the color of the diffuse light reflected by the material. Transparency is controlled by the map's alpha channel.

TRANSPARENT   **OPAQUE**

2.1.2   Normal
The normal map adds more surface details without increasing the polygon count.

2.1.3   Specular
The specular map controls the color of the specular highlights and the shininess (specular reflections) of the material.

NON-SPECULAR   **FULL-SPECULAR**

2.1.4   Smoothness/Metallic
The metallic map controls how metallic a surface is. The metallic information is stored in the red channel of the texture.

The smoothness map controls the surface's roughness/glossiness. The smoothness information is stored in the alpha channel of the texture.

NON-METAL   **METAL**

2.1.5 Height

The height map adds additional height information to the surface. An appropriate shader can calculate a pseudo-occlusion on the surface without increasing the polygon count.

LOWEST LEVEL   HIGHEST LEVEL

2.1.6 Ambient Occlusion

The ambient occlusion map controls the amount of ambient light received from the surface. White means full ambient light.

NO AMBIENT LIGHT   FULL AMBIENT LIGHT

2.1.7 Emission

The emission map controls the amount of light emitted from the surface. White means full emission, while black means no emission at all.

NO EMISSION   FULL EMISSION

2.1.8 Transparency

The tranparency map controls the amount of light emitted from the surface. White means that the surface is opaque, while black means that the surface is completely transparent.

TRANSPARENT   OPAQUE

2.2 Layers

Each output map is composed of multiple layers. Layers can be freely added, rearranged or removed. The layers get mixed together controlled by the selected Blend Mode and the specified opacity. The different layers get blended in a top-down order.

2.3   Filters

Each layer is composed of multiple filters. Filters can be freely added, rearranged or removed. The filters get applied in top-down order. Filters often have an asymmetrical behavior. This means that the position of the filter within the parent layer influences the layer output. See Adding Layers.

3   Layer Blend Modes

3.1   Normal
This is the default mode. Just the *Opacity* value controls the blend of the top and bottom layer.

3.2   Darken
This is a per-channel blend mode. The darker color component gets selected. If the color component of the top layer is darker than the bottom layer it stays the same.

3.3   Lighten
This is a per-channel blend mode. The lighter color component gets selected. If the color component of the top layer is lighter than the bottom layer it stays the same.

3.4   Multiply
This is a per-channel blend mode. It multiplies each color of the top layer by the corresponding color of the bottom layer. The resulting color is always a darker color or stays the same. Multiplying any color with white leaves the color unchanged. Blending any color with black results in black.

3.5   Divide
This is a per-channel blend mode. It divides each color of the top layer by the corresponding color of the bottom layer. Blending any color with black or white leaves the color unchanged.

3.6   Screen (Inverse Multiply)
This is a per-channel blend mode. It multiplies the inverse color of the top layer by the corresponding color of the bottom layer. The resulting color is always a lighter color or stays the same. Blending any color with black leaves the color unchanged.

3.7   Add (Linear Dodge)
This is a per-channel blend mode. It adds the inverse color of the top layer by the corresponding color of the bottom layer. Blending any color with black leaves the color unchanged.

3.8   Subtract
This is a per-channel blend mode. It subtracts the color of the bottom layer from the corresponding color of the top layer. Blending any color with black leaves the color unchanged.

3.9   Difference

This is a per-channel blend mode. It subtracts either the top layer color from the corresponding color of the bottom layer or vice-versa, depending on the brighter color. Blending any color with black leaves the color unchanged.

3.10   Overlay

This is a per-channel blend mode. It multiplies or screens the colors, depending on the top layer color. The top color gets not replaced, but blended with the bottom layer color to reflect the lightness or darkness of the original color.

3.11   Linear Light

Decreasing or increasing the brightness, depending on the bottom layer color. If the bottom layer color's brightness is larger than 50%, the image gets lightened by increasing the brightness. If the bottom layer color's brightness is smaller or equals 50%, the image gets darkened by decreasing the brightness.

3.12   Tangent Normal

This is a per-color blend mode. The colors get interpreted as three dimensional vectors. The vector from the top layer gets added to the vector from the bottom layer, the resulting vector gets normalized and then color-encoded as tangent normal.

4   Usage

4.1   Add Input Images

Every new map project needs at least one input image. You can specify your input images under the **Input** tab.
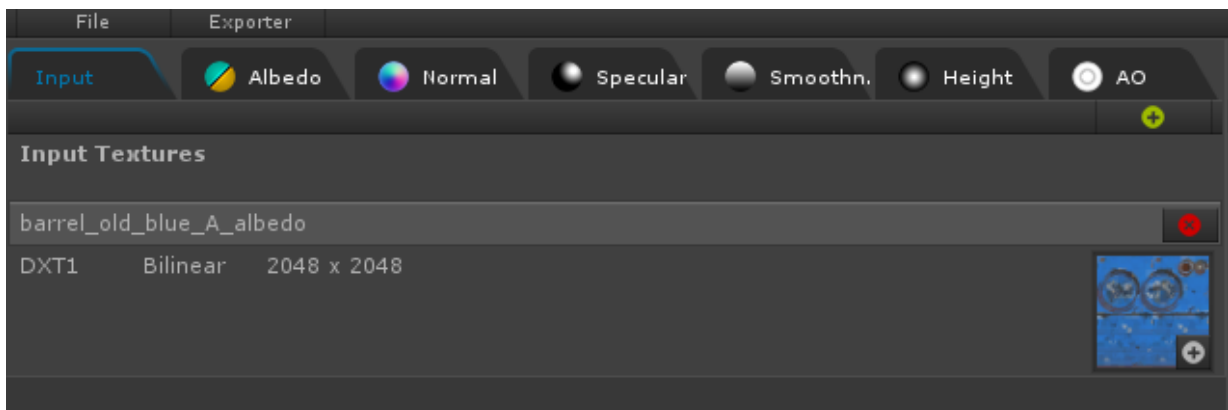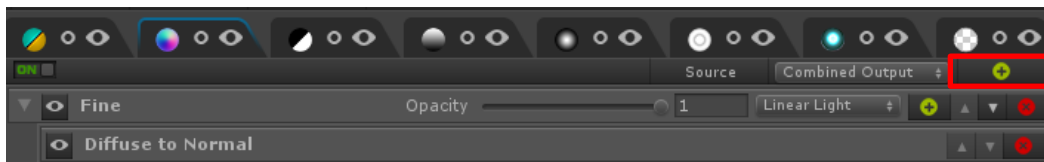

To delete an input image just click on the delete icon ⊗ beside the texture name.

> Map Lab also supports multiple input textures. You can add a new image by clicking on the green plus icon ⊕ in the upper right corner.
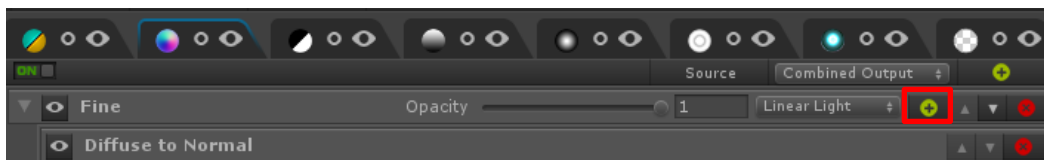
4.2   Adding Layers

To add a new layer to an output map click on the ⊕ icon in the map toolbar. A new layer gets always added at the bottom.
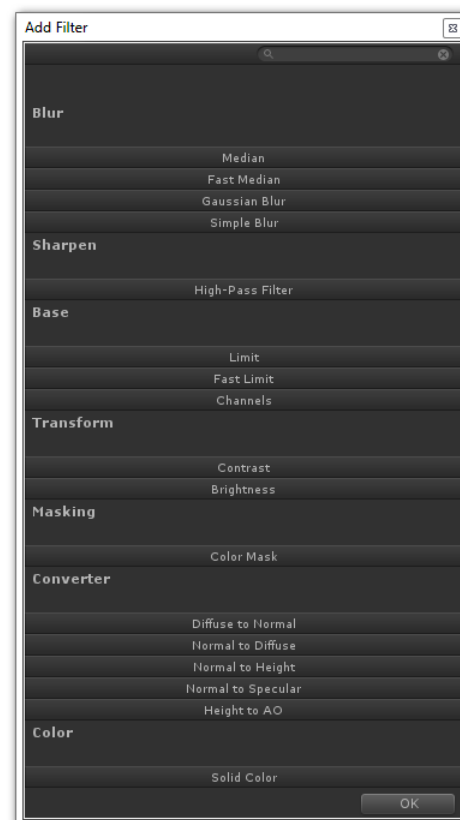

4.3   Adding Filters

Each layer needs filters to do something with the specified input. To add a new filter just click on the ⊕ in the particular layer.

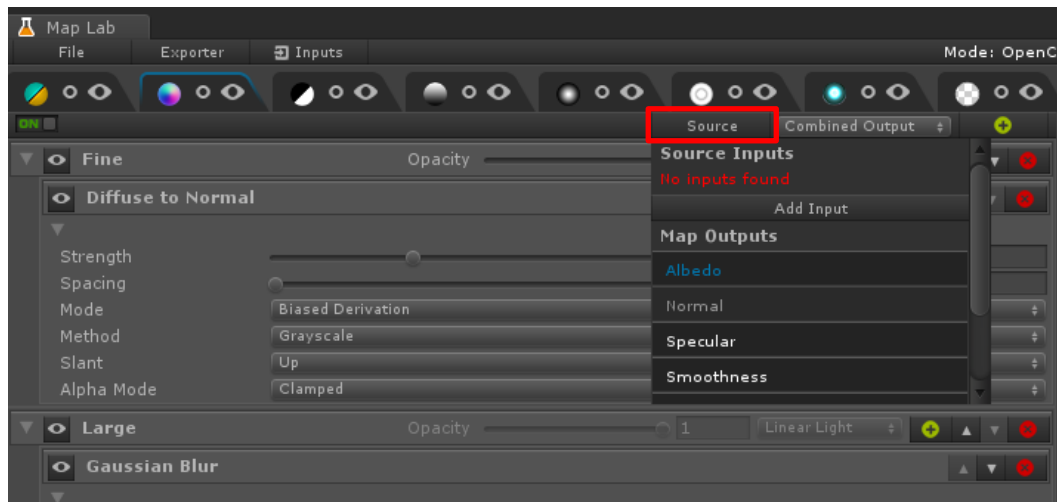In the pop-up window select the filter you want to add.

ℹ️ You can add multiple filters to a layer at once.

4.4   Setting the Input Source

Each map needs to have an input source specified. The source could either be a plain image input or the output of another map.


If you haven't added any input textures yet, you can click to **Add Input** to quickly add one.

When the source input is set to another map's output, the source map is then dependent of selected map. When the dependency changes, the current map will also change and reflect the modification.

Additionally you could specify whether to take the **combined output** or a single layer as source.
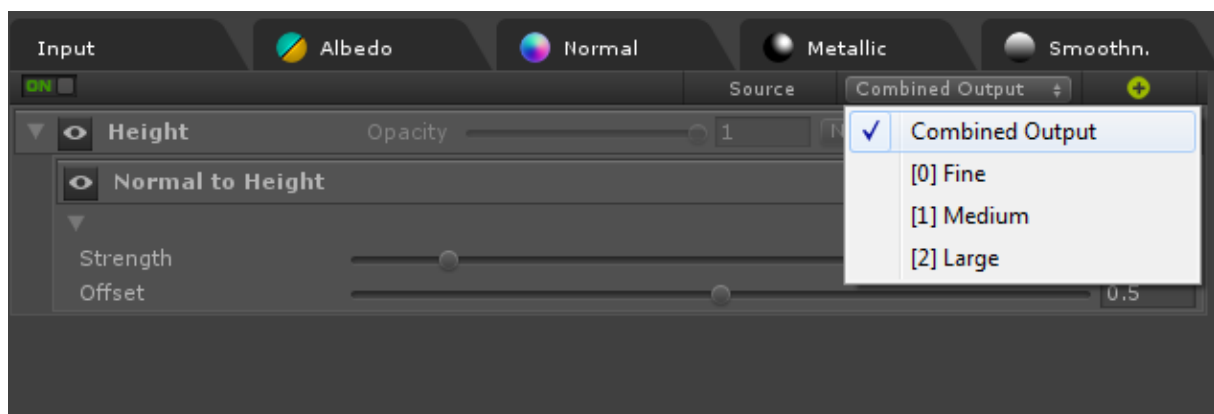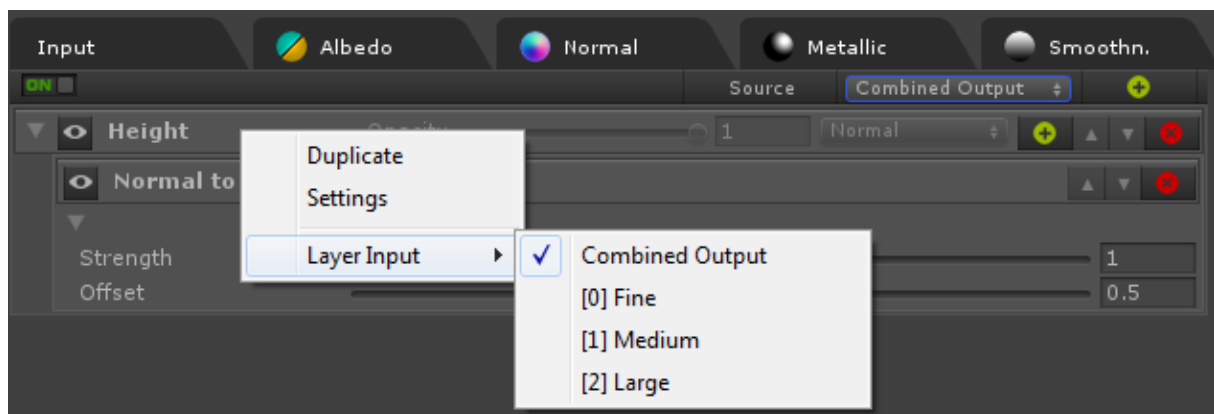
4.5 Change Input Source on a single Layer

Each layer in a map can have a separate layer as input. This is useful, for example, if one needs to convert a multi-layer normal map to multi-layer height map.

To assign a single layer as input source right click on the header of the desired layer and select the input in the context menu under **Layer Input**.

4.6 Duplicate a Layer

To duplicate a single layer right click on the header of the desired layer and click **Duplicate** in the context menu.

4.7 Renaming a Layer

To rename a single layer right click on the header of the desired layer and click **Settings** in the context menu. In the Layer Settings window enter a new name and press **OK**.

4.8 Hotkeys

4.8.1 Main Editor

Key	Description
1 - 7	Change between the different maps.
S	Open the settings window.
E	Open the exporter window.
I	Open the inputs window.
Space	Rerender all maps.
ESC	Flush the command queue. Cancel the rendering. Reset the UI.

4.8.2 Map Tiler

Key	Description
Ctrl+D	Clear the current selection.
M	Marquee tool.
V	Arrow tool.
Hand	Hand tool.

&u - Assets

5 Material Previewer

The built-in WYSIWYG material previewer always renders the material with all maps applied. Changes are immediately reflected.
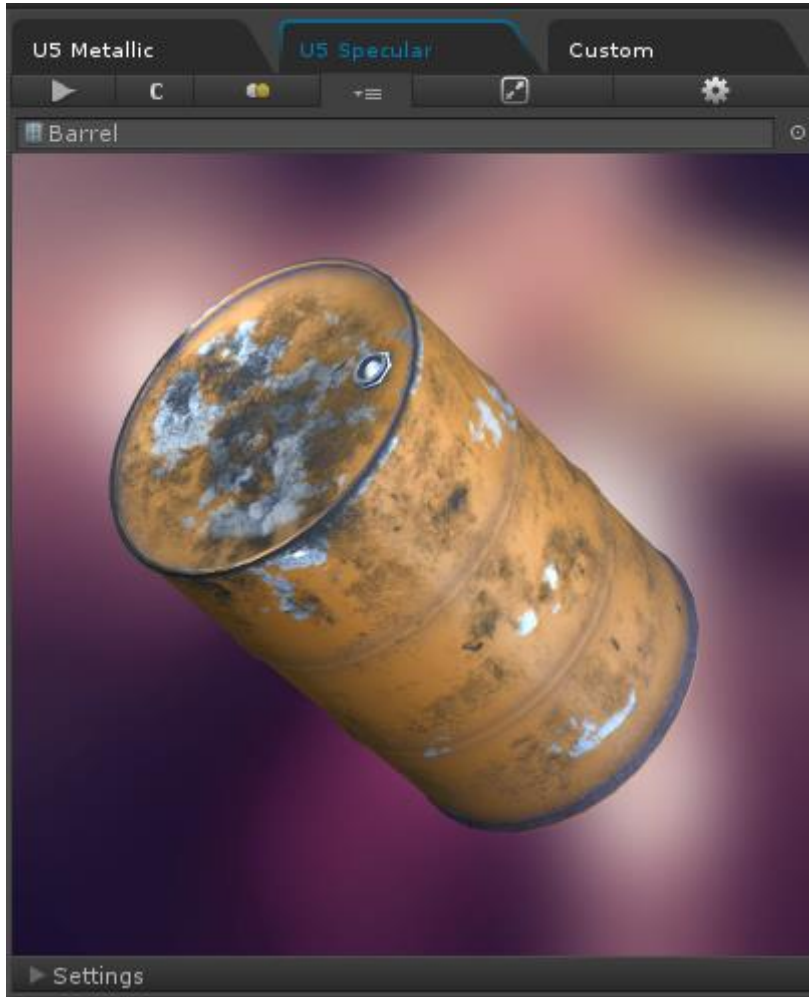
5.1 3D Orientation

5.1.1 Rotation
Hold down the left mouse button and drag to rotate around the preview model.

5.1.2 Zoom
Use your mouse's scroll wheel to zoom in and out.
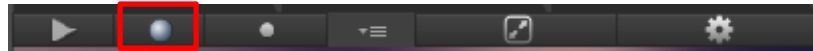
5.2   Animate Preview Model

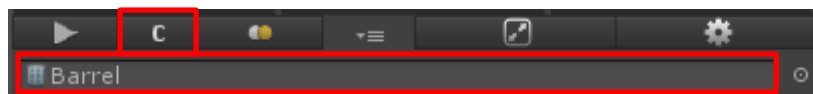Press the play button to let the model linearly rotate.

5.3   Change the Preview Model

Press the model button to switch between the different preview models.
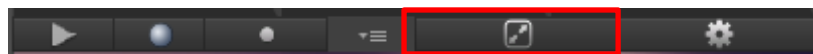
To use a custom model click until you see the C icon and assign your custom model to the field below.
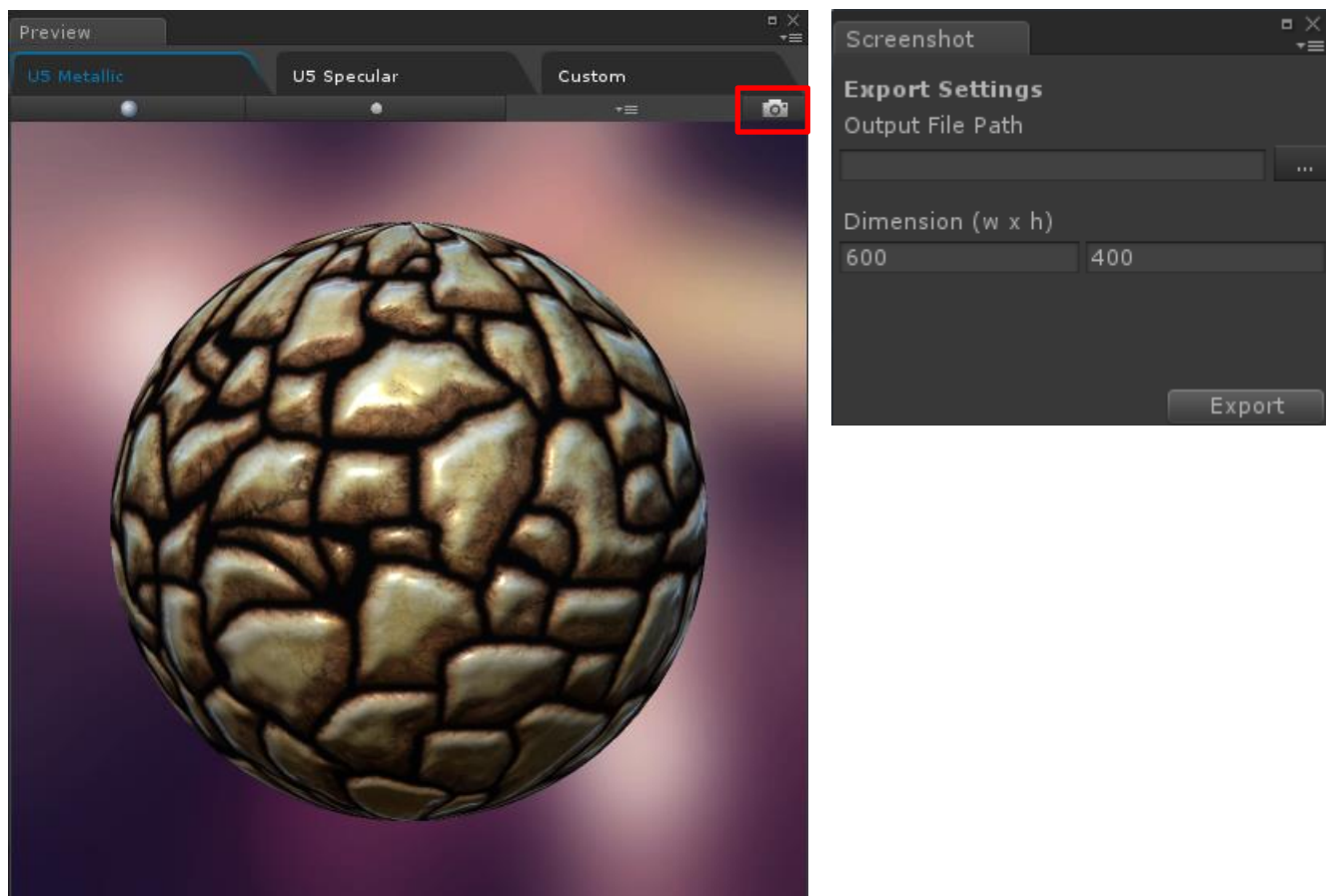
5.4   Full Screen Preview

Press the full screen button to get a scalable preview window. The preview is synchronized between the different windows.

5.5   Export a Preview Render

In the full screen preview window you can render the preview at a given resolution and export the resulting image.

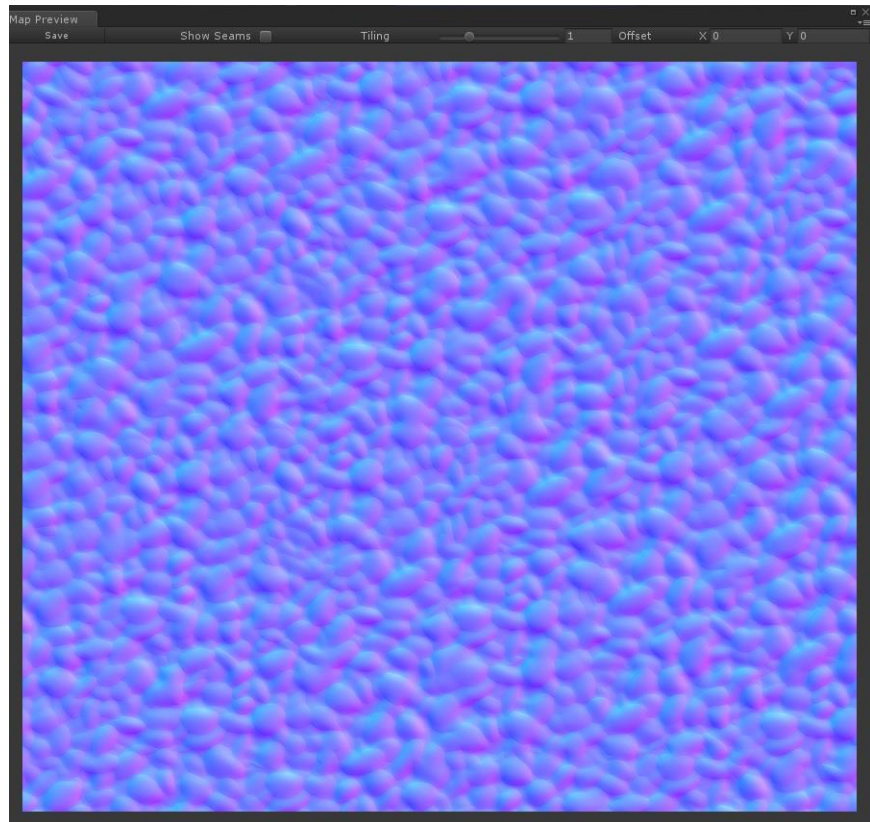| Parameter Name	Description
Output File Path	Sets the path of the output image.
Dimension	Sets the dimension on the rendered image.

> The background of the output image gets defined by the Background property in the Map Lab preview settings.

6   Map Previewer

The map preview shows up when clicking to one of the preview thumbnails.
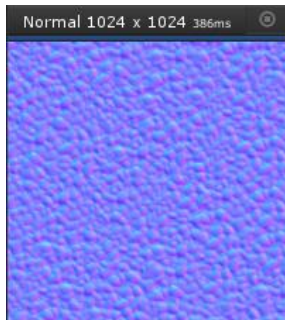
Click here to show
the large preview

The map preview has an infinite workspace which can be dragged and zoomed to easily verify the correctness of the seams.

6.1   Orientation

    6.1.1   Pan
Hold down the left or middle mouse button and drag to pan the map in the previewer.
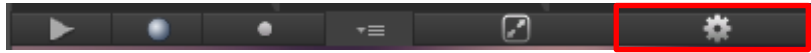
    6.1.2   Zoom/Tiling
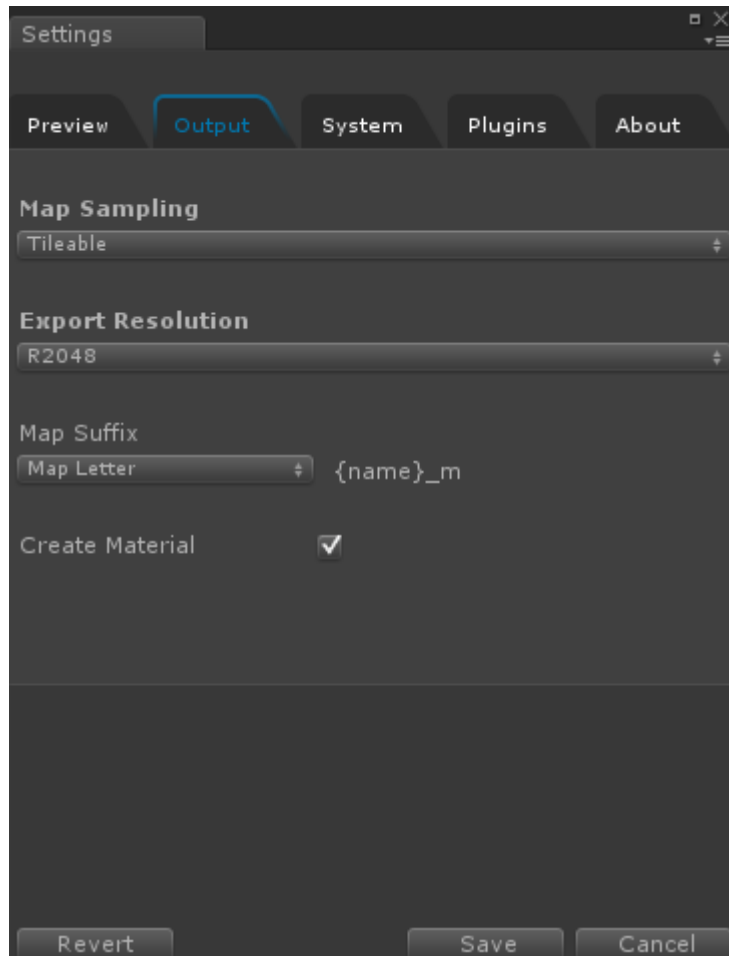Use your mouse's scroll wheel to zoom in and out.

7   Settings

The settings button is located in the material preview toolbar. The settings are global and get shared between the sessions.

7.1 Preview

Configure the settings for the preview here.

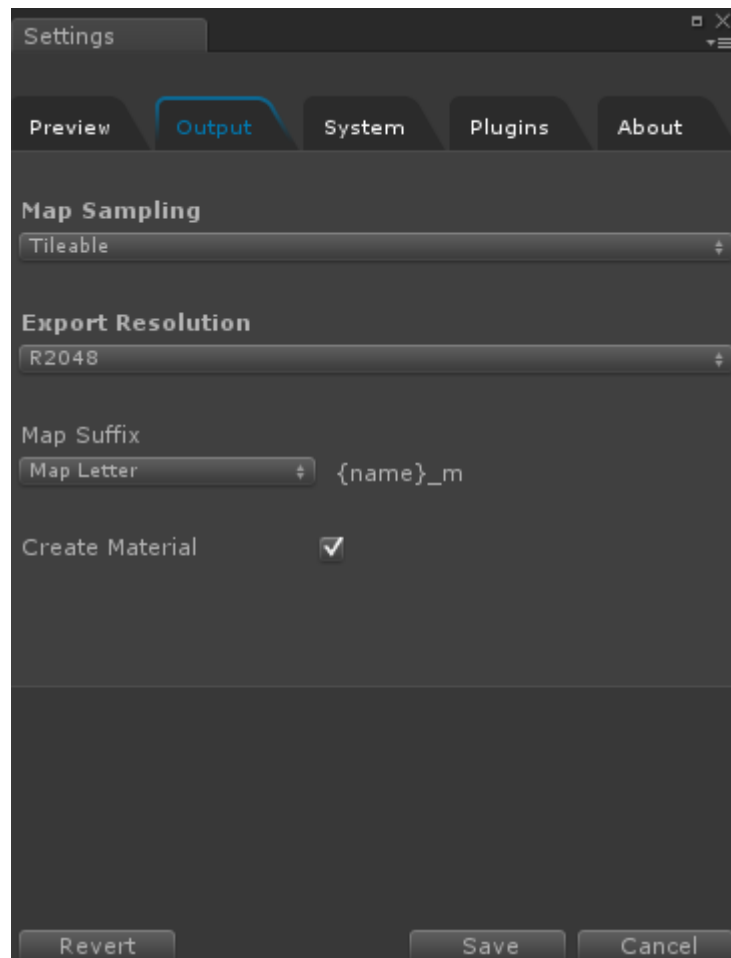| Parameter Name	Description
Quality	Sets the render quality for the preview maps. **Very Low** **High** 128 x 128 px 1024 x 1024 px **Low** **Ultra** 256 x 256 px 2048 x 2048 px **Normal** 512 x 512 px
Color Space	Sets the color space of the map and 3D model preview.
Background	Sets the background type of the 3D model preview. Note: The background setting is also used by Preview Render Exporter.

Draw Wireframe	Enables or disables the wireframe in the preview window.
Orthogonal Projection	Toggles between orthogonal and perspective projection in the 3D model previewer.
Revert	Revert the factory defaults.

Don't set the preview quality too high, as this can affect the editor's performance.

7.2 Output

Configure the settings for the output here.

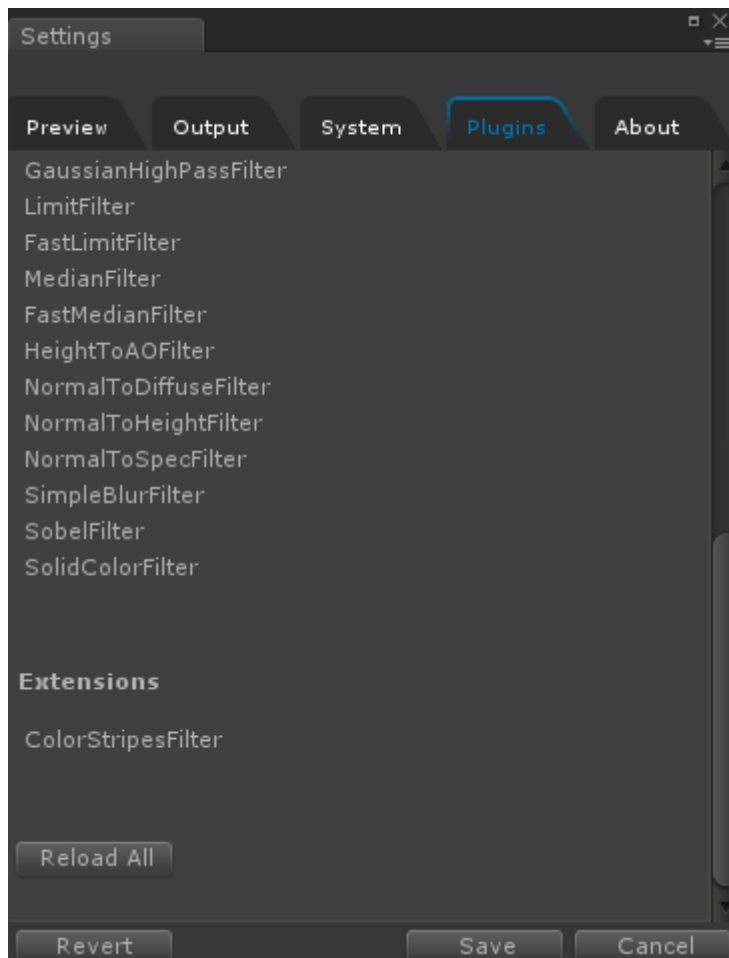| Parameter Name	Description
Map Sampling	Sets the sampling method at the map's borders. **Tileable** This method wraps around at the borders, ensuring that a seamless input texture remains tileable after processing. Use this method when working with seamless textures. **Clamp** This method clamps pixels at the borders. That means that edge pixels get repeated.
Map Suffix	Sets the naming convention for the exported maps.
Create Material	Specifies whether or not Map Lab should create a Unity material after the export has finished.

7.3 System

Configure general system settings here.
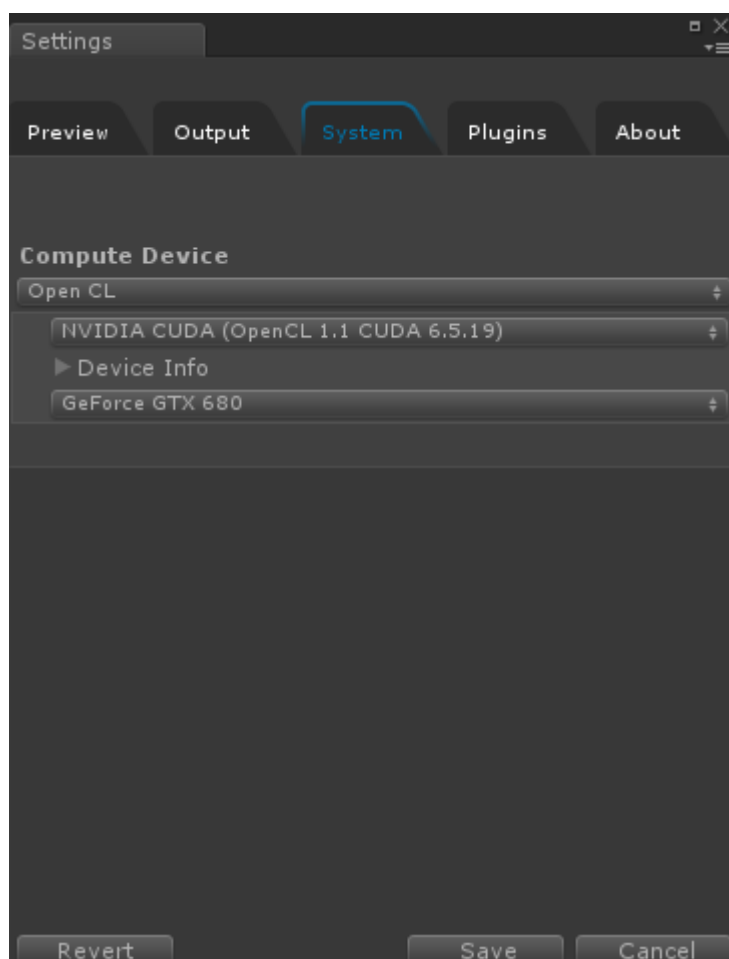
Parameter Name	Description
Chunk Size	Sets the size in pixels of a single chunk processed by a single thread. This property is only available on CPU.
Acceleration	Sets the computing device and the acceleration. **CPU** Perform all calculation on CPU. **Open CL** Use an Open CL capable device to perform calculations. All available Open CL platforms get listed in the list box below.

&u - Assets

7.4 Plug-ins

Configure general plug-in settings here.

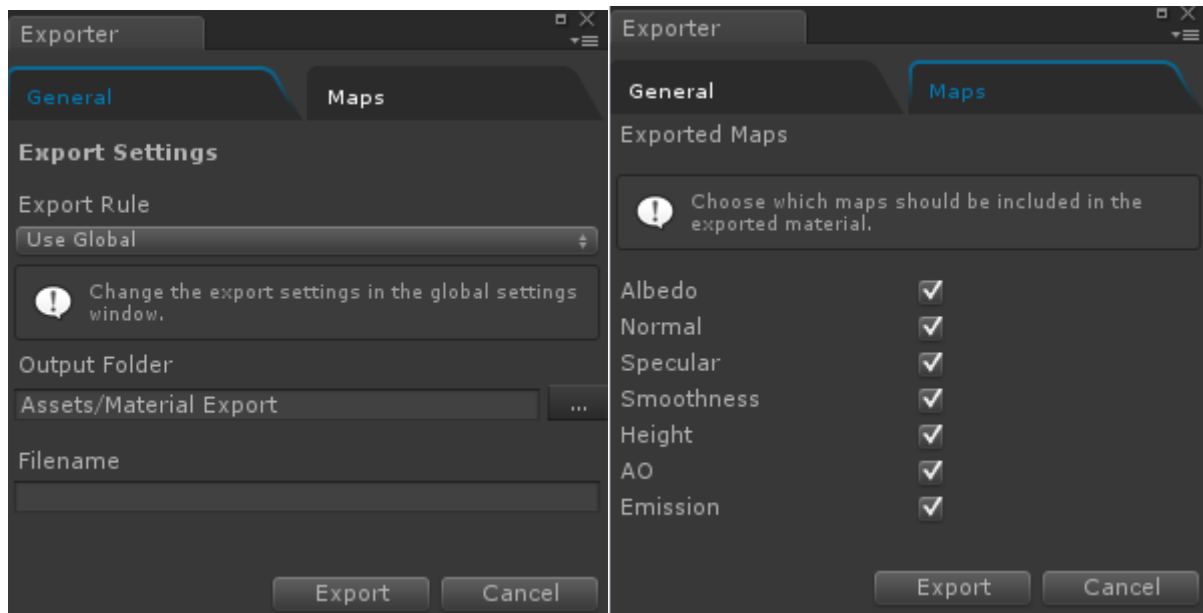| Parameter Name	Description
Reload All	Reloads all plug-ins found in the current Unity project.

7.5   About

In the **About** tab you can find information about the current Map Lab version and options for support.

8 Exporter

Configure the exports here.

Under the Maps tab you can select which maps should be exported.

| Parameter Name	Description
Export Rule	Sets the export rule for this project. **Use Global** Use the global settings to export the maps. **Per Project** Override the settings for the current project.
Create Material	Enables or disables the automatic material creation. When enabled the exporter will automatically create a material with all maps and settings applied.
Output Folder	The folder where the maps and material get saved to.
Filename	The name of the material and the prefix for the maps.

9 Tutorial

9.1 Create a multi-frequency normal map

A multi-frequency normal map is basically just a map composed of multiple detail levels. Each detail level gets preprocessed by a low-pass filter to sample the normal vectors in descending frequency ranges and then combined to a single normal map.
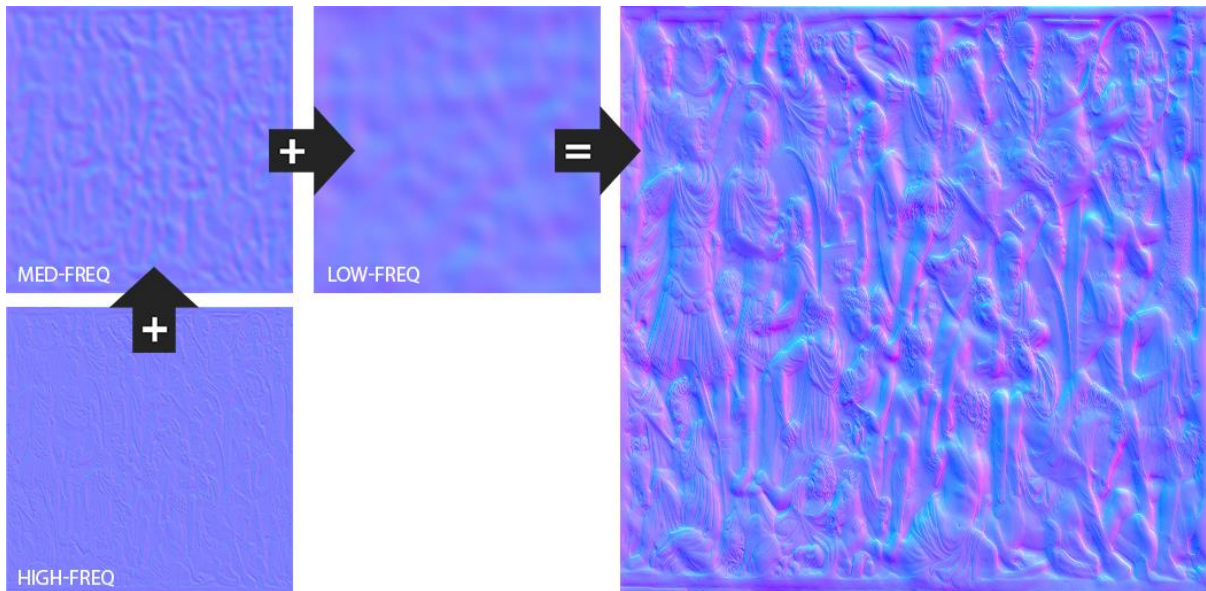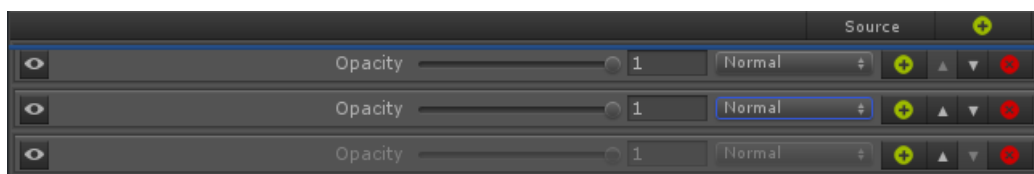

Step 1

Select an input texture and go to the Normal tab
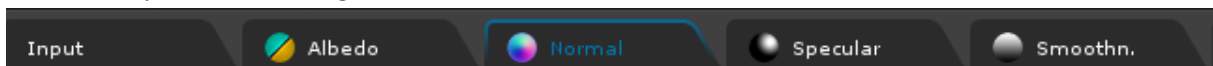


Step 2

Create three new layers

Step 3

1. Add a *Diffuse-To-Normal* filter to the top-most layer. This layer will reflect the high-frequencies and shows the fine details.

2. Add a *Gaussian Blur* filter and a *Diffuse-To-Normal* filter to the middle layer. This layer will reflect the medium-frequencies and shows medium details.

3. Add a *Gaussian Blur* filter and a *Diffuse-To-Normal* filter to the bottom layer. This layer will reflect the low-frequencies and shows just the very slow-changing surface characteristics.

4. Set the layer blend mode to Linear Light to appropriately mix the layer outputs.
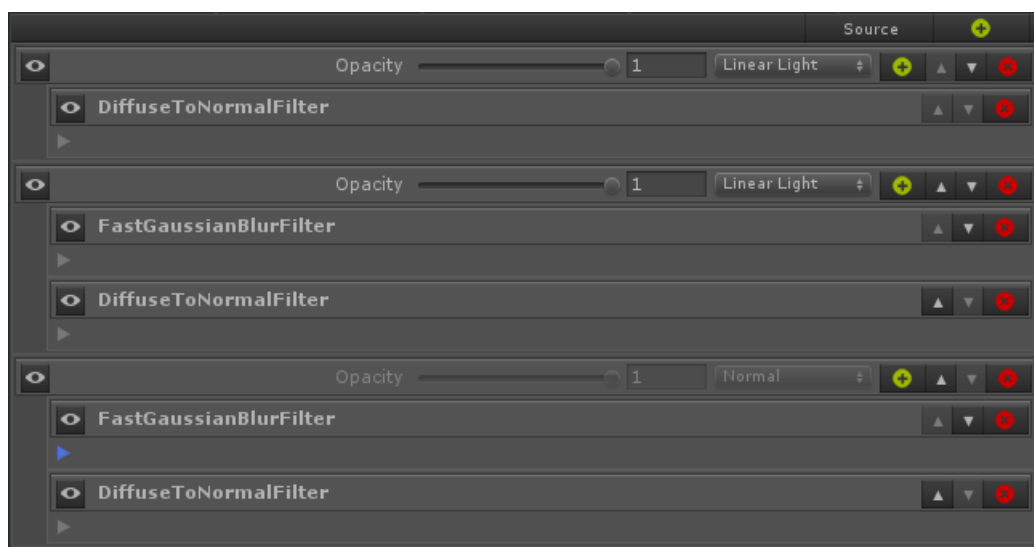
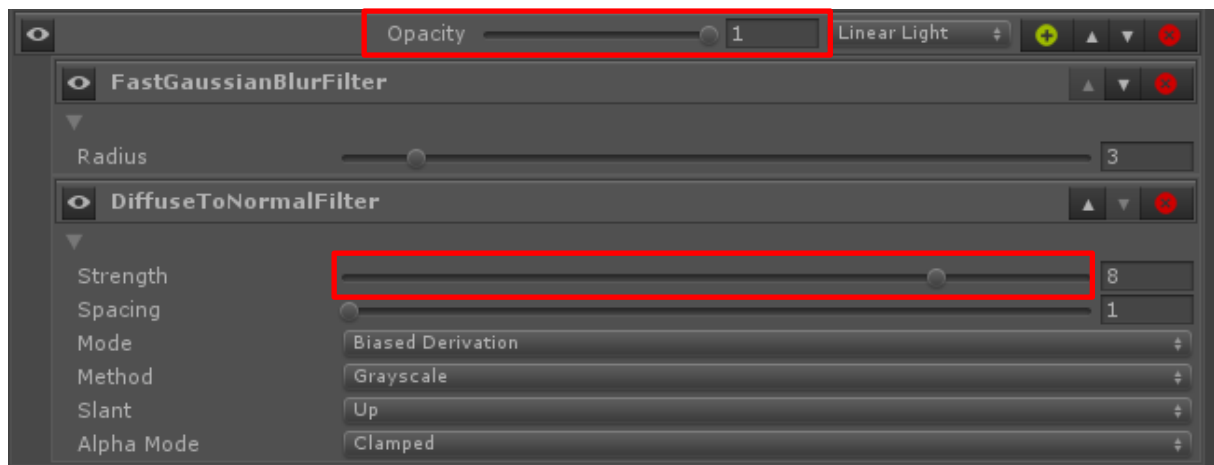**Step 4**

Set the Gaussian blur radius to appropriate values.
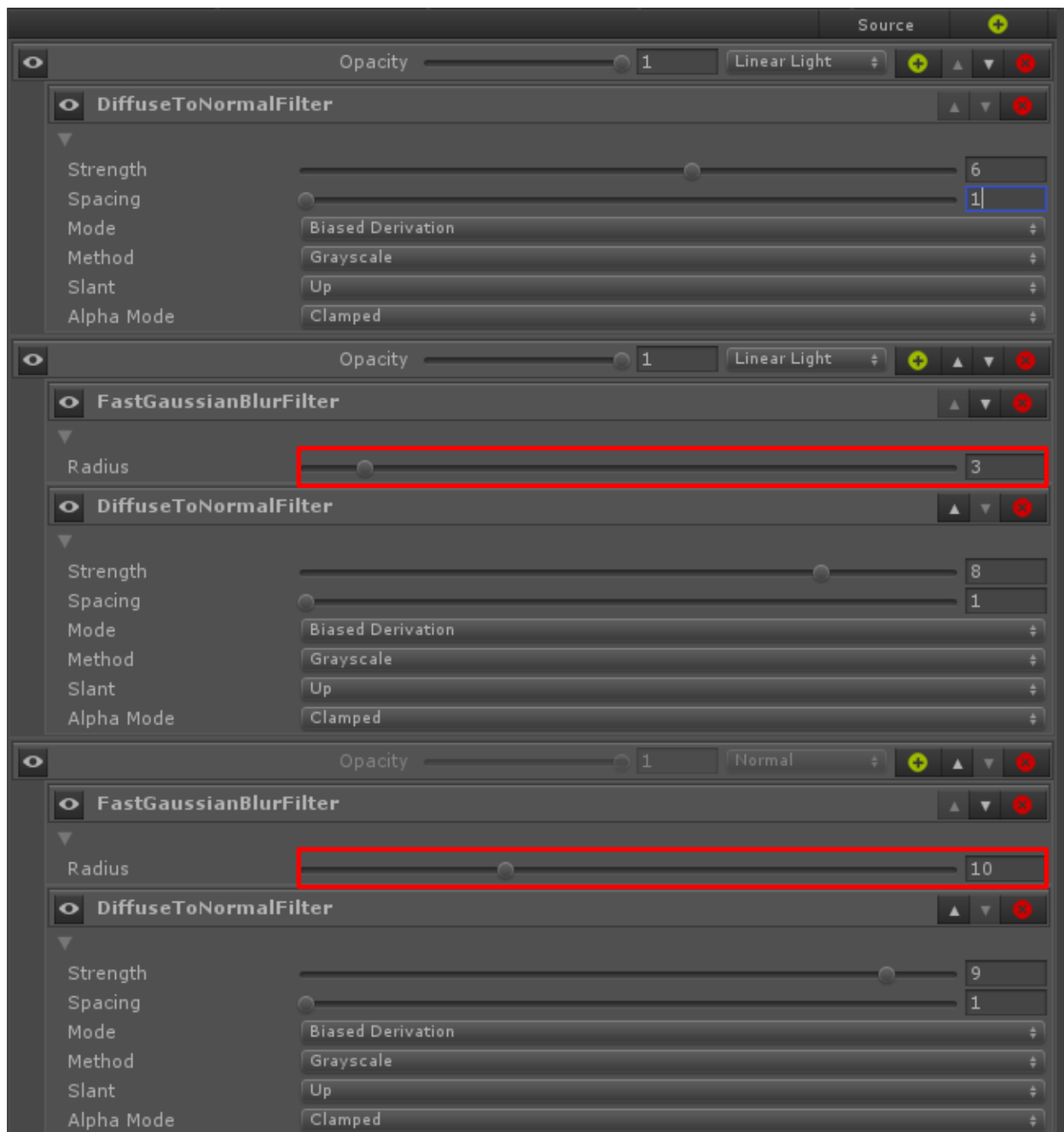
Step 5

Fine-tune the settings until the output fits your needs.

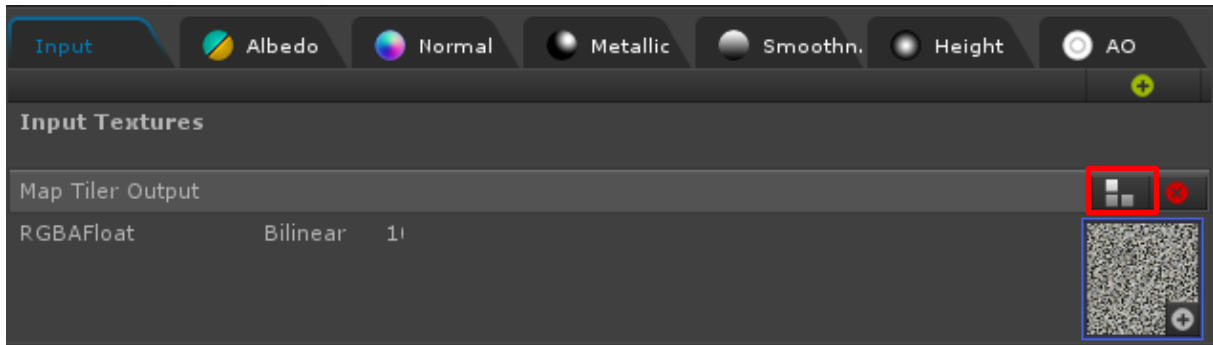Depending on your inputs, the final result could look like the following preview.

Step 5

&u - Assets

10 Map Tiler

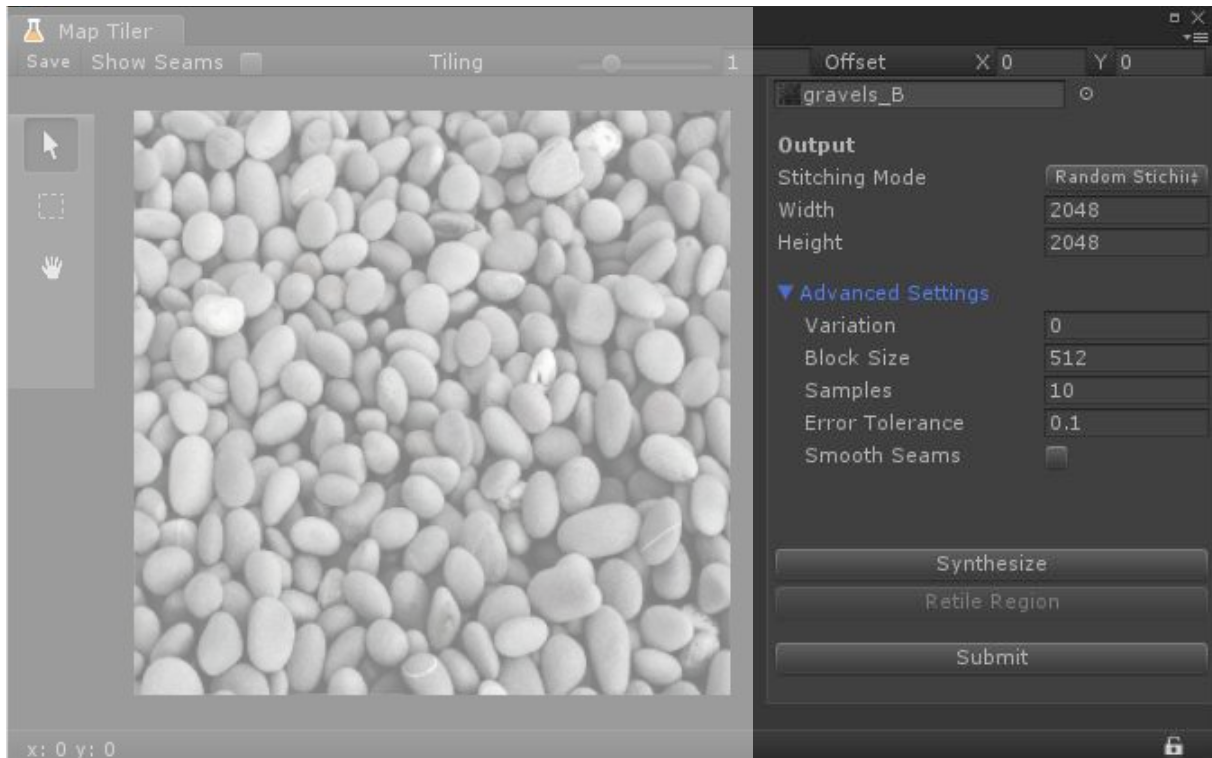The Map Tiler editor synthesizes a seamless map from a given input texture in just one click.

10.1 Open

The Map Tiler can preprocess each input texture by clicking on the tile button.
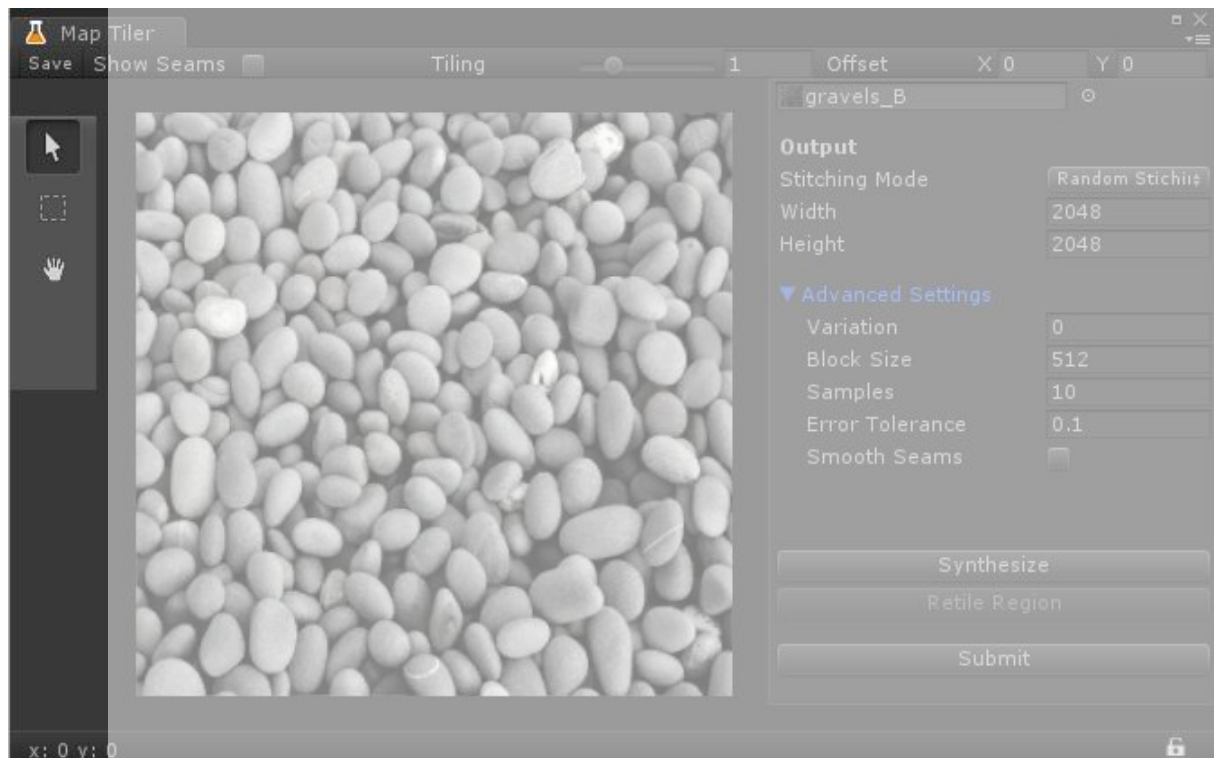
10.2 Interface
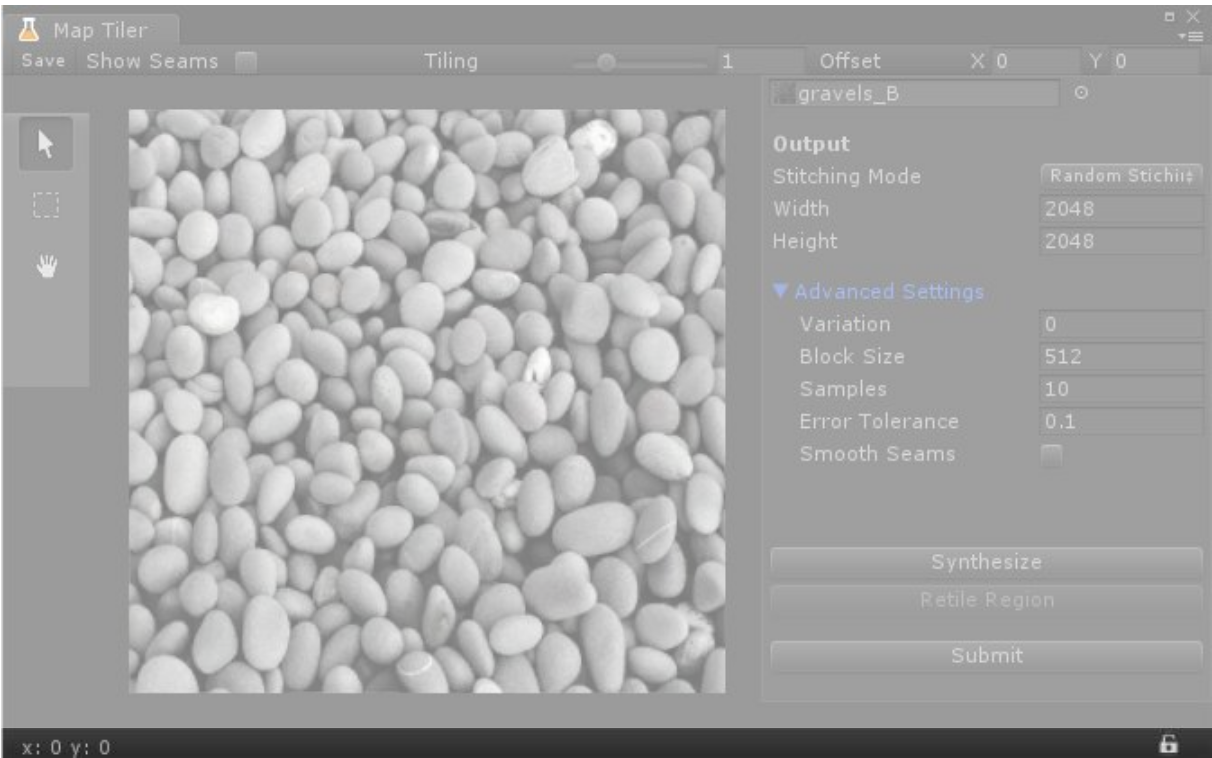
10.2.1 Tiler

| Parameter Name	Description
Variation	Sets the seed used by the texture synthesizer. Changing this value results in a different output map.
Width Height	Sets the dimension of the output map. A small input texture can be losslessly upscaled by the synthesizer.
Block Size	Sets the size of the block used to find an appropriate candidate in the input texture. Larger sizes help preserve the original structure but reduce the overall diversity of the output map. Too small values can completely change the initial structure and lead to blurry results.
Samples	Sets the maximum amount of samples the synthesizer can take to find an appropriate candidate block. Larger values may increase the overall quality of the output map but also impact the performance.
Error Tolerance	Sets the error tolerance used by the candidate comparer.
Synthesize	Recalculates the output map.
Submit	Sends the output map back to Map Lab and rerenders the maps.

10.2.2 Tools

Tool	Description
Arrow	The arrow tool is the default tool and has currently not special function.
Selection	The selection tool is used to select a region of the workspace. Currently a region cannot overflow the image boundaries.
Hand	The hand tool is used to drag the workspace. The workspace can also be dragged using the middle mouse button even though the hand tool is not selected.

10.2.3 Status Bar

Tool	Description
Position Label	The position label shows the current position of the cursor within the workspace. The displayed coordinates are relative to the workspace and normalized [0..1]
Workspace Lock	The lock button can be used to fix the workspace. A fixed workspace cannot be dragged or zoomed.

10.3 Tile a texture
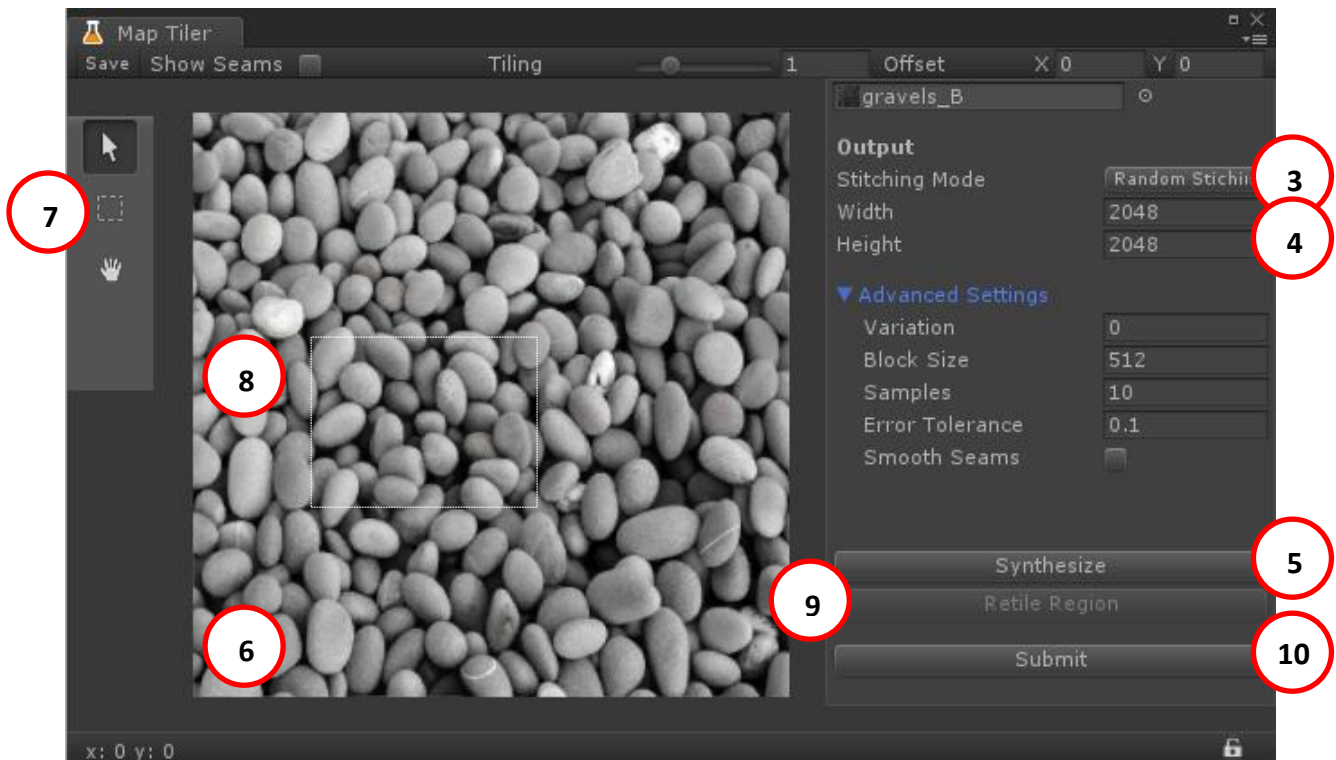
Follow the steps below to make an arbitrary input texture seamlessly tile.

1. Select an input texture.
2. Open the Map Tiler.
3. Specify the Stitching Mode (Currently only *Random Stitching* is supported).
4. Specify the output size.
5. Click *Synthesize*.
6. Examine the result.
7. If there are parts that look bad, select the Selection tool
8. Select the region that you want to have recalculated
9. Click *Retile Region*.
10. If you are satisfied with the result click *Submit* to send it back to Map Lab.

The *Random Stitching* mode is suitable for random looking textures such as grass, messy bricks, concrete, asphalt, gravels, etc.

Input textures with sharp geometric edges, patterns and low-frequency color changes may result in weird looking outputs.