FLAT KIT. USER MANUAL

Link to this doc online (leave comments!)

If you've got a question regarding Flat Kit, please first read through the Frequently Asked Questions, and try searching for the answers in this manual. If the question is not covered, please shoot an email to info@dustyroom.com. If you find a bug, it really helps us if you include steps to reproduce it. Please mind that we get lots of messages daily, be patient - we're getting to it.

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Frequently Asked Questions (FAQs)

Q. Does Flat Kit support URP?

A. **Flat Kit supports URP** (v.7.2.0 or higher)**.** There are a few known limitations, please see FlatKit in URP. Please note, there is **no HDRP** version of Flat Kit.

Q. It takes very long to import Flat Kit into Unity.

A. This is normal. FlatKit uses shader variants to achieve high flexibility and best performance. However it can take time to import the asset and build the game binary.

Q. There are missing scripts in some demo scenes on the main camera.

A. Our demo scenes use Unity's PostProcessing Stack V2. It is not required if you are not using the demo scenes.

Q. Does Flat Kit support PBR (Physically-Based Rendering)?

A. In Flat Kit indirect sources of light influence the colors of the scene by default, which can be turned off. The shaders do not support parameters required for the photorealistic look such as metallicness and translucency and subsurface scattering.

Q. Does Flat Kit support normal maps?

A. Yes, it does.

Q. Does Flat Kit work with Post-processing stack v.2?

A. Yes, it does. The fog and outline image effects can be added on the same camera as the Post-processing component (Built-in Rendering Pipeline). Post-processing in URP is known as 'Renderer Features'. See FlatKit in URP if you are willing to know more.

Q. Does it work with Unity version 20XX.x?

A. As soon as you've got a stable Unity version, it does.

Q. What platforms can I build for? What about VR?

A. Flat Kit shaders work in builds for all platforms listed in Unity Build settings, including VR, WebGL and mobile. Please, note, the Outline image effect currently is not optimized for VR.

Q. Can I use the scenes from Flat Kit in a commercial project?

A. Yes, you can. As soon as you purchase it, you can use anything from Flat Kit in the private and commercial projects without a need to credit authors of the asset (us). What you can't do is to re-sell, give away or place on public repositories any part of the asset as it is. More info here — https://unity3d.com/legal/as_terms

Q. I've got errors just after importing Flat Kit. Why?

A. Chances are that there was some kind of an issue while importing the asset, due to the fact that it takes a while to import Flat Kit. Try re-importing the asset.

Q. How do I get projectors to work with the Stylized Surface shader?

A. Please uncomment this line in the StylizedSurface.shader:

```
#pragma skip_variants POINT_COOKIE DIRECTIONAL_COOKIE
```

Q. What is the Shader Compilation Target Level of Flat Kit shaders?

A. The object shaders target 3.5 (or es3.0).

1. Quick Overview

Thank you for purchasing Flat Kit. We hope it will bring you some serious streams of inspiration and suit your wide variety of design needs.

We've spent hundreds of hours to research, design and implement the right set of assets needed to achieve a slick minimalist look. We hope it works for your project out of the box. If you have questions after reading this guide, let us know at *hi @ dustyroom.com*.

To name Flat Kit a set of flat shaders, cel shaders or toon ones, would be a serious underestimation. Yes, these all can be easily done. As well as countless other (maybe unseen before) styles. It can be sharp flat, it can have one, two, nine steps of hard shadow, or soft-shaded, or gradient-shaded — with pale or acid colors, it can have three gradiental effects (when you start thinking out of the box, the parameter like 'Specular', usual for, well, a specularity or glare, here can act as your fourth shadow, or a gradient etc).

In case you already use any other flat-looking shaders, you will still find a variety of useful tools for quick image processing. Particularly, later in the manual we'll overview the *Height Gradient mode* of the *Stylized Surface Shader*, the *Fog Image Effect* camera component, *LightPlane* shader effect etc. They have quite little related to toon or cell shading, but in conjunction with a stylish flat or cel look, they add a whole new life to your scene. Plus, they can be used out of context of non-photorealistic aesthetics. It is a spice that can dramatically make your dish sweeter (tastier).

Flat Kit was made with optimized and fast workflow in mind, so that one could fulfill the picture popped up in the mind — as quickly as possible, in various ways. This means:

- One task could be done in different ways. It is a multi-purpose set of shaders;
- Some outstanding graphical results can be achieved in minutes (given that you have your models ready, there are lots in FlatKit);
- There is always an element of you-didn't-think-it-can-be-done-this-way surprise thanks to FlatKit deep yet streamlined interface.

For example, let's take fog. Fog is usually a big part of any 3D environment, isn't it? There are lots of methods to implement fog into the scene, often complex and complicated. With Flat Kit, we decided to make it as convenient as possible for the user end. So, the fog can be done in two ways.

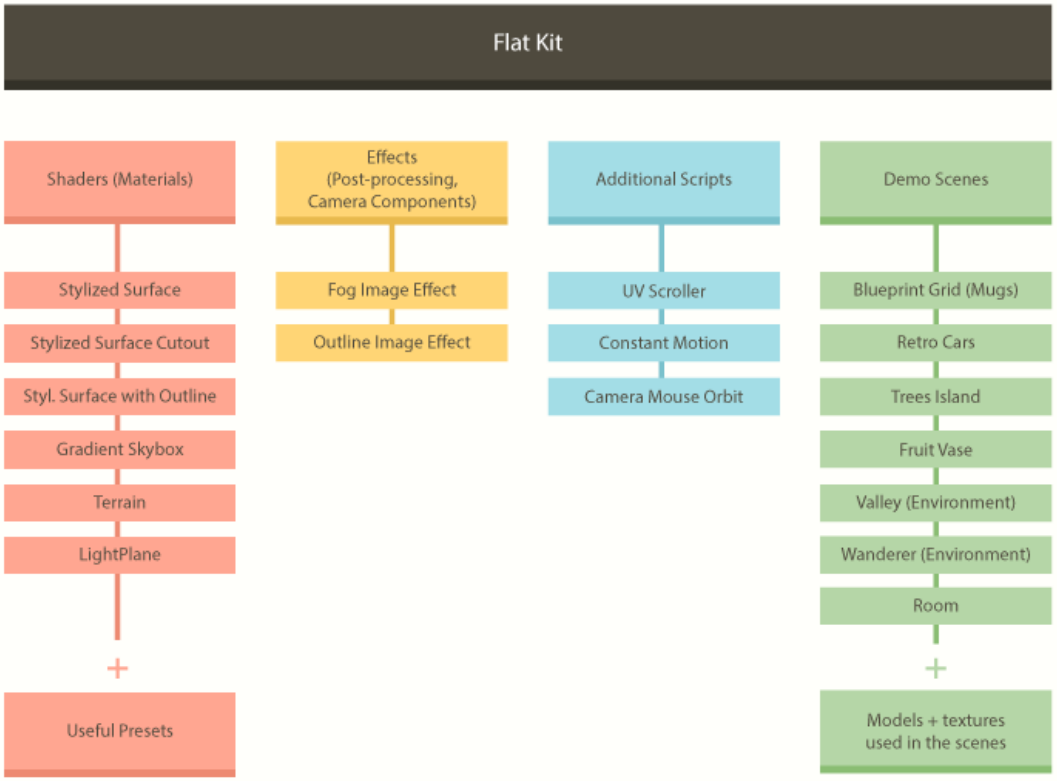
- Using **Fog Image Effect** post-effect / camera component
- Using **LightPlane** shader

We are going to explain how these work and what they are down in the manual. Both ways suit different needs, but they really do compliment each other.

Another example of the multi-purpose nature of our shaders is cel shading itself. Now, it's going to take a whole chapter of this manual to elaborate on cel shading. For now it's only worth mentioning that the same or similar results can be made using different parameters of the shader's interface.

It's important, because apart from the expected 'Cel Shade parameter', Flat Kit also has a bunch of additional settings to explore. Each additional parameter of the shader adds an extra dimension of possibilities. It's like having purple color paint, then you have red, and blue, and yellow. Purple is cool by itself and you already have it, but you can make it up by mixing blue and red. Or you can spare blue to match with yellow — to get green. In any case you get your purple, and also, simultaneously — other combinations, often surprising and inspiring. We'll talk about the importance of such potential later in the manual.

One of the big advantages of using these shaders is the fact that you don't have to guess how the colors will look on your scene. If you want precision and accuracy — you have it. Moreover, if you want something unpredictable and you are trying to make your scene look different to spark your inspiration and imagination, but not sure how, you can do this too! Remember, this is a *set* of shaders selected to complement each other.



Flat Kit structural view

2. Quick start. Beginning to work with Flat Kit

Flat Kit is fully self-contained and does not depend on any external assets.

If you do not need demo scenes, example materials and models you may skip importing the Demos directory in the asset.

The easiest way to get started with the asset is to dig into the demo scenes.

It may take a while for Unity to import the asset — this is normal. Under the hood, Unity needs to generate all shader variants that are used in the demo scenes.

On the 3D models side, it's important that you make normals 'smooth' for your meshes. If you import someone else's models and can't edit the object in 3D editor, at least try to calculate normals in Unity — in the import settings of the model. It should work anyway, but sometimes the difference can be obvious, especially on objects with rounded corners.

Note: Our demos were created in **Linear color space** (a setting found in Project Settings). We recommend switching to it if your project is in Gamma color space, although this is entirely optional.

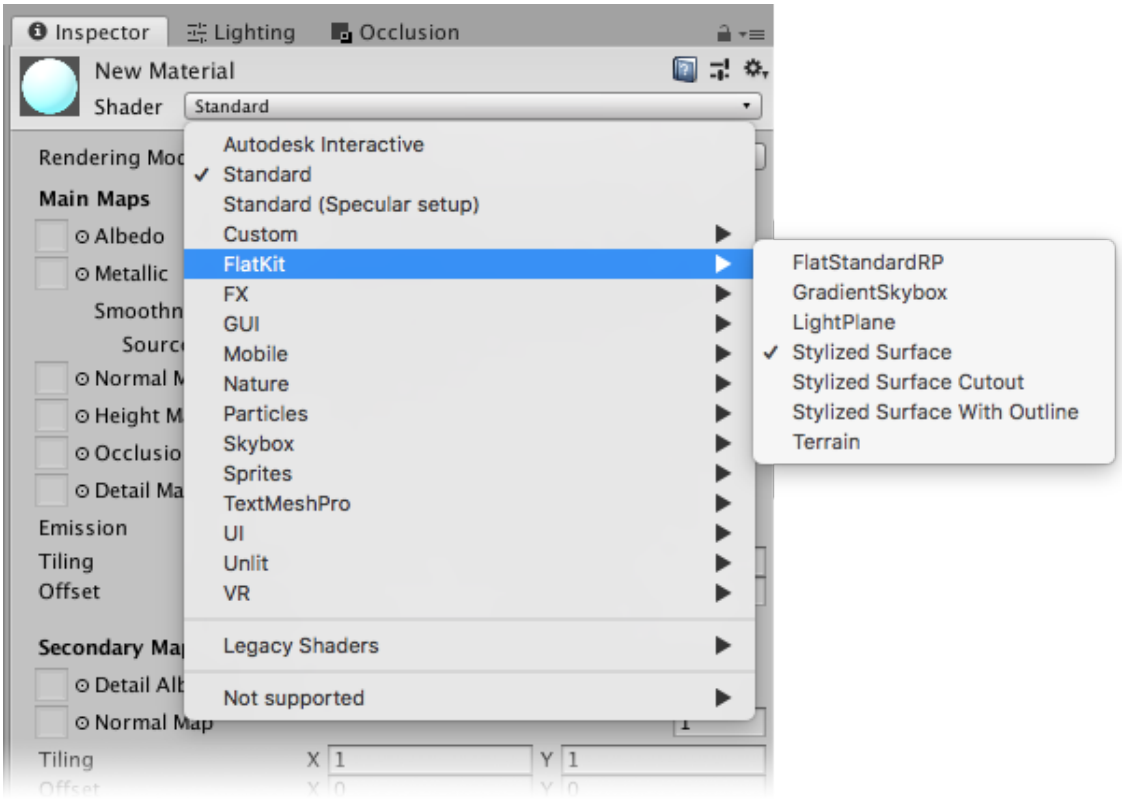
3. Shaders. In-Depth Overview

When you create a material, you'll choose a shader. By default, Unity has the standard shader picked up. Once installed, all Flat Kit material shaders are located under the Flat Kit sub-menu of the Shader drop-down menu. Please choose the one that would work for your current task. Below is the description of all the shaders.

Our shaders expose shading properties as material features. If a feature toggle is not activated on any materials in the build scenes, the portion of shader code for that feature is not included in the build.
Because of the fact that these shaders are designed for a stylized look as opposed to photorealistic, metallicness and translucency features are not supported. The support for PBR (Physically-Based Rendering)

in Flat Kit means that indirect sources of light (e.g. skybox) influence the colors of the material, unless you turn this feature off.

At the moment, there are the following shaders included into Flat Kit: *Stylized Surface*, *Stylized Surface Cutout*, *Stylized Surface with Outline*, *Gradient Skybox*, *Terrain*, *LightPlane*.



Collection of shaders in Flat Kit. From a Shader drop-down, hover the FlatKit sub-menu and choose a shader

3.1. 'Stylized Surface' Shader

This is a versatile shader to be used on rigid object materials. To use it on a material select the shader "FlatKit/Stylized Surface" or "FlatKit/Stylized Surface Cutout". This is your main go-to shader. It works for the vast majority of cases.

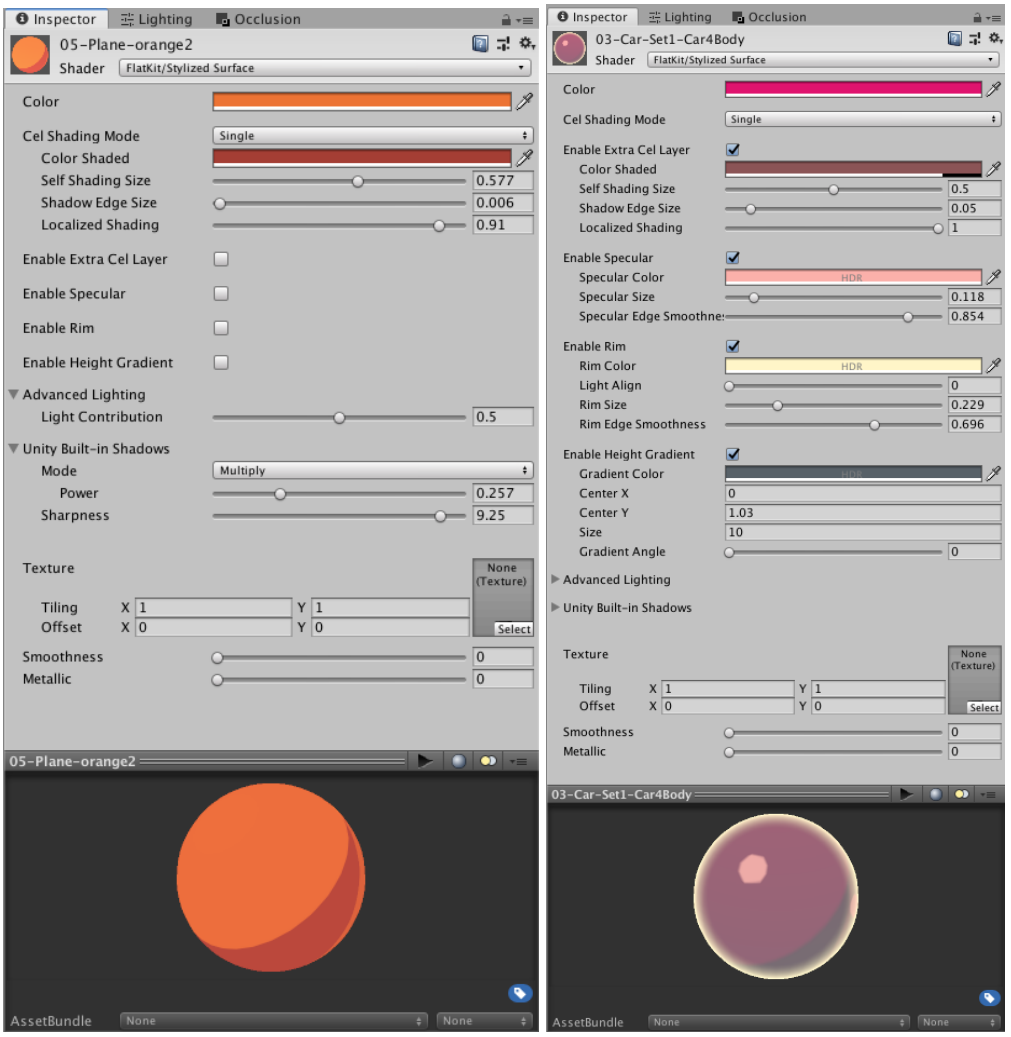
Stylized Surface shader consists of the following **main** building blocks:

- Color,
- Cel Shading mode (None, Single [Cel], Steps, Gradient),
- Extra Cel layer,
- Specular,
- Rim,
- Height Gradient.

The **additional** parameters are:

- Advanced Lighting,
- Unity Built-in Shadows,
- Texture.

Note: Each combination of the features above, used in your project results in generating a ***shader variant*** during the build process. To limit the build time and the resulting binary size be careful not to add unuseful feature combinations. On the other hand, this mechanism makes sure that only the used features are included in the build. More information on shader variants:
https://docs.unity3d.com/Manual/SL-MultipleProgramVariants.html



'Stylized Surface' shader in Single mode. Simple use case on the left, more options engaged on the right

3.1.1. The Main Parameters of the Shader

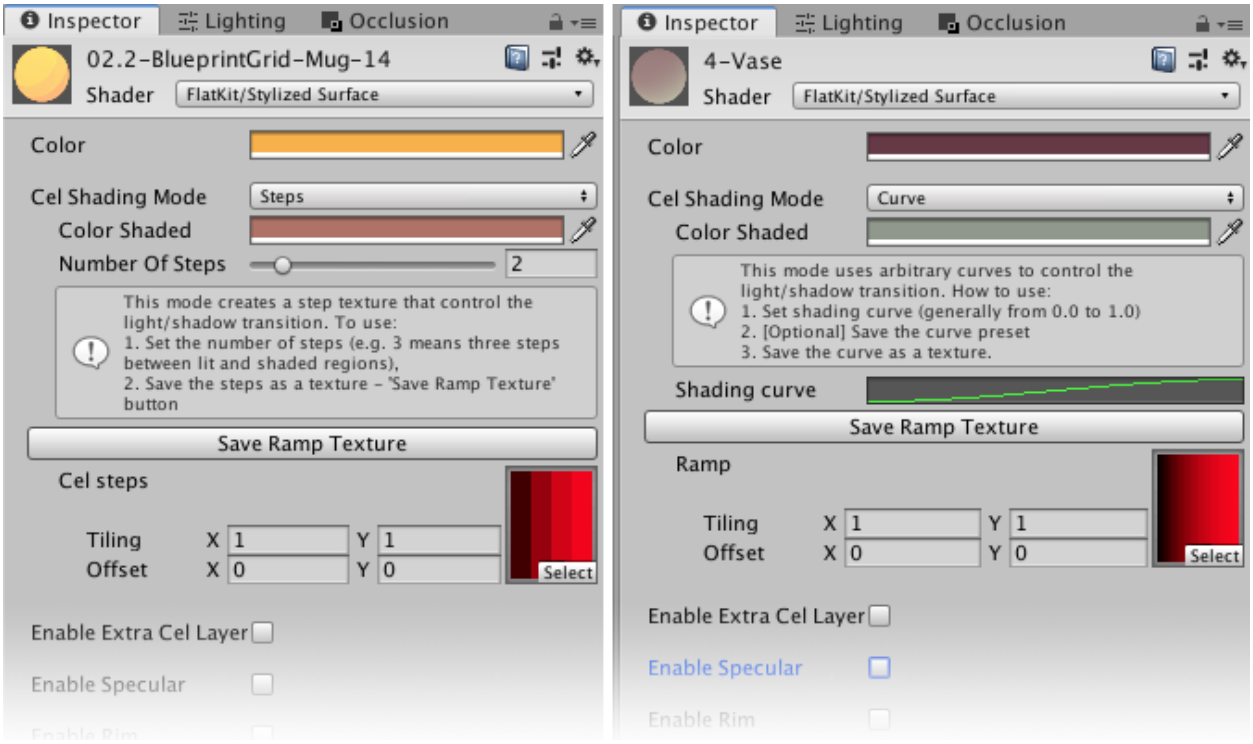
Color. This would be the color of your mesh (applicable to most cases, though you can make the shader's other parameters override or mask this main color, if you wish).

Cel Shading Mode. This is where you choose the style (mode) of your shading, the color of the shading, and other respective parameters of the modes. Depending on the mode you choose the parameters will look differently. So, let's talk about modes.

- ***None.*** Use this to achieve a simple flat look or to get any other creative picture not involving cel shading, however, the following parameters of Stylized Surface shader will still let you do this, if you choose so.
  Note, the flatness and actual representation of colors on the scene depend on the lighting of the scene. In our demos we use Skybox as the source of lighting. Conveniently, there is a Dependency slider on the Lighting panel of Unity, which tells how much of the influence the Skybox provides. At minimum, there won't be any shadows, as well as the colors will be identical to those you would choose in the **Color** block of the shader. At maximum, the Skybox heavily dictates what the colors will look like. For more natural (not necessarily realistic — but natural, *organic* look of the scene, it's healthy to let Skybox influence the coloring of the scene).

- ***Single.*** This mode provides you with one shadow of chosen *Color*. *Self Shading Size* is the size of the cel. Larger values mean larger size of the shadow. *Shadow Edge Size* controls the sharpness of the cel. The lower the value — the sharper the cel. The higher the value — the more blurry is the shadow. *Localized Shading* is basically how condensed the shadow is. Higher values represent sharper cel.
- ***Steps.*** Basically, you choose the shading color and number of steps to blend from main Color into the color you pick up in Steps mode.
- ***Curve.*** The gradient, interpolated transition from one color to another.

In order to get *Steps* and *Curve* modes to work — as soon as you have a number of steps (*Steps* mode) or curve shape (*Curve* mode) chosen — the shader will ask you to save its utility ramp texture somewhere on the disk. It will write the transition onto it. The texture will appear red in the editor. This is because internally we use the R8 texture format for efficiency.



Steps (on the left) and Curve (on the right) Shading Modes of Stylized Surface shader. Inspector interface

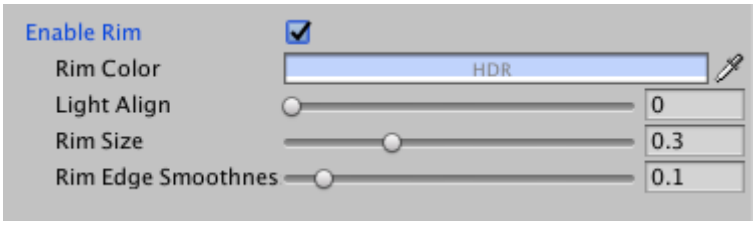
Extra Cel Layer. This is like another instance of ***Single*** Cel Shading mode. Works independently from the main **Cel Shading Mode**. It means, you can make main Cel shading as ***None*** (flat), and add an **Extra Cel Layer**. The result will be the same as if you would have used the ***Single*** mode. Or, make the main Cel layer and Extra Cel Layer almost identical, giving an Extra Layer a darker color, and making it smaller. This would result in stepping, similar to ***Steps*** mode with 1 step.

Specular. You can make a, well, specular with this parameter. Also it can be used as another layer of shadow.

Specular. Inspector interface

Specular Color picks up the color of your glare, the parameter works in HDR. *Specular Size* determines how big the specular is. Higher values mean bigger specular. *Specular Edge Smoothness* — moving slider to the left decreases blurriness and makes specular sharper.

Rim. Rim was designed as a way to make outlines.



Rim. Inspector interface

You can think of Rim as some kind of inner shadow and/or as inner glow. In one of the **Fruit Vase** demo scenes, there is an example of extensive use of Rim as an outline. On **Blueprint Grid** demo scene *Rim* is used as a smooth inner glow. This parameter can be used creatively, for example, to substitute Curve mode or Extra Cel parameter. Just reminding you that the name of any parameter should not be perceived literally, most of them have many use cases. In the screenshot below, with the help of Suzanne the Blender Monkey, we tried to show a few instances of Stylized Surface shader with *None* mode selected (meaning no straightforward shadows are applied), using orange color, and only Rim parameter enabled. The results are variations of Rim section only. Imagine adding some creative Specular and Height Gradient…

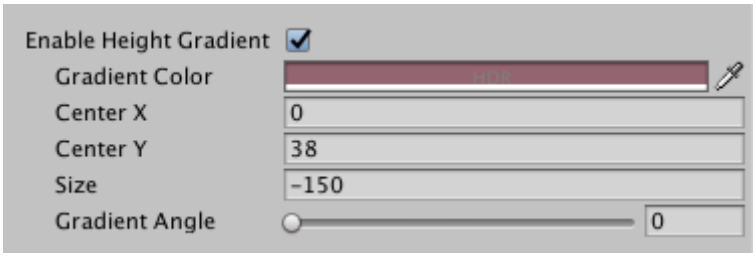
Variety of uses of Rim parameter alone on Suzanne the Blender Monkey. Interface of Stylized Surface shader with 'None' cel shading mode

Rim Color selects the color of the parameter. It works in HDR. *Light Align* parameter rotates the rim. *Rim Size* controls how big the Rim is. Very high values can serve you as an unlit effect. *Rim Edge Smoothness* — moving slider to the left sharpens the Rim, to the right — makes Rim blurry.

Although *Rim* option is creatively useful, there are two more obvious ways to add an outline using Flat Kit: to use **'Stylized Surface with Outline' shader** and/or to use **'Outline Image Effect' camera component**.We'll talk about them both later in this manual.

TIP. Animate Cel layer size, Specular size or Rim size — to get a neat transition effect.

Height Gradient. This effect overlays a gradient from opaque selected color to transparent color onto everything you've set before. Height Gradient is absolute, it depends on the position of the object on the scene. If you would like to make a relative height gradient, duplicate the material and adjust the height gradient.



Height Gradient. Inspector interface

Gradient Color picks the parameter's own color to fade into from transparency. *Center X* and *Y* are initial points from where the effect takes effect. Adjust these to move the gradient across the scene. *Center X* is useful if you engage *Gradient Angle*, which means the rotation of the Gradient. *Size* determines how steep the transition of Gradient is. The further the value is from 0 (zero) — the more gradual the effect is. Negative values flip the Gradient.

More about the nature and use of **Height Gradient** is covered in the '**Terrain' Shader** section of this manual (chapter. 3.4).

Setting the colors from scripts

The following are the color field names for manipulation via the code for tweening, randomization etc:

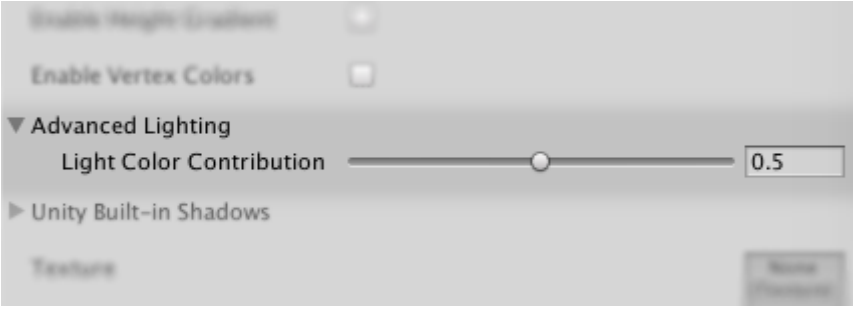
- `_Color`: the primary color, "Color" in the inspector,
- `_ColorDim` (and `_ColorDimSteps`, `_ColorDimCurve` in the corresponding cel shading modes): Color Shaded in the Inspector,
- `_ColorDimExtra`: the shaded color of the "Extra Cel Layer" feature,
- `_FlatRimColor`: rim color, requires "Enable Rim Color",
- `_FlatSpecularColor`: specular color, requires "Enable Specular Color",
- `_ColorGradient`: the gradient color used along with the `_Color` parameter when "Enable Height Color" feature is active.

3.1.2. The Additional Parameters of the Shader

Advanced Lighting (Light Color Contribution). Light Color Contribution defines how much the color of the light source of the scene impacts the color of the object. The value of 0.0 results in completely ignoring scene lights, the value of 1.0 results in full multiplication between scene light color and the object color. As an example, imagine the winter morning light. Usually it is blue-tinted, thus all the snow around can't be white but rather blueish.

Please note that the effect is visible only if the color of the light is anything but white.

Light Color Contribution works only with directional light. The point and spot lights are contributing to colors and shading of the material regardless of the **Light Color Contribution** value.



Light Color Contribution parameter on Flat Kit shaders Inspector panel.

Let's view it in example.

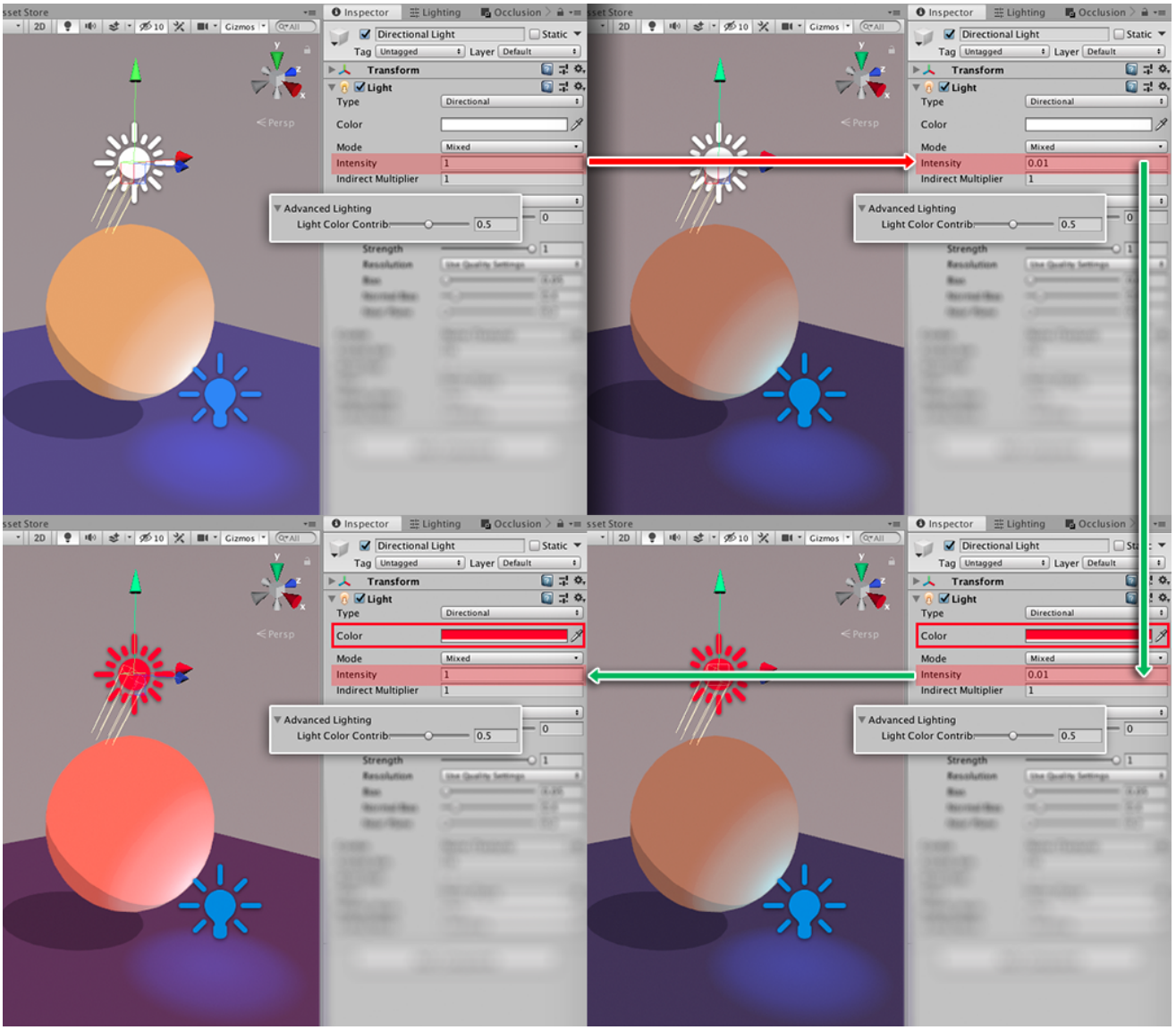
Three pictures below describe how we change Light Color Contribution values on all (two) used materials: on a sphere and on a plane. Within a picture we change the intensity value of Directional Light as our main source of light.

Additionally, there is a point light on each picture. This way it's visible how local lights work together with the main Directional Light.

Take the first image (below). At first, we turn down the Intensity to the very low value. White sun now has no impact on the scene brightness, resulting in a darker scene.

Then we change the color of Directional Light from white to red. It has no effect because Directional Light is too "weak" to fill the scene.

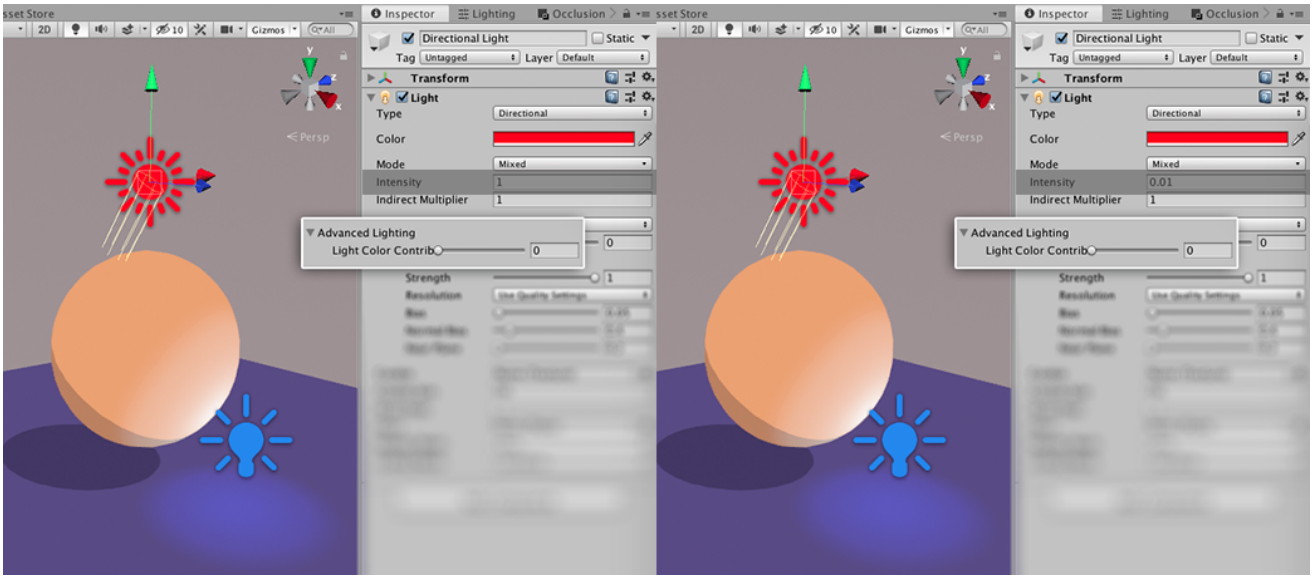
After raising Intensity value back to "1" the scene is now lighter and has a red tint.



Light Color Contribution at value 0.5. Changing intensity value and color of Directional Light.

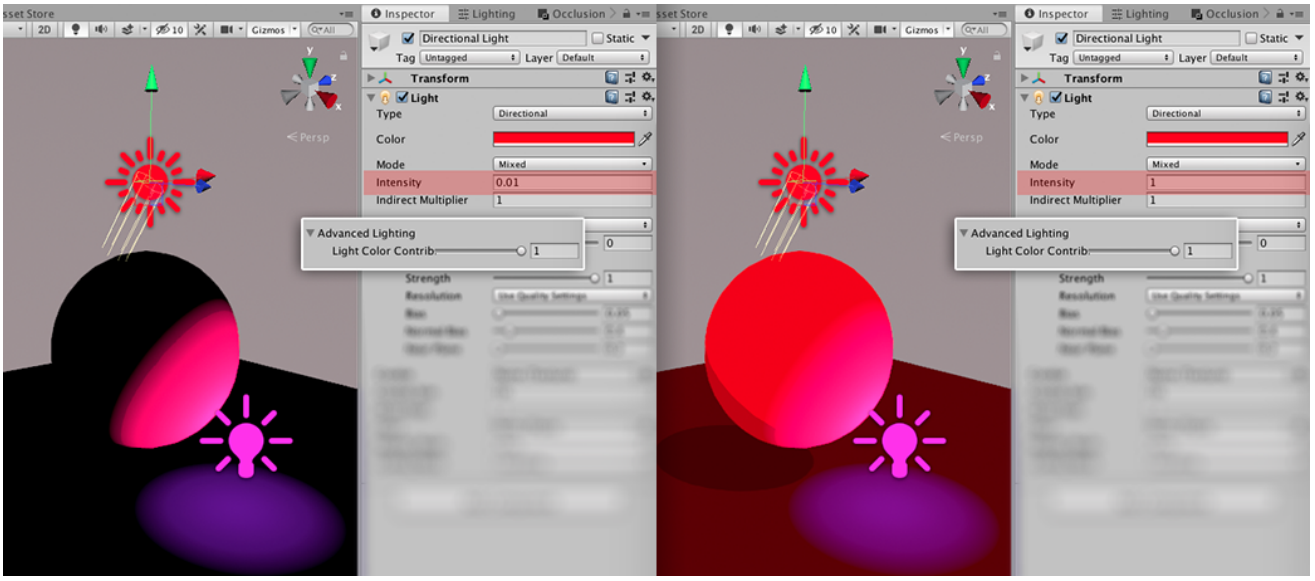
Once we change *Color Light Contribution* parameter to "0" (pic below), Directional light has no effect light-wise and color-wise. Changing *Intensity* parameter of Directional Light on the Inspector panel has no effect. Both sides of the picture are identical.

This way you can achieve a flat look, in other words, the colors on the scene are exactly the same as you choose in the shader parameters.



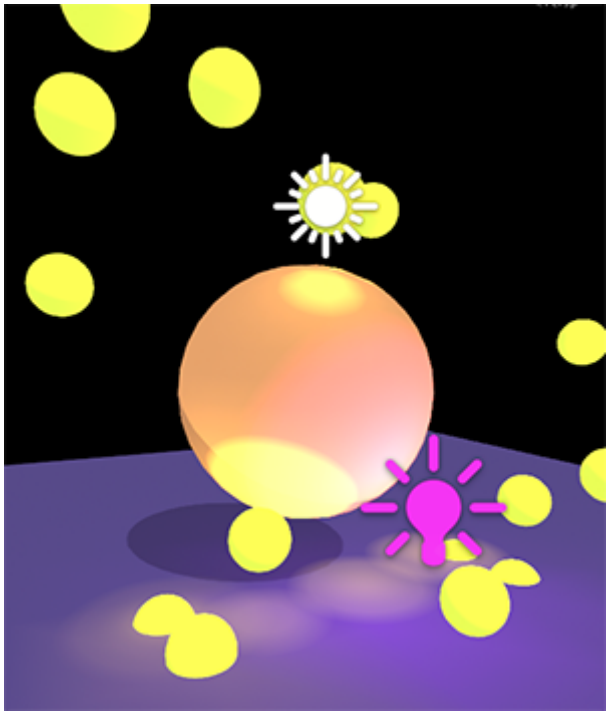
Light Color Contribution at value 0. Directional Light intensity at max and min values.

Now, (on the pic below) we raise Light Color Contribution to the max value of “1”. If we set Directional Light Intensity parameter low, the scene theoretically has no source of direct light. Local lights now act as the only light sources. If the Intensity of Directional Light is at its maximum, it’s too hot now.



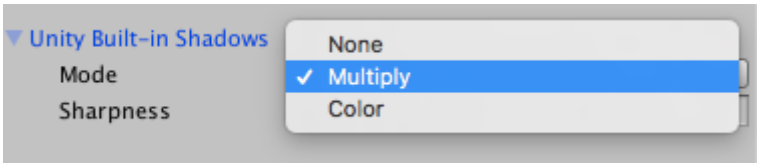
Light Color Contribution at value 1. Changing intensity value of Directional Light.

If you use a Particle System and choose your particles to emit light, Flat Kit shaders respect that!



Particles emitting light on Flat Kit shaders.

Unity Built-in Shadows. If the object has the 'Receive Shadows' option turned on in Mesh Renderer, you have an ability to use Unity-processed shadows on it, as you would do in Unity Standard Material shader, with a few extra-options.



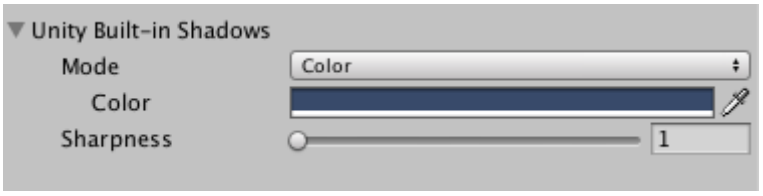
Unity Built-in Shadows mode menu. Inspector interface

First, you have to select what mode to work with.

None mode turns the Built-in shadow parameter off.

Multiply mode lets you cast the shadows as in default material. You don't have direct control over the color. You can change intensity and sharpness.

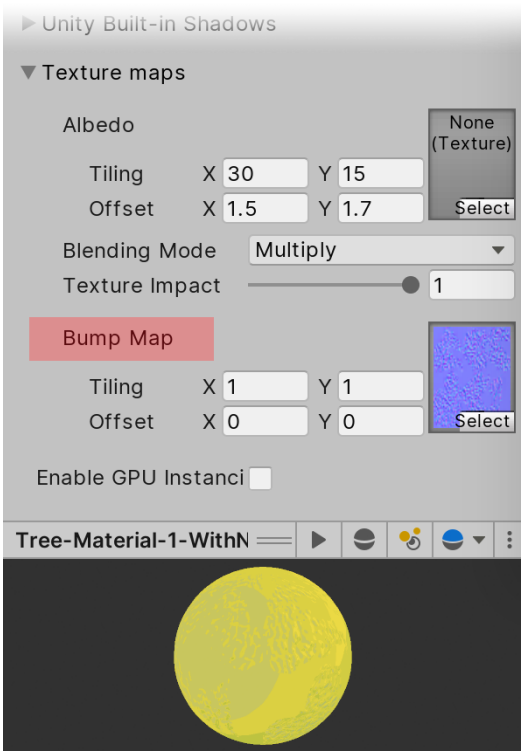
Color mode lets you choose the color of the cast shadow.



Height Gradient in Color mode. Inspector interface

Texture. If you've got a UV-unwrapped mesh, you can add a texture to it. If you work with transparency in textures, please use **Stylized Shader Cutout** shader. It can see alpha on the texture as transparency.

To make an impression of a low-poly mesh having many details, you can use normal maps. Add one to *Bump Map* slot in the Inspector panel.



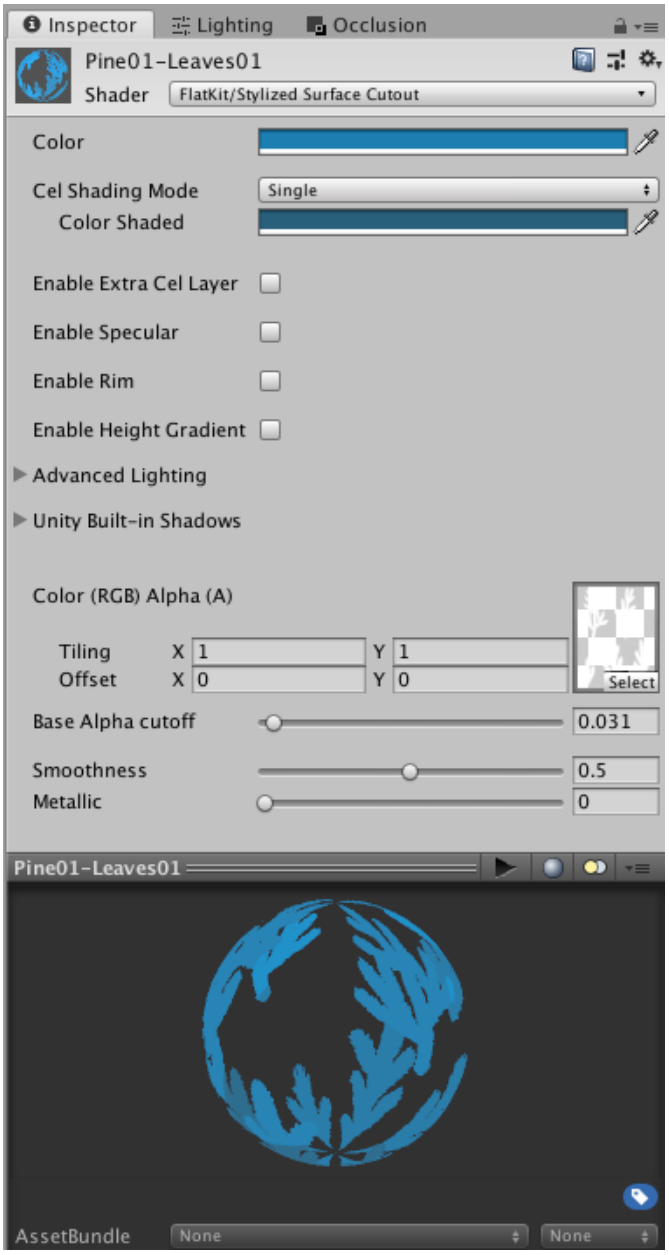
'Stylized Surface' shader — normal map applied

'Normal Map Tree' demo scene, a tree without and with a normal map

3.2. 'Stylized Surface Cutout' Shader

This is a version of Stylized Surface shader with an option to treat alpha as transparency on a texture. The rest of the shader is the same.

The *Base Alpha cutout* parameter determines how much of the alpha portion of the texture is going to be transparent.



'Stylized Surface Cutout' shader — Valley demo scene, tree branches material. Inspector interface

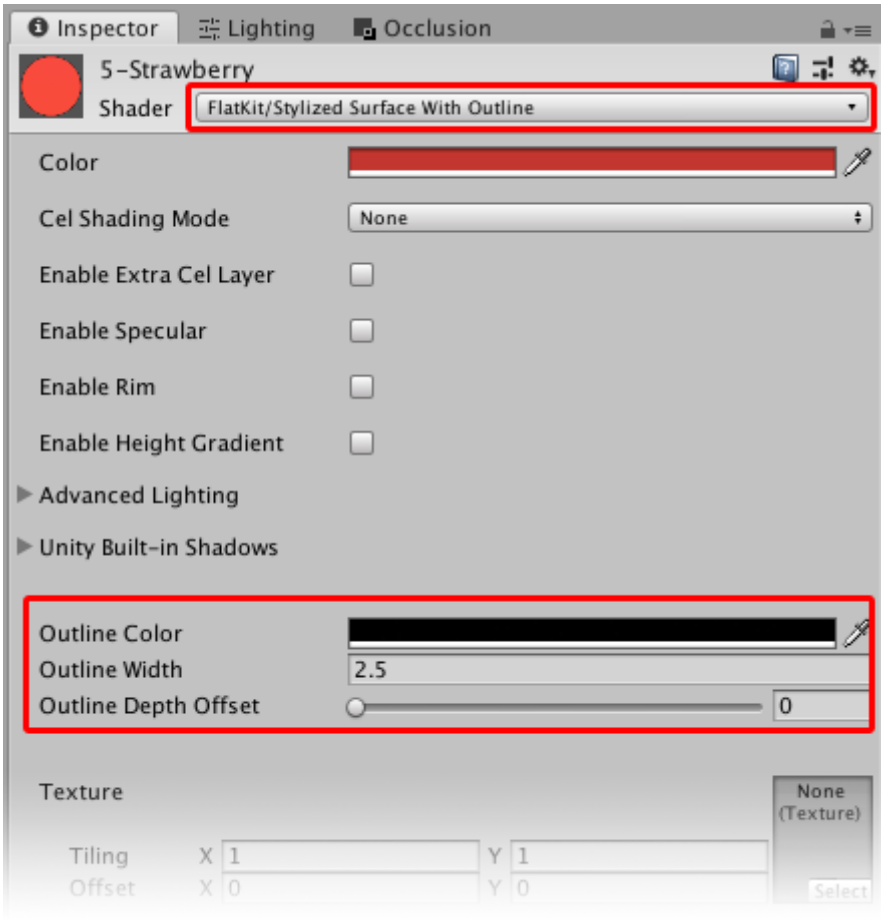
IMPORTANT. In the Built-in Rendering Pipeline, to reduce import time of the asset, this shader has been moved to the Extra Package folder you can select or deselect upon import. Please go to the **Extra Packages** folder and unpack the ***Terrain & Cutout Shaders + Valley Demo.unitypackage***.

3.3. 'Stylized Surface with Outline' Shader

'Stylized Surface with Outline' shader, being the same as the regular *'Stylized Surface' shader* in a nutshell, has an additional option of… outlines.

Outline Color picks up the color of the outline. *Outline Width* determines how thick the outline is. *Outline Depth Offset* moves the outline inwards or outwards an object.

Please note that the width is absolute to the scene, meaning, it won't scale depending on the distance from an object to the camera. Objects closer to the camera will have an outline of the same width as the more distant ones, of course, if they share the same material.



'Stylized Surface with Outline' shader

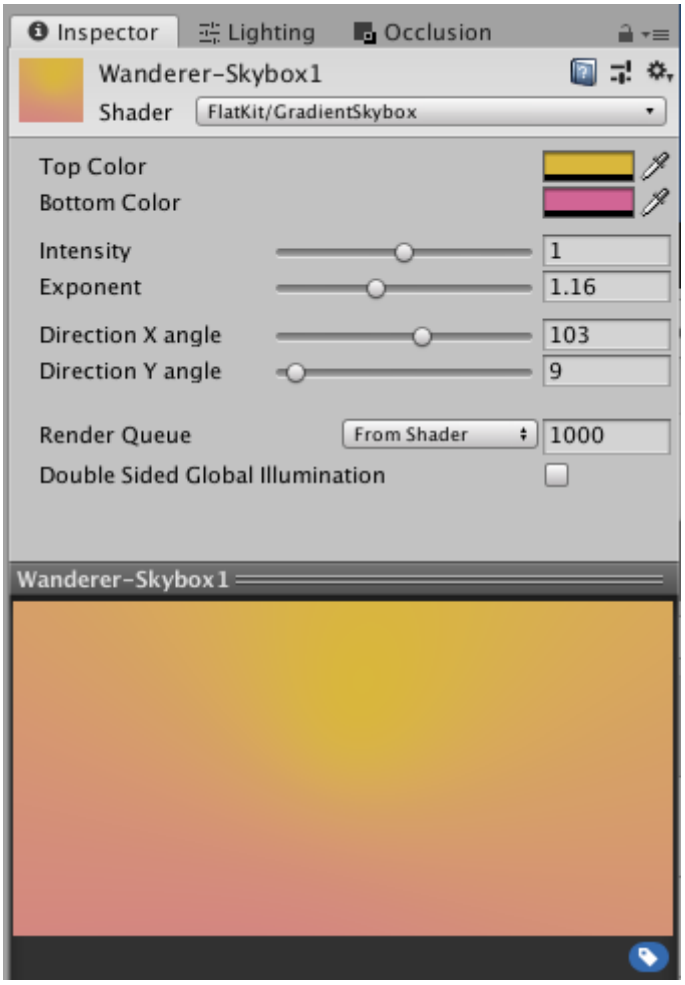
3.4. 'Gradient Skybox' Shader

This is a simple method to fill the sky of your scene.

Top Color and *Bottom Color* define two colors to be blended. *Intensity* is a darkness/brightness controller. *Exponent* accentuates the effect in favour of either *Top Color* or *Bottom Color*. *Direction X angle* and *Direction Y angle* rotate the effect along the corresponding axis.

Make *Top Color* and *Bottom Color* identical colors or move *Exponent* parameter to one of the extremes if you want a flat background.

Intensity is the brightness of the skybox.



Gradient Skybox. Inspector panel interface.

3.5. ‘Terrain’ Shader

Terrains are great in Unity. But it’s not so trivial to work with terrain materials, that is why we added a separate shader that deals with the Unity Terrain system.

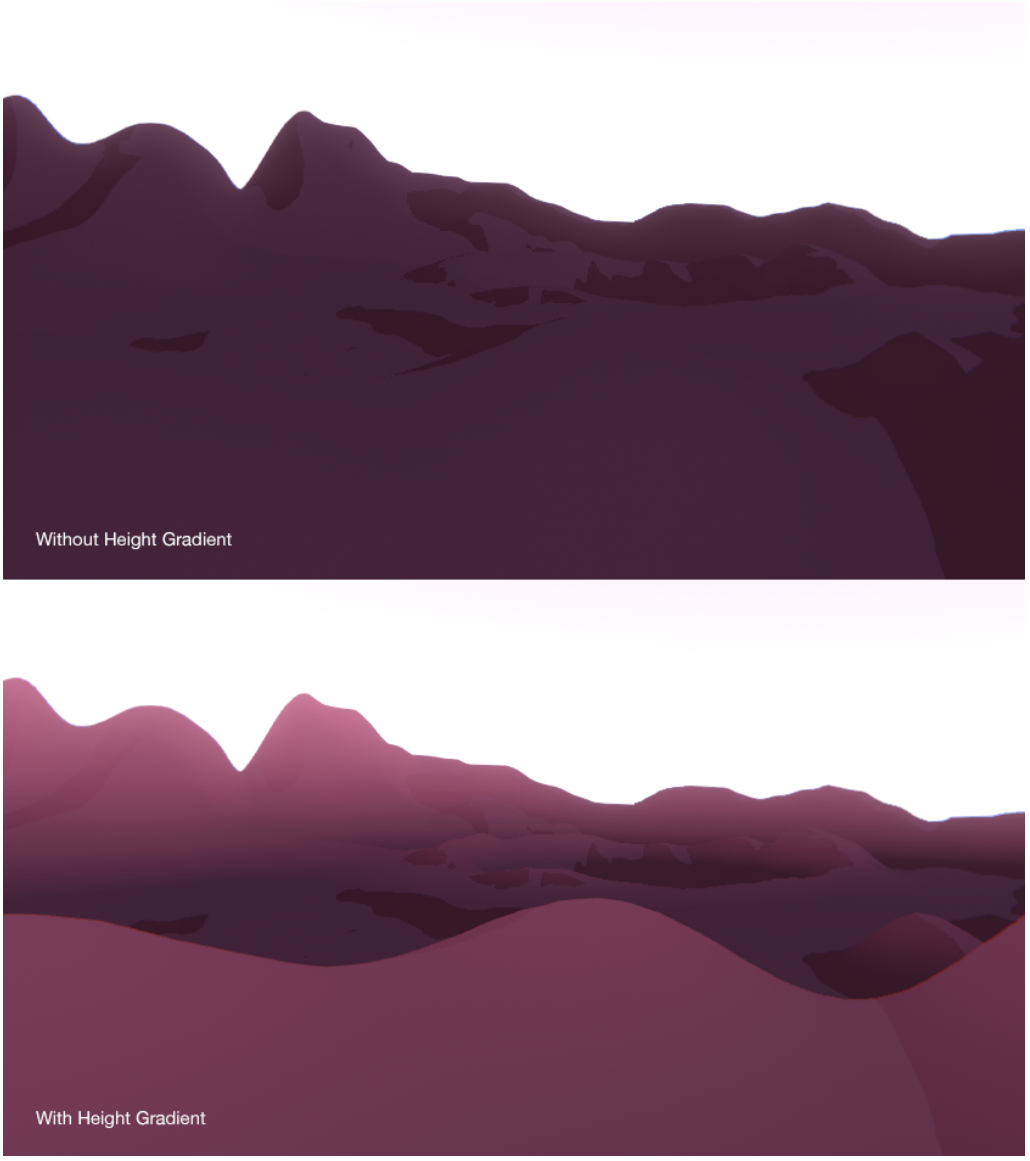
If you are not familiar with Unity Terrains, please refer to their documentation. In two words, terrain uses Terrain Layers, something like containers of all textures — diffuse, normal, bump etc. FlatKit Terrain shader sees those textures and applies its own colors onto the layers. Since we are talking about the flat look, no normal or bump maps are required. In order to have full control over colors of the terrain, you can load a plain white texture as your terrain layer (on **Valley demo scene** we did so). All the colors will be available from the shader interface, they will be multiplied with your white texture, resulting in the pure color you choose. If you are already familiar with Stylized Surface shader, Terrain shader interface won’t be news to you.

This is an appropriate time to talk about Height Gradient parameter FlatKit offers. You can use it as a part of Stylized Surface, Stylized Surface Cutout and Terrain shaders. Height Gradient works wonders on terrain in context of flat shading.

Usually flat shaded landscape objects lack organic embellishment the real world has. All extra-shadows, small scale details, big and tiny grunge spots etc make the picture nonlinear to our eyes, thus, interesting, engaging. With flat aesthetics — there is a color, there may be a shadow or shadows, maybe a few models for the more natural look. The result — quite a boring scene. If you want a more polished look, you’ll want to fight linearity, with Height Gradient coming handy. It stretches the interpolation between transparency and its own color along the vertical axis (by default) and multiplies the gradient over the colors you already have. You can rotate the direction, so that it is no longer vertical but diagonal, horizontal and all in-between.

This effect changes the scene dramatically. Now, the terrain has its shadow work that you set on the interface, and on top of that there is a gradient, subtle or obvious. Immediately, it adds depth and a more professional look to the scene.

If you work on some kind of an environmental landscape object but do not use Unity Terrain, please use the *Stylized Surface* shader instead of *Terrain*. Height Gradient is available there, too.



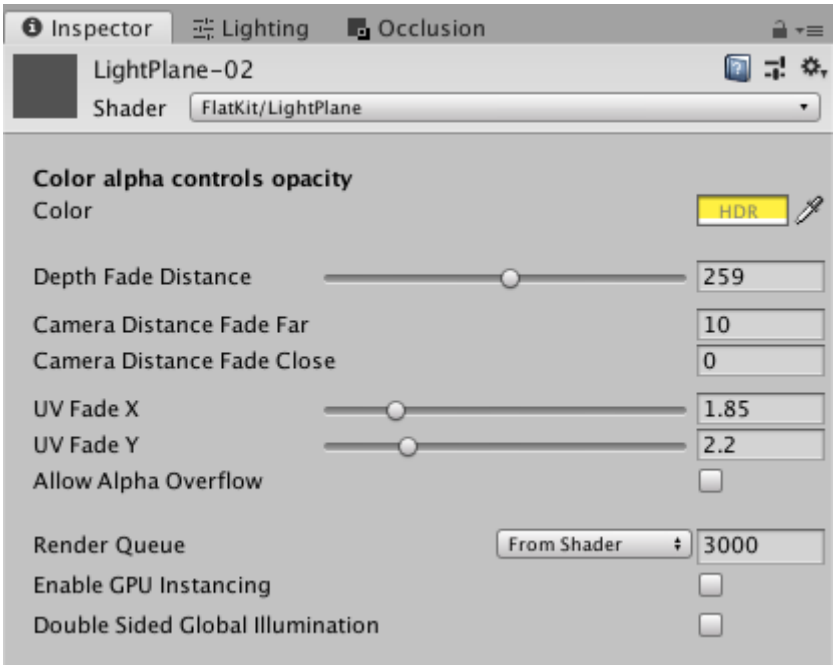
Height Gradient on Unity Terrain (without on upper image, with — on lower one). Valley Demo Scene

IMPORTANT. In the Built-in Rendering Pipeline, to reduce import time of the asset, this shader has been moved to the Extra Package folder you can select or deselect upon import. Please go to the **Extra Packages** folder and unpack the ***Terrain & Cutout Shaders + Valley Demo.unitypackage***.

3.6. ‘LightPlane’ Shader

This shader is what we are particularly proud of. It looks like a small tool. But it has immeasurable possibilities. Fog, mist, delicate scene boundaries, light beams, glow of magic swords, laser beams. These things are what LightPlane is for.

Wanderer scene includes LightPlane shader implemented not only as fog areas, but also as light beams of so-called pick-up objects and even as planets. One of the Valley scenes has got the LightPlane shader used as floating air particles thanks to the Unity particle system.



LightPlane Shader. Inspector panel interface

3.7. GPU Instancing

When the “Enable Instancing” option is enabled on a material, the shaders will perform GPU Instancing of the following fields that are common across all FlatKit shaders:

1. **Color** value (property name “_Color”),
2. Parameters of the cel shading mode *“Single”*
    a. **Shaded Color** value (property name “_ColorDim”),
3. Specular parameters, active when *“Enable Specular”* is checked
    a. **Specular Color** value (property name “_FlatSpecularColor”),
    b. **Specular Size** value (property name “_FlatSpecularSize”),
    c. **Edge Smoothness** value (property name “_FlatSpecularEdgeSmoothness”),
4. Rim light parameters, active when *“Enable Rim”* is checked
    a. **Rim color** value (property name “_FlatRimColor”),
    b. **Rim size** value (property name “_FlatRimSize”),
    c. **Edge Smoothness** value (property name “_FlatRimEdgeSmoothness”),
    d. **Light Align** value (property name “_FlatRimLightAlign”).

4. Camera Image Effects

Both Fog and Outline image effects rely on image-based anti-aliasing, like the one in Unity's Post-processing stack. Camera effects are used in Built-in rendering pipeline. For using these in URP — you must use ‘Renderer Features’.

4.1. Fog Image Effect

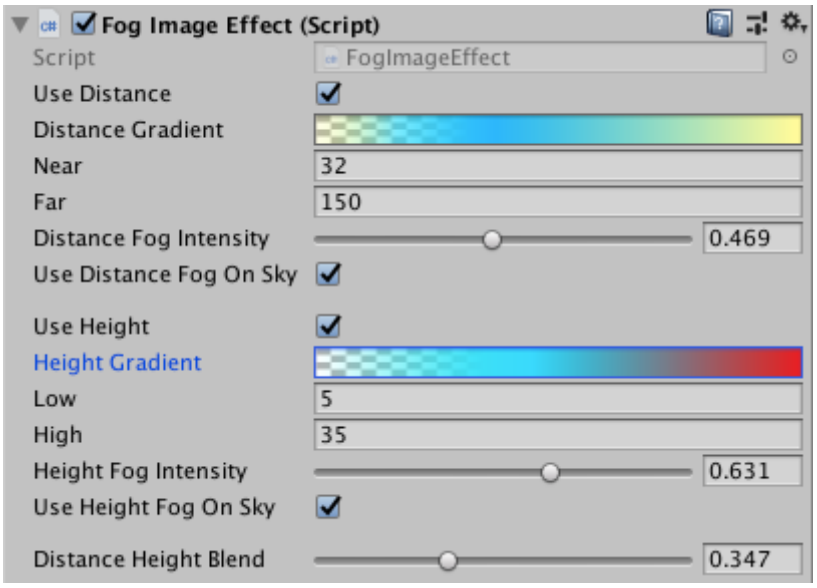
Fog Image Effect camera component can be reviewed as a post-processing effect. It can be subtle, like a mist in the lower part of the valley, or a dominant effect, as in a completely hazed environment. Simply put, it works in the following way. You decide whether you need only length fog or height fog or both. Then you determine the bounds where it would take effect. Then you choose colors along each dimension. And after that, blend between distance and height. This effect starts from camera position up to the Near/Far, Low/High

bounds, meaning, your camera is the zero coordinate from where the fog spreads. Each camera on the scene can have a separate independent instance of an effect.

Because Unity's MSAA (multi-sample anti-aliasing, which is an option in the Quality Settings of your project) does not apply to depth texture, there may be inconsistencies between the anti-aliased color image and the unprocessed depth image. This may look as aliasing if fog intensity is set to a high value. **Such artifacts may only occur if using MSAA**, so we recommend using screen-space anti-aliasing, such as in Unity's post-processing stack that you can import by going to Window - Package Manager in Unity 2018+.

When you click on any of the color ramps (Distance or Height Gradient), the Gradient Editor pops up.

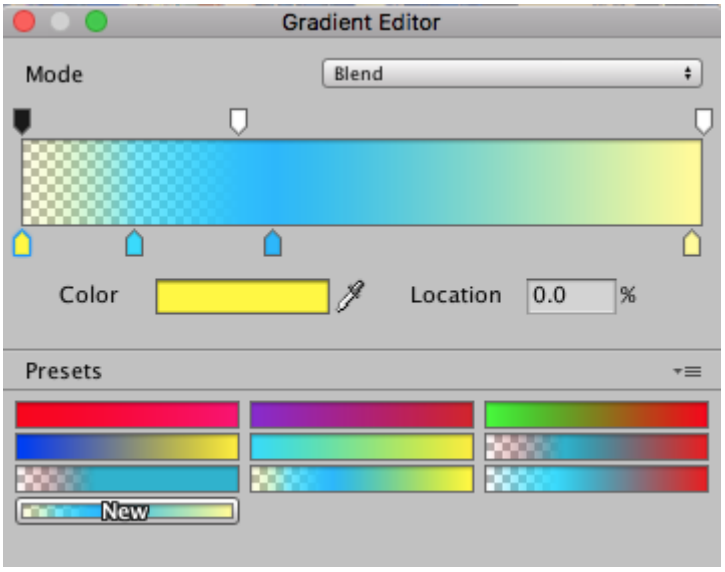
Fog Image Effect is being used in the *Wanderer* demo scene (more subtly) and Valley Demo scenes (more accentuated). For the Valley demo scenes we prepared a couple of presets to be found in the demo scene folder.



Fog Image Effect. Inspector panel interface

Gradient editor controls the colors of the gradient. To open it, click on Distance Gradient or Height Gradient. The bottom row of breakpoints (pointing up) is the selection of the colors. The above row (pointing down) controls the opacity of the area it points at; the opacity value of one breakpoint fades into the opacity value of the adjacent one. Same for colors.

TIP. If you want the area close to you to be without fog, apart from increasing *Near* parameter, you can open up the color ramp(s), add a breakpoint next to the leftmost one on the ramp, select leftmost one, make it transparent (see screenshot of Gradient Editor below). The breakpoint you created (opaque, next to the transparent one) becomes your distance or height control.



Fog Image Effect. Gradient Editor interface.

4.2. Outline Image Effect

Outline Image effect is, essentially, a contour on the objects on the scene. It can draw outer outlines, inner ones or both outer and inner outlines of the objects.

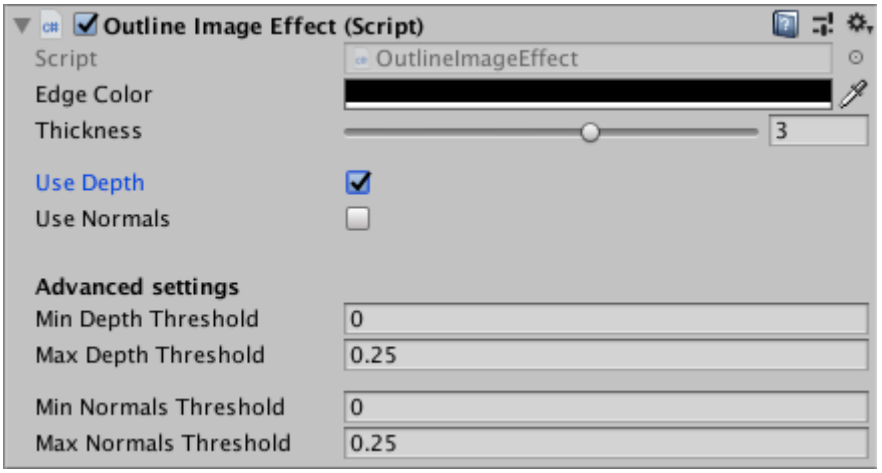
Edge Color is a color of an outline. *Thickness* makes the outline thicker or thinner.

Use Depth parameter outlines the outer contour of the objects with depth threshold control.

Use Normals creates outlines for “inner” parts of the objects, meaning, for those that are inside the boundaries of the object, for every given camera perspective. The effect depends on the geometry of an object. So, having proper normals here is important. There is a Normals Threshold control.

Min Depth Threshold and *Max Depth Threshold* determine the range of depth differences where outline should be applied. Lower values draw lines “inside” the scene resulting in a more beveled image. Higher values have more flat effect.

Min Normals Threshold and *Max Normals Threshold* determine the range of normals edges to be outlined. Lower values increase the amount of affected normals, leading to more stroked effect. Higher values decrease the amount of affected normals, leading to flatter look.



Outline Image Effect. Inspector interface.

Please, note that *Outline Image Effect* is a global effect, as it is used as the camera component, which is suitable for a consistent look of your project. If you would like to outline a particular object on your scene, you can engage the shader instead — **‘Stylized Surface with Outline’ shader**.

5. Additional scripts

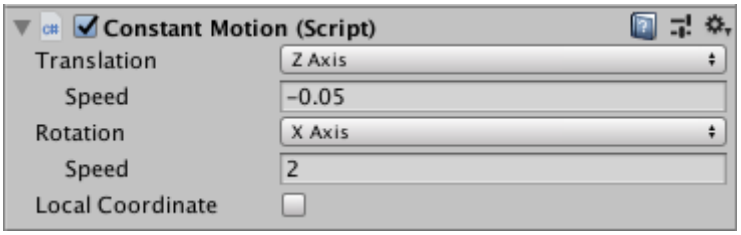
5.1. UV Scroller

Used in the *Wanderer* demo scene. It scrolls waterfall texture along the Y axis.

5.2. Linear Motion

Linear Motion is a simple script that translates (moves) and rotates any object. We used it heavily on cameras to prepare promo video footage. There is an option to translate or rotate along the X, Y, Z axis.

TIP. Use a couple of instances of this component if you want to translate and rotate along more than one axis and make more complex automations.



Linear motion script. Inspector interface.

6. Scenes

We tried to depict the big spectrum of possibilities using various scenes. They are one of ten million examples of possible Flat Kit use cases. Consider viewing them as starting points or macro-preset objects for your own project.

- **Valley, Wanderer** scenes are environmental. There we tried to show the work of both fog systems of Flat Kit. Also it is one of the perspectives of displaying the shaders — how these would look in a large scene.

Valley uses Terrain shader and transparent textures inside a Stylized Surface Cutout shader. Valley demo scene is also an example of obvious, rather than subtle, use of **Fog Image Effect.** Once the scene is loaded, you can scan through the Fog Image Effect presets to find which one you like more. There is a Presets chapter later in this manual with explanation of how to use them.

In a *Valley* scene, please, note that although the ground is made with Unity native terrain, the trees on it are populated manually, not using the terrain system.

IMPORTANT. Since the *Terrain* shader and *Stylized Surface Cutout* shader have been used in this scene only (Valley Scene) and take a considerable amount of time to get imported, we made them as an Extra Package you can import anytime you need them. Making it a separate option to import should significantly speed up the asset compilation time upon the first import. The asset's import time is a downside we have been battling with continuously. If you need to use this scene or these shaders, please go to **Extra Packages** folder and unpack the ***Terrain & Cutout Shaders + Valley Demo.unitypackage***

- **Blueprint Grid** (Mugs) and **Fruit Vase** scenes are an exhibition of most sought use cases of cel / toon shading.

However, you can find there more experimental stuff, too. It has been a temptation to overpopulate the scenes with content, because while making these included materials — literally dozens of interesting by-product or work-in-progress materials showed up, but we had to discard them to keep the scenes clean.

Blueprint Grid is a descriptive one, there is a text telling what we used to get the displayed materials.

Fruit Vase is actually a collection of 7 scenes. There is one vase with fruits across all scenes and each scene is dedicated to some specific look, thus uses a different set of materials.

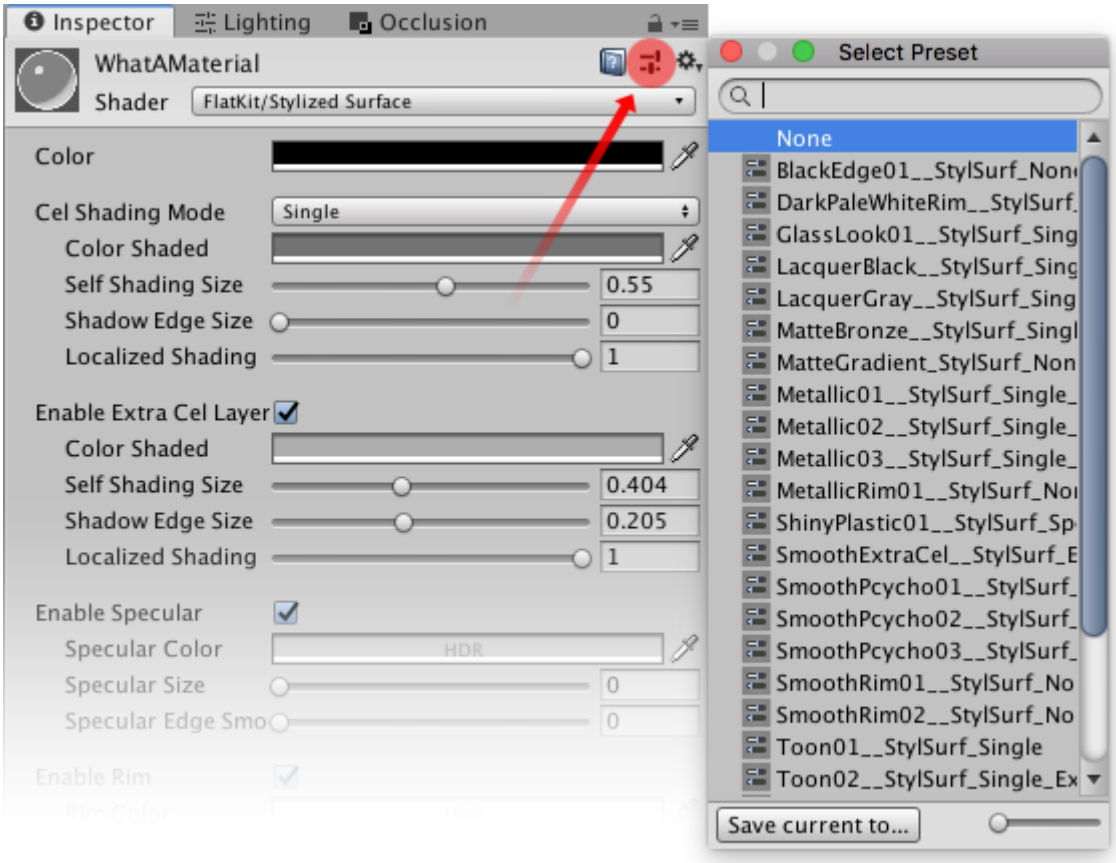
- **Tree Island** scene is a showcase of a more cartoony use case. Imagine a 3d-platform game with such a look. Or Any other arcade game.
- **Room.** We just had to include a room.
- **Retro Cars.** Retro cars are curvy. What a possibility to show how shiny (or rough) shaders can be.
- **Normal Map Tree.** An example of normal maps application.

7. Presets

Unity has its own Preset management system. The preset is the saved current state of the shader, in our case, the Flat Kit material. The presets are available across scenes and can be saved whenever you want inside the current project. For convenience, we saved the most useful presets inside a shared presets folder (*Assets/FlatKit/PresetsShared*).

In Flat Kit you can find presets as **.mat* Material instances (that you can drag and drop on the objects) and **.preset* Unity Presets (saved states of shaders that you can recall from interface of already applied materials). The sets are identical. Unity presets (*.preset) are great when you have a material (*.mat) applied to lots of objects and you want to swap it with a preset you already have.

To save the preset, select the material or an object with this material you want to save, click on the 'mixer' icon on the top right of the shader interface on the Inspector panel. Then, the menu will pop up. Click 'Save Current to…'. Then you choose the destination. Once created, you can move the actual file wherever you would like. All presets within a project will show up in the 'Select Preset' menu.



Preset menu. How to load.

Save, recall, experiment, discard bad results, save great results, all by using Unity's preset system. You cat A/B this way and share the shader's parameters across multiple separate materials. Scan through them and once you stumble upon something close to what you are looking for, adjust the one.

TIP. Naming the preset files as descriptive as possible is a gratifying practice. It would save your time later when you gather lots of them. It would be easier to navigate through them and distinguish between them, and also the proper names would remind you what you had in mind at the moment of saving the preset. Just look at the screenshot below.

8. Flat Kit in URP

FlatKit requires URP version 7.2.0 or higher.

Generally, Flat Kit looks identical between the Built-in and Universal Rendering Pipelines. The exceptions to this rule are described in the 'known limitations' list below.

Please note, Flat Kit had been initially created for the Built-in Rendering Pipeline. To keep the visual results as close to the original as possible, the URP version of Flat Kit is using HLSL code rather than shader graph. It means you can switch a Flat Kit project between URP and Built-in RP at any point without extra work. However if you'd like to edit the shaders, you'll need some programming skills.

8.1. Known Limitations

Although we did our best to support URP, the pipeline itself is not yet fully mature and brings some limitations. Before Unity has updated the URP, we are working on building our own workarounds in order to make things work.

The current limitations are:

- **SRP Batcher** is not yet supported by the Stylized Surface shaders.
- ~~**Vertex color** is currently not exposed in URP. This makes 'Use vertex color' toggle unavailable in Flat Kit when using URP.~~ Vertex color is now supported in URP.

8.2. URP Installation

To be able to use URP, we've included the URP version alongside the Built-in pipeline version, in a single package. In order to use URP, you need to unpack it first.

If you have not installed Unity's Universal RP native package before, it's time to do so.

Go to *Window* ▶ *Package Manager* ▶ *All Packages* ▶ *Universal RP* ▶ *Install*.

Import the URP version of Flat Kit scripts and shaders

Go to *Assets* (in Project tab) ▶ *"URP Package"* folder ▶ *FlatKit URP* ▶ unpack.

NOTE: If the "URP Package" folder does not appear, please **re-import Flat Kit from the Package Manager** instead of the Asset Store in Unity: *Window* ▶ *Package Manager* ▶ *Locate 'My Assets' drop-down menu* ▶ *Choose Flat Kit there*.

Once you've got it installed, select URP as a working rendering pipeline for your project.

Go to *Edit* ▶ *Project Settings* ▶ *Graphics* ▶ *Scriptable Render Pipeline Settings* ▶ select your rendering pipeline asset. We've got an example included in the asset.

Then you'll have to create a URP asset to work with.

Right click on *Assets* (in Project tab) ▶ *Create* ▶ *Rendering* ▶ *URP* ▶ *Pipeline Asset*.

Once you do it, the Asset and Forward Renderer are created.

8.3. Flat Kit Image Effects in URP

In URP, 'Fog' and 'Outline' image effects, included in Flat Kit, are no longer image effects, they have been adapted to become Render Features. Unlike the conventional image effects that are added to the camera game object, Render Features are added as stages to the Forward Renderer.

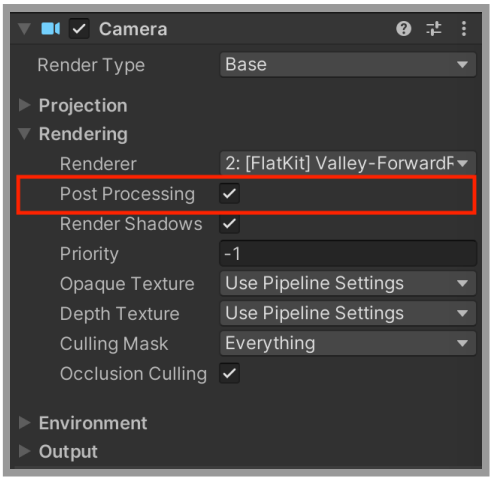
To use Flat Kit effects, please first update the Universal RP to the version **higher than 7.2.0**.
Go to *Window* ▶ *Package Manager* ▶ *Universal RP* ▶ Select the version to upgrade to ▶ click *Upgrade*

Our example scenes already include configurations of the Forward Renderer with outline and fog image effects (look for the **URP Config** folders in the demo directory).
To enable outline and fog, select the ForwardRendererConfig and add the 'outline' or 'fog' stage. In the case of 'outline' effect, you also need to add the DepthNormalsPass stage.

8.4. Post-processing V2 in URP (General Info)

We use PPv2 in our demo scenes for additional image effects. To enable these additional effects you need to:

1. Go to *Assets* (in Project tab) ▶ *Universal Rendering Pipeline* asset ▶ go to *Inspector* tab ▶ *Post-processing Feature Set* ▶ select ***Post Processing V2*** from the drop-down.
2. Enable the **Post Processing** flat on the camera inspector:



Camera properties. How to enable Post-processing V2.