

# **Fantasy Adventure Environment**

by Staggart Creations

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## 1. Fantasy Adventure Environment

Thank you for purchasing the Fantasy Adventure Environment!

**Please consider rating the package through [your download list](#) or leave a review at [the store page](#) once you're familiar with it.**

Your feedback is instrumental to the future of this package!



Feedback and suggestions can be made in the forum thread:

<https://forum.unity3d.com/threads/486102/>

This manual is intended to clarify the use of the package.

## 2. Compatibility

### Unity versions

This minimum supported version at this time is Unity 5.4. This is likely to be increased to version 5.6 at some point, as it features GPU instancing.

Unity 2018.1 is currently not supported since Substance integration has been depreciated. Once 2018.1 leaves beta, a separate (free) plugin will be made available. In Unity 2018.1 the follow errors will appear:

*Built-in support for Substance Designer materials has been removed from Unity. To continue using Substance Designer materials, you will need to install Allegorithmic's external importer from the Asset Store.*

Once this plugin is available, I'll be able to investigate compatibility.

### Platforms

The package was designed for mid-range to high-end PC and consoles.

VR has not been tested since I have no access to a headset at the time, but users have reported to have no graphical issues.

Mobile platforms, WebGL and DirectX 9 are not supported.

Playstation 4 and Xbox One remain untested since dev kits are extremely hard to obtain. Some users have reported to have no issues on these platforms. If you're developing for these platforms and find yourself having issues, please get in touch as I'd be happy to work towards a solution!

### Asset store

Compatible Asset Store packages:

- Vegetation Studio

Incompatible Asset Store packages:

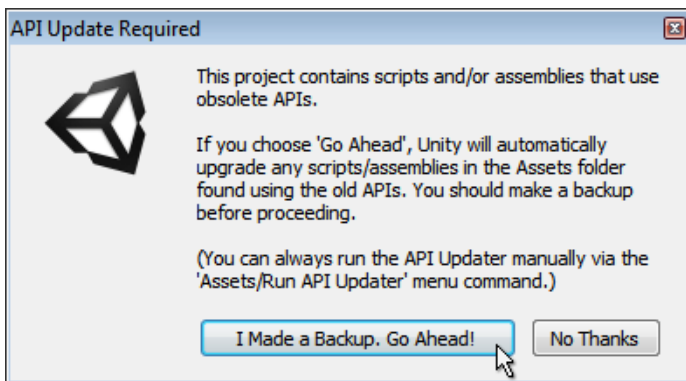
- uNature

## 3. Getting started

### Importing

Import the Unity package through the Asset Store download manager (Found under Window->Asset Store). Please be sure to download the assets in your current Unity version, as the package has been submitted separately for Unity 5.4 and up, and 2017.1 and up. Meaning if you upgrade from Unity 5.6 to 2017.1, you will have to re-download and import the package.

You may receive a warning message about obsolete APIs, it is completely safe to run the API updater.



*In Unity 2017.3, there will be several warnings reading the following:*

*warning CS0618: 'UnityEngine.ProceduralMaterial' is obsolete: 'Built-in support for Substance Designer materials has been deprecated and will be removed in Unity 2018.1. To continue using Substance Designer materials in Unity 2018.1, you will need to install a suitable third-party external importer from the Asset Store.'*

*This is harmless, and unfortunately not something that can be solved in this version.*

There are several demo scenes included:

**FAE\_Demo1:** The main demo scene, demo scene, which is intended to demonstrate the practical uses of the assets. In order to start building your world, you can browse the prefabs in the */Prefabs* folder and use them as you see fit.

**FAE\_AssetOverview:** A scene with all the assets lined up and their LODs

**FAE\_RocksDemo:** All the rock assets showcased, and some best practice examples.

**FAE\_CliffCoverageDemo:** A demo scene which makes use of the cliff coverage shader, and a demonstrates the use of a "coverage map".

### Unity terrain

It's important to note that the vegetation items will not work on the terrain as "Detail objects". This is because they have LODs, which is incompatible. It is also undesirable to use the assets in this way, since the shader would be overridden by the built-in terrain grass shader.

Instead, add the vegetation items as “Tree Objects”. This also applies to assets like Gaia or Map Magic.

I highly recommend using tools such as [Easy Scatter](#) or [Mesh Brush](#), which have a lot more options for distribution.

### Other topics

- [Environment set up](#)
- [Features](#)
- [Customizing assets](#)
- [Scripts](#)
- [Shaders](#)

## 4. Environment set up

In order to recreate the demo scene’s environmental settings, the following steps can be taken:

Go to *Window/Lighting*

- Set the Ambient Source to a white color in the Lighting tab found under *Window/Lighting*.
- Enable Fog, set to *Exponential* with a value of *0.007*
- Assign the *FAE\_Skybox* material to the *Skybox* field.
- Disable *Precomputed Realtime GI*

Directional Light:

- On your directional light, assign the *FAE\_Lensflare* asset in the *Flare* field if you wish.
- Control the intensity of the sun shaft effects through the Directional Light’s color’s alpha channel

Post effects:

- Grab the [Post Processing Stack](#) package from the asset store
- Add the “PostProcessingBehaviour” script to your camera and assign the included *FAE\_PostProcessingProfile* profile asset.

Scene:

- Add a WindController object to your scene, for the wind animations on the trees and vegetation to work. You can do so by through the menu: *GameObject/3D Objects/FAE Wind Controller*
- Select your terrain and add the *PigmentmapGenerator* script. The first time, the pigment map will automatically be generated. If not, press the “Generate” button.
- (Optional) Add a CliffAppearance object to your scene, which will allow you to modify the material properties of all rocks at once. You can find a prefab for this in the *Fantasy Adventure Environment/Prefabs/Effects* folder, which is pre-configured with the default rock materials.
- (Optional) Look for the FoliageBender prefab in the */Prefabs/Effects* and drag it into your player, move the object to the feet/base of the player. This will make the grass and foliage bend away from this position. Currently, you can only have one of these objects active at a time.

More detailed information on these features can be found in the [scripts](#) section.

## 5. Support

Should you run into any issues or have questions/feedback, please do not hesitate to reach out! I will do my best

to respond as soon as I can.

Unity forums thread: <https://forum.unity3d.com/threads/486102/>

E-mail: [contact@staggart.xyz](mailto:contact@staggart.xyz)

Twitter: [@JonnyIO](https://twitter.com/JonnyIO)

## 6. Refunds

Please refer to our [refund policy](#)

## 7. Features

### 7.1. Wind controller

The shaders used for both the trees and the vegetation utilize a custom wind animation method. In order to control this effect a “FAE\_WindController” script component must be active in the scene. You can find a preconfigured prefab under the Prefabs/Effects/ folder. Or you can create one through the menu: *GameObject/3D Objects/FAE Wind Controller*

See the [scripts section](#) for detailed information about this script.

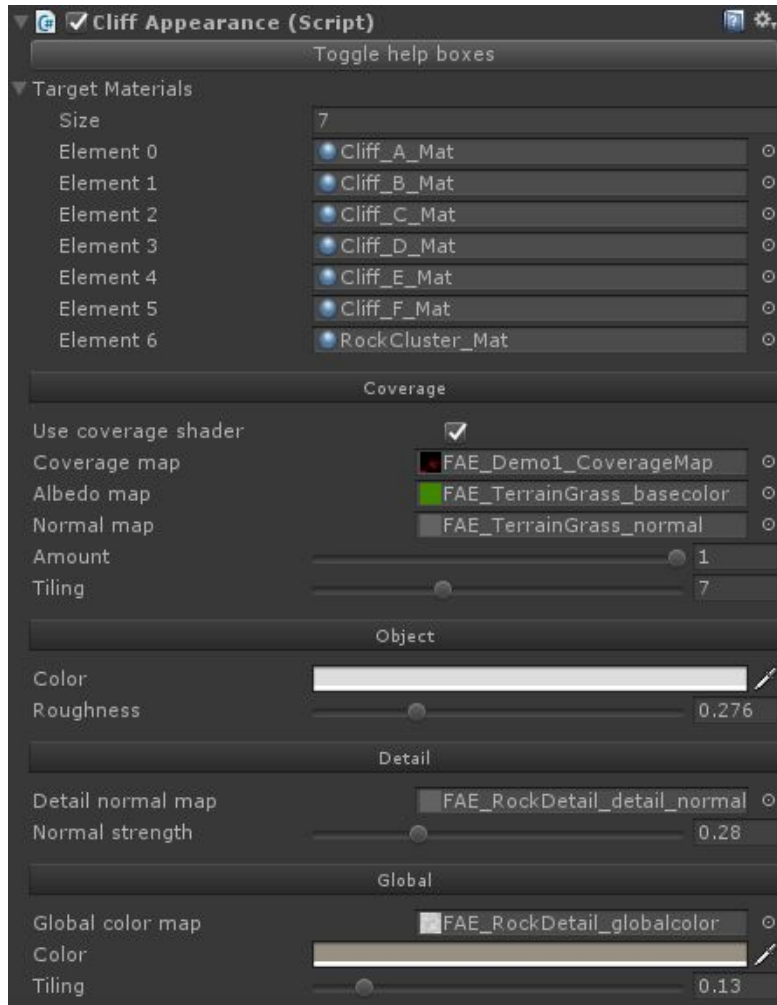


### 7.2. Cliff appearance

The CliffAppearance script allows you to modify multiple cliff/rock materials at once. The settings are loaded as soon as the object is enabled. So it allows you to quickly apply different settings, or save the object as a prefab to serve as a preset.

**Note:** The coverage feature is not supported on DirectX 9, the inspector will show an error message.

Essentially this means you can have different looks per scene, while using the same materials.







By toggling the “Coverage” shader you can add snow, sand or grass to your rocks. Through the use a coverage map, you can determine where on the terrain this effect should show:



You can make such a map by taking a top-down screenshot of your terrain and bring it into an image editing program. By painting over it with a black/white map (black meaning no coverage, white meaning fully covered) the effect can be centralized.

Currently, it is not possible to have multiple textures on the rocks. For instance grass in one place, and snow in another. As this would require the shader to hold a lot of texture maps, which is taxing on performance. Instead,



you'd have to use a separate `CliffAppearance` object with different material instances assigned to the cliffs.

### 7.3. Foliage bending

The shader found under "FAE/Foliage" supports basic player interaction. In order to enable this, the "FoliageBender" script component must be attached to a `GameObject` in the scene, parented to the player.

Once added, move it to the base/feet of your player:



You can grab the "FoliageBender" prefab found under Prefabs/Effects/.

Materials using the foliage shaders feature a "BendingInfluence" parameter which determines how much influence the Grassbender has on the material.

**Note:** This functionality is currently limited to one transform and is set to be updated with [a more extensive system](#). Currently, the improved functionality needs some improvements and testing before it is added through an update.

### 7.4. Fog sheet

The fog sheet is a quad mesh which fades out/in based on its distance from the camera. It can be used to highlight certain areas (push/pull concept) or to enunciate a silhouette.



The shader has an optional texture slot, to add, for instance, a cloud texture.

You can see how it's being used in ABZU in the following GDC talk: <http://www.gdcvault.com/play/1024409/Creating-the-Art-of-ABZU> (17:57 mark)

## 8. Polycount and LODs

Many users might like to know the polycount of the various assets before purchasing, hence this list containing the polycount and consequent LODs.

**Note:** All trees are saved as Unity asset files, because they were modified through script in order to bake wind information.

### Trees

| Asset name | LOD0 | LOD1 | LOD2 |
|------------|------|------|------|
| Tree_A     | 2497 | 1871 | 930  |
| Tree_B     | 1912 | 1472 | 752  |
| Tree_C     | 2321 | 1737 | 952  |
| Birch_A    | 1107 | 963  | 891  |
| Birch_B    | 469  | 242  | 164  |
| Birch_C    | 745  | 203  | 167  |
| Spruce_A   | 1324 | 876  | 312  |
| Spruce_B   | 1124 | 720  | 256  |
| Spruce_C   | 1068 | 708  | 248  |
| Pine_A     | 1048 | 608  | 436  |
| Palm_A     | 884  | 408  | 180  |
| Palm_B     | 910  | 540  | 288  |
| Palm_C     | 1214 | 552  | 336  |
| Willow_A   | 2675 | 1496 | 660  |
| Willow_B   | 3560 | 1888 | 1022 |

**Note:** All trees have a billboard after LOD2, which is 8 polygons.

### Cliffs

| Asset name    | LOD0 | LOD1 | LOD2 |
|---------------|------|------|------|
| Cliff_A       | 3994 | 1996 | 796  |
| Cliff_B       | 3994 | 1996 | 796  |
| Cliff_C       | 3994 | 1996 | 796  |
| Cliff_D       | 1994 | 996  | 396  |
| Cliff_E       | 996  | 496  | 246  |
| Cliff_F       | 1994 | 996  | 496  |
| RockCluster_A | 1160 | 572  | 278  |
| RockCluster_B | 336  | 160  | —    |
| RockCluster_C | 268  | —    | —    |
| RockCluster_D | 156  | —    | —    |

### Vegetation

These items have few to no LODs as the polycount is already low. Flowers are around 12 polygons, whereas their clustered counterparts are around 60 polygons

## 9. Customizing assets

### Branch colors

1. Navigate to the “Substance/Trees” folder and expand the Substance container of the tree you’d like to modify.
2. Select the branch material you’d like to edit and modify the parameters in the inspector

### Grass appearance

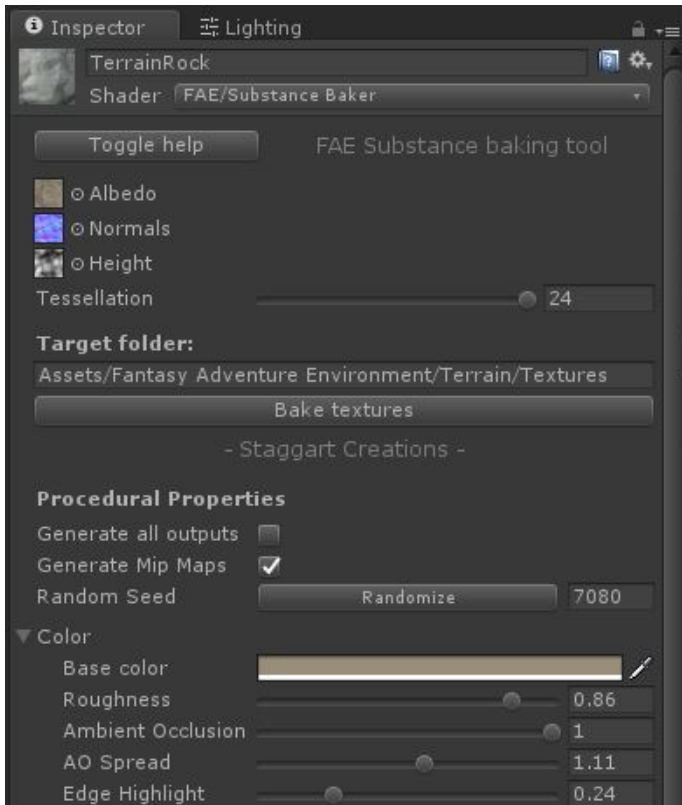
1. Navigate to the “Substance” folder and expand the “FAE\_Vegetation” Substance container.
2. Select the GrassAtlas material and edit its properties.

**Note:** You cannot use Substance materials directly on the prefabs, since a Substance material requires to use the Standard shader. Otherwise it will not generate its textures, or show the procedural properties, often enough it will even crash the editor. This is why all the assets use regular materials and only utilize the Substance output textures.

### Terrain textures

In the *Fantasy Adventure Environment/Terrain/Substance* folder you will find the Substance materials used to generate the terrain textures.

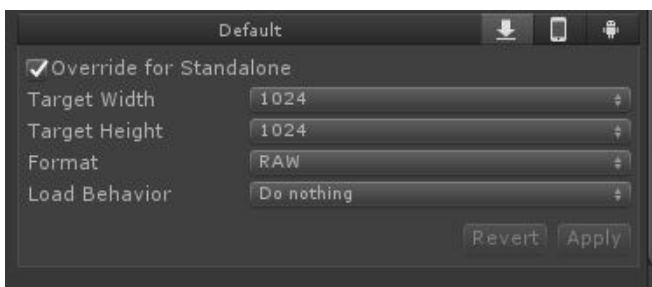
It’s handy to add a plane to your scene, and assign such a material to it. This way you’ll be able to see the material in your scene, since the preview window uses very simple shading.



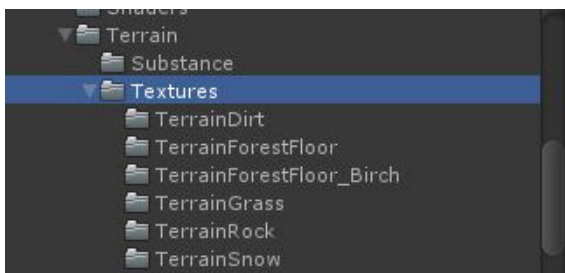
The materials have the *FAE/Substance Baker* shader assigned. This shader is an example PBR shader with a custom inspector. If it is not already assigned, you might have to reassign the shader twice, as it may stay on the Standard shader, this is a bug in the Substance integration plugin.

The last used target folder is saved in the editor settings. By default it points to the FAE textures folder.

It is very important the "Format" is set to "RAW", otherwise the textures will turn out black. The loading behavior is best set to "Do nothing", which will prevent the Substances from re-generating during the building process.



For every material, a sub folder is created, where the texture files will be stored.



These textures are what you can use on the terrain. The tool overwrites these files, so every time you bake the textures the changes will be reflected on your terrain.

The material feature a heightmap, which can be used for displacement or height-based texture blending. I highly recommend using a third-party terrain shader which will utilize this.

## 9.1. Material instances

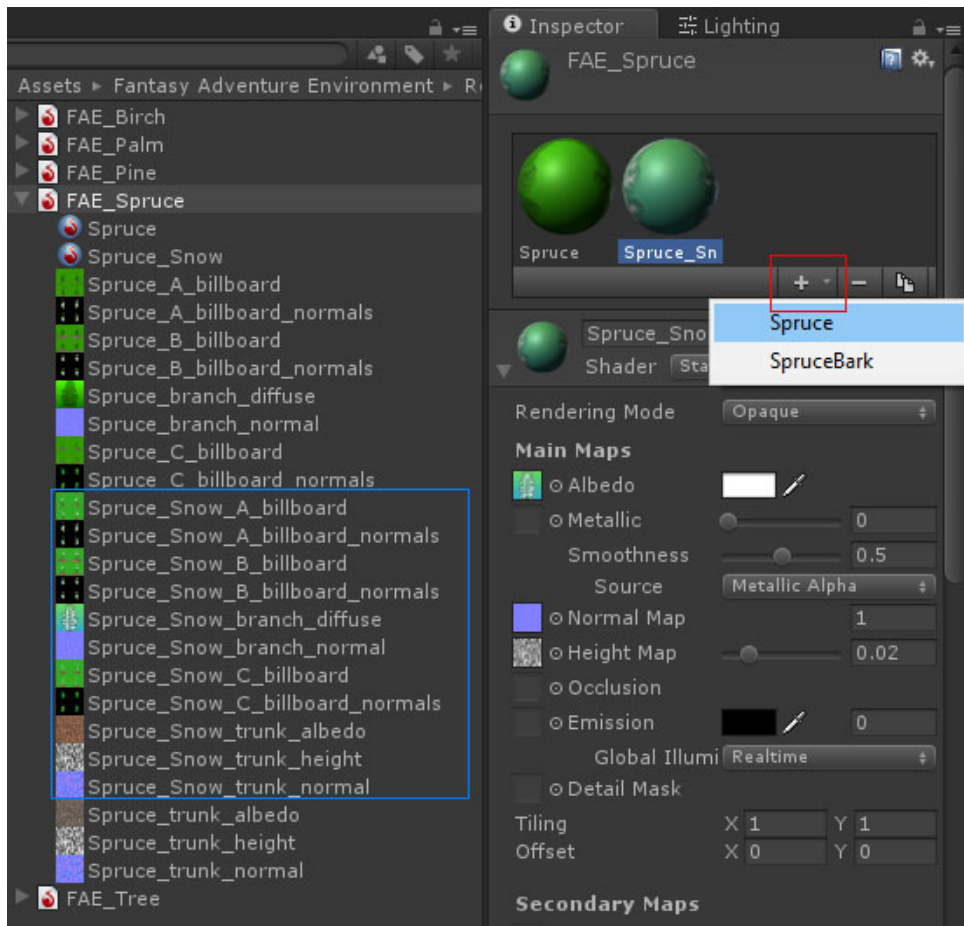
If you'd like to separate appearances, for the same tree, you are required to make separate materials.

Every tree type has a Substance container, which generates the textures for the branch, trunk and the billboards for every tree variant. Naturally, if you were to change any of its color properties, these changes will carry through to all other trees using the same textures.

If you'd like to add snowy trees to your scene, but would like to retain a set of regular trees, you are required to make an instance of the Substance material. Which will generate a new set of textures.

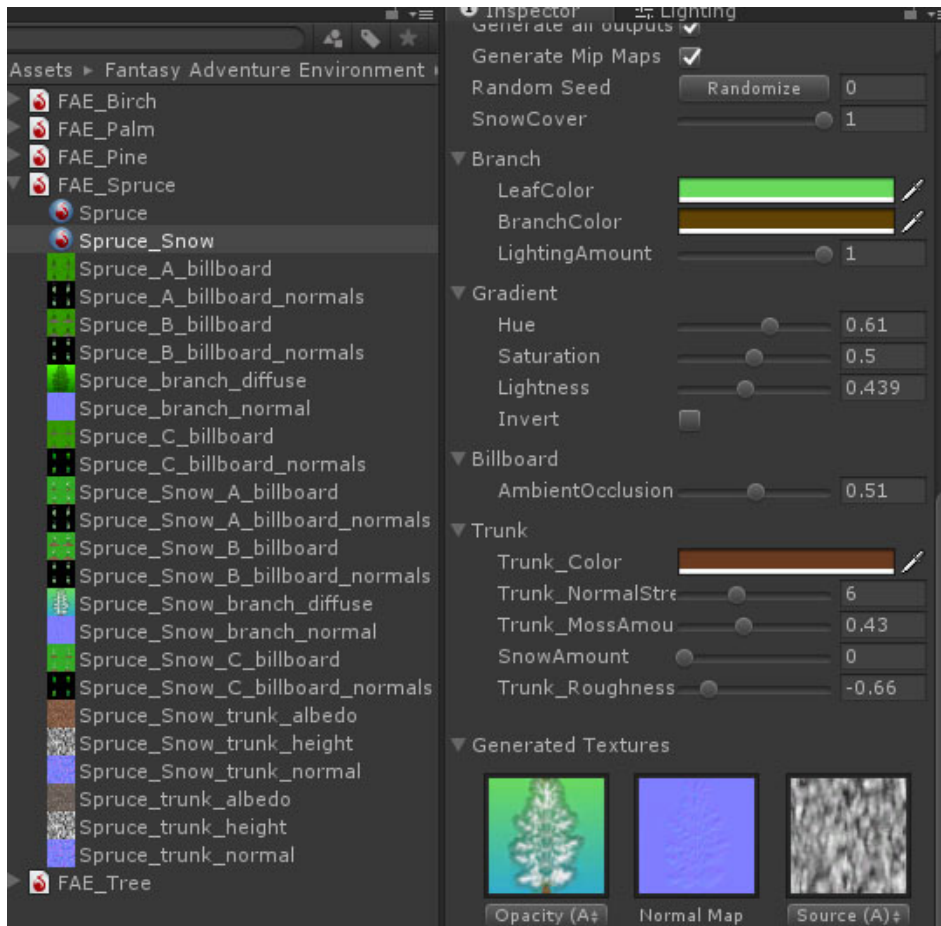
You can do so by following these steps:

1. Select the Substance root, and press the "+" icon (outlined in red) to create a new instance, you can give it a name at this point. You will notice a new set of textures is generated (outlined in blue)

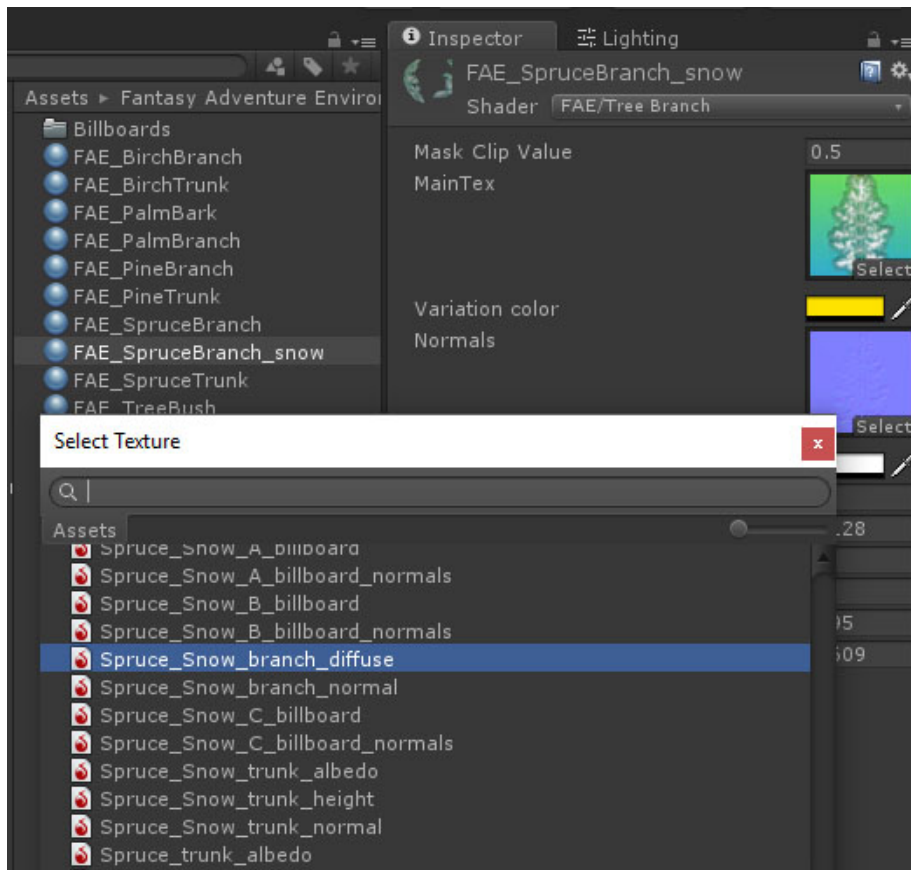


2. Change any properties you like. For example, I'm adding snow. You can come back to these setting at any time.



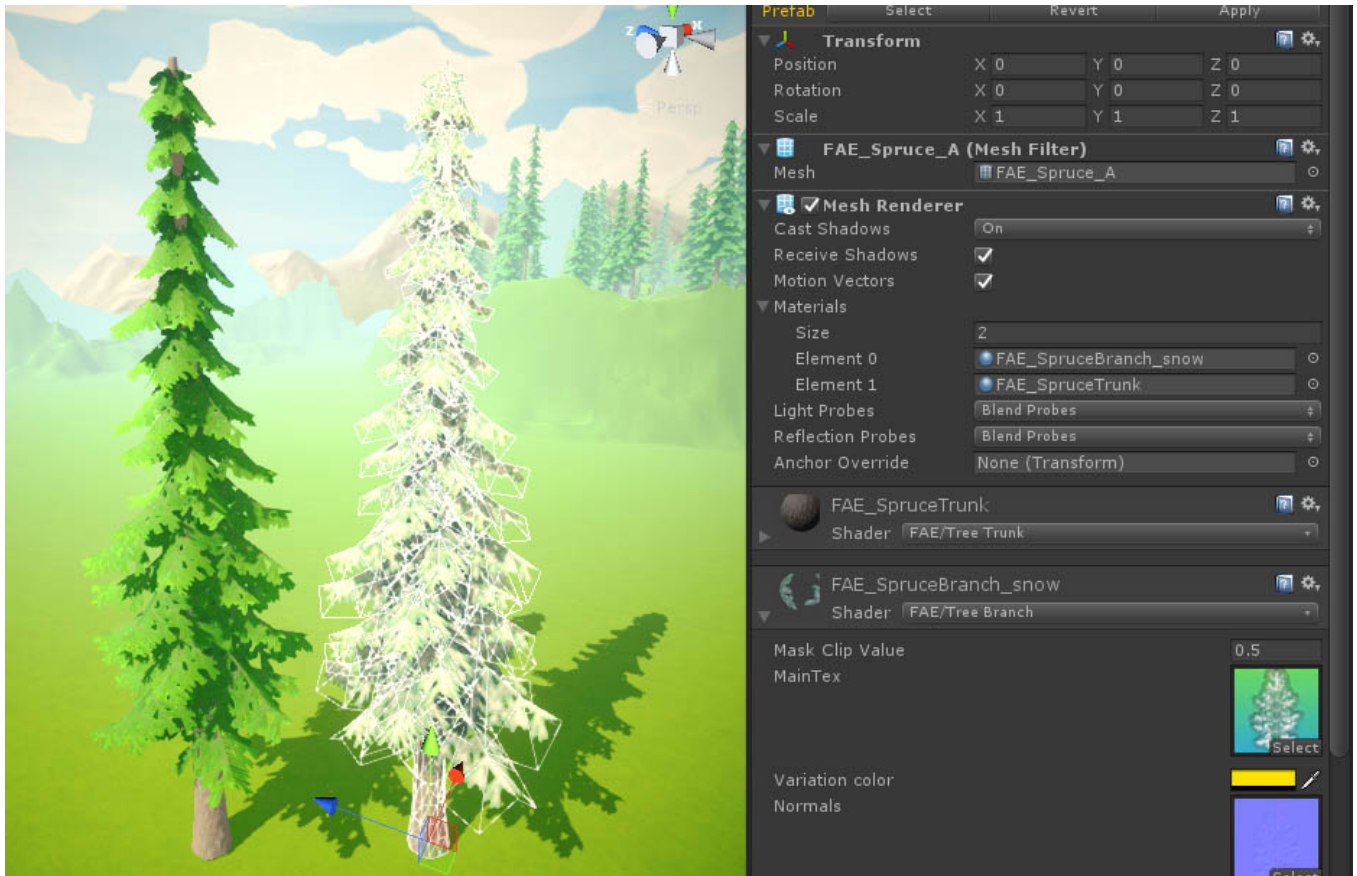


3. Create a new branch material, and assign the new branch textures to it.



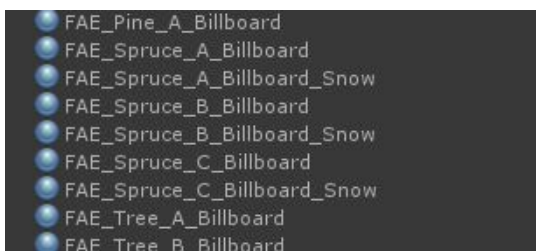
If you're looking to have a different look trunk, make a new trunk material as well.

4. Drag the tree prefab into the scene, and assign your new materials to every LOD mesh



If you're looking to have the billboard of the tree also look snowy, repeat step 3 and 4 for every variant of the tree.

You'll end up with something like this:



Assign this material to the "billboard" LOD of the tree.

5. Rename the tree, and create a prefab from it.

In summary, the Substance container is responsible for generating textures, and you need materials to utilize these. Unfortunately, it is not possible to use the Substance material directly on the mesh, as they are not able to use custom shaders.

## 10. Performance Guidelines

This environment pack was produced for desktop/console platforms, as such the visual fidelity does not come very cheap. Development was done on a laptop with an i7-4700HQ and a GTX765M (comparable to a desktop GTX650) where the demo scene performed around 40-70fps. On machine powered by a GTX960 it performed

around the 120fps range.

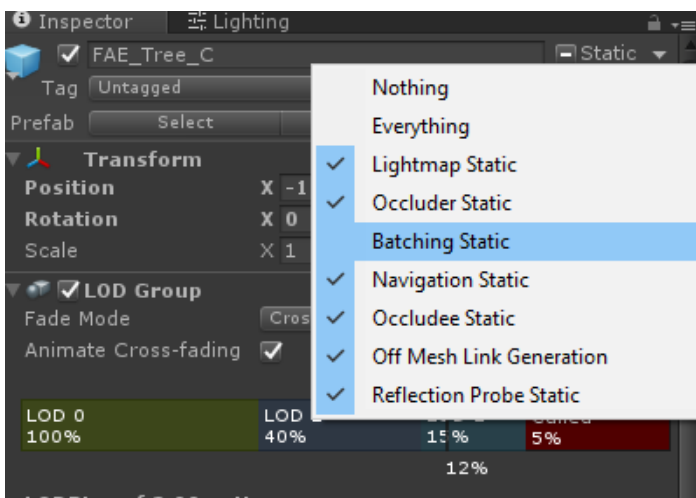
At this time of writing, the average framerate in the downloadable demo is 95 FPS, across +500 reports.

## Instancing

All shaders support GPU instancing, which is available since Unity 5.6. It sees a huge performance improvement. Be sure the “Enable Instancing” checkbox is ticked on the used materials. Using a system like Vegetation Studio is highly recommended.

It's important to know that Static Batching has been disabled on the tree prefabs. This is so that each tree has its own random wind motion speed and color variation. Since when models are batched they all share the same Transform. And the shaders utilize the model's scale to add an offset to the wind speed.

If you find this negatively impacts your performance, you can enable Static Batching on the prefabs:



It might be beneficial to set the *Trunk Wind Weight* value to 0 on your *WindController* after doing so. Or else all trees will appear to sway in unison. I hope to circumvent this limitation at some point, but it warrants some experimentation.

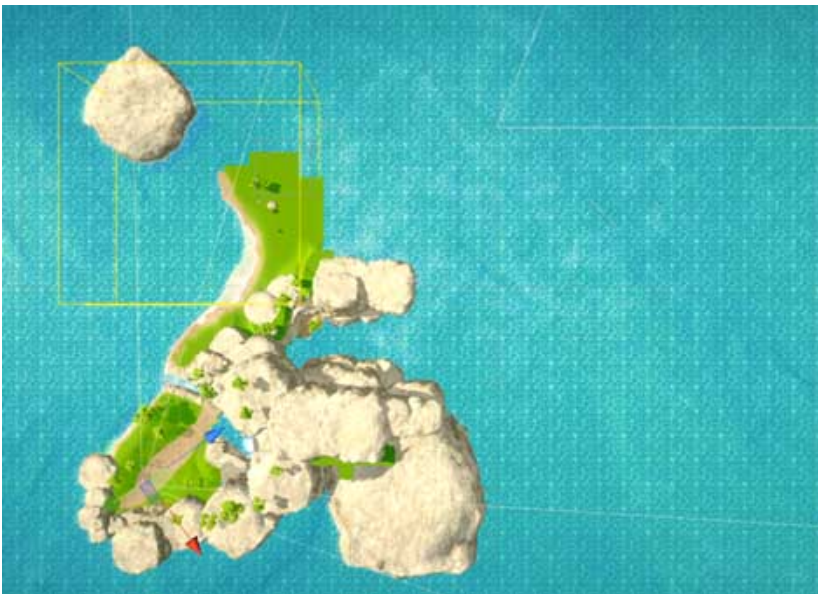
## Occlusion Culling

Also note how in the demo scene, the line of sight is broken at several points:



This is beneficial for Occlusion Culling, which avoids rendering objects that aren't visible. Thus, reducing the rendering overhead.

<https://docs.unity3d.com/Manual/OcclusionCulling.html>



## **Terrain**

Increasing the “Pixel error” value in your terrain settings, also has a huge impact on performance.

Be sure the splatmap (referred to as “control texture” in the terrain settings) is not set too high. If you need a higher resolution it's advised to [split the terrain up](#) into multiple pieces. Rather than using a 2x2km terrain with a 2048px splatmap, that would be a huge performance killer.

GPU instancing will be disabled for objects painted as terrain trees when light probes are enabled for them. So be sure to disable this in your terrain's settings.



## 11. Scripts

*All scripts are in the "FAE" namespace.*

### WindController

The shaders used for both the trees and the vegetation utilize a custom wind animation method. In order to control this effect a "FAE\_WindController" script component must be active in the scene. You can find a preconfigured prefab under the Prefabs/Effects/ folder.

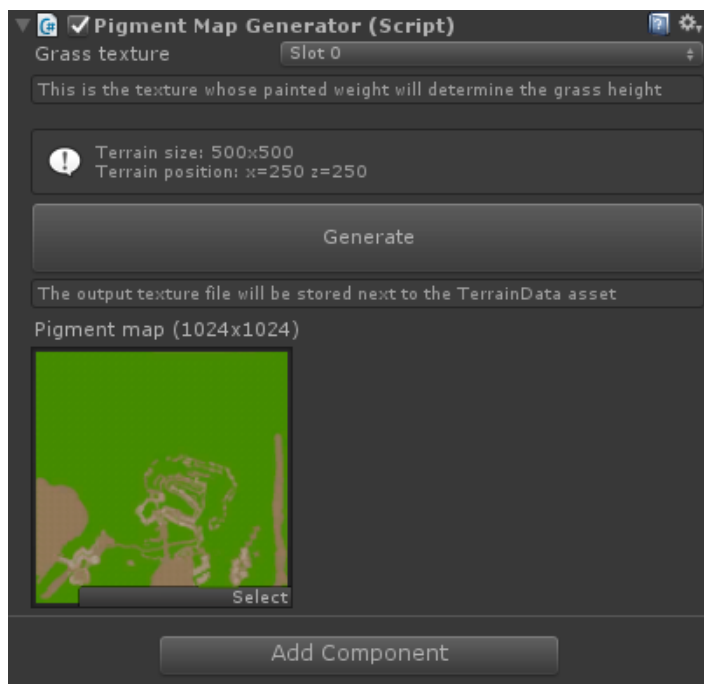
For ease of use, you can find a prefab for this in the Fantasy Adventure Environment/Prefabs/Effects folder.

By keeping this object in the scene, it is possible to have different wind settings per scene. However, it is safe to remove it, as the settings will be saved in the shaders.

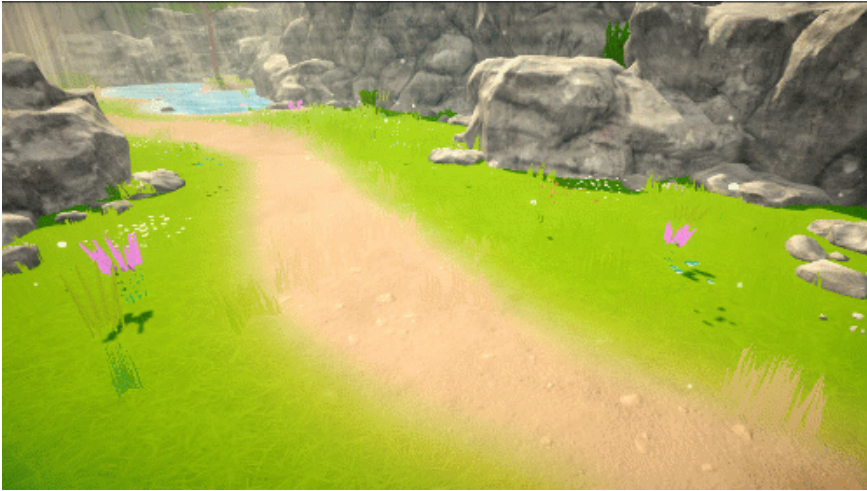
### PigmentmapGenerator

This script must be added to your terrain object. It generates a color map texture (pigment map) and heightmap for the *FAE/Grass* shader (see shaders section). Which can be utilized in the material to tint the grass by the terrain's color and have the height taper off where there is no grass.

Attaching this script to your terrain will load it's pigment map on startup. So it's possible to be used in multiple scenes.







The script also works with mesh terrains. However, like Unity terrain's, the size must be uniform, and the pivot point must be in the corner. If a mesh terrain fails to meet these requirements the pigment map will not line up accordingly.

**Note:** In version 1.1.0 mesh terrains with centered pivots are supported. Options to rotate or flip the pigment map are also added, in case your mesh UV differs

### **CliffAppearance**

Used to modify the shader properties of the *F AE/Cliff* shader across multiple materials.

Attach this script to any object in your scene and assign the materials using the *F AE/Cliff* shader. The values set in the inspector are applied as you change them, or whenever the object is enabled.

For ease of use, you can find a prefab for this in the *Fantasy Adventure Environment/Prefabs* folder.

This could be used to, for instance, load different settings based on the scene. You could save the object as a prefab to use it as sort of a preset.

### **FoliageBender**

Tells the *F AE/Foliage* shader from which position in the world it should bend away from, and by which strength/radius.

### **SubstanceBaker**

Used internally to bake the terrain materials to PNG files, in order to use them on the terrain

### **TerrainUVUtil**

A internal helper class for the PigmentmapGenerator

## **12. Shaders**

All shaders, except the sunshaft shaders, have been made using [Amplify Shader Editor](#), and thus can be modified

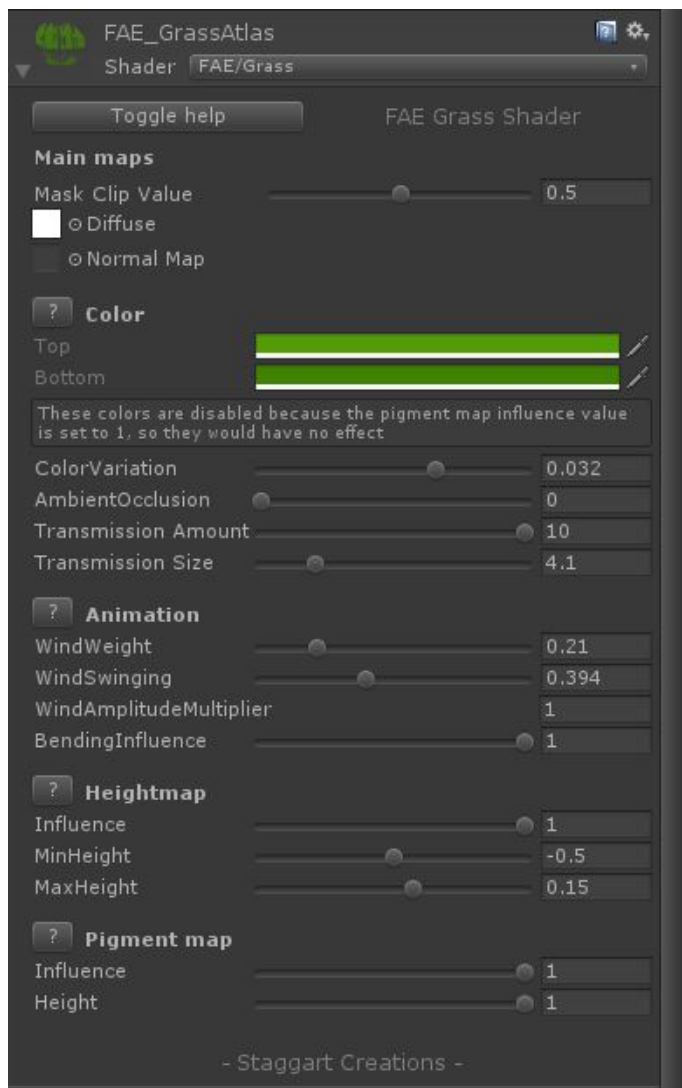
using it. Please make sure you are using the latest version from <http://amplify.pt/download/> as this can avoid a lot of headaches.

Please note that I cannot provide support for the use of ASE and modified shaders are no longer subject to user support.

The shaders included in the package can be found under the “FAE” section in the shader dropdown list.

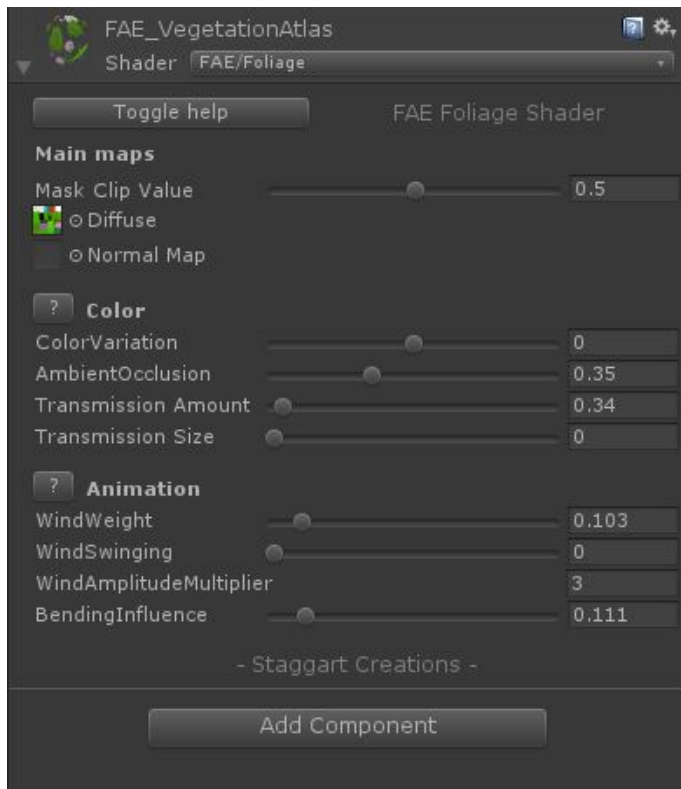
## Grass

Used by the grass. Features light transmission, wind animations, bending and the heightmap/pigment map functionality.



## Foliage

Used by the vegetation. Features color variation through wind, bending, light transmission and wind animations



## Tree Branch

Shader used on the tree branches, which enables wind animation and stylized rendering.



## Tree Trunk

Simple PBR shader, uses the Albedo map's alpha channel for the roughness.

This shader is required on a tree for the global wind motion to work.

### **Cliff**

Features a tri-planar projected color map, and detail normals. Roughness is sampled from the albedo map's alpha channel.

### **Cliff Coverage**

Same functionality as the Cliff shader, but with the addition of a coverage feature

### **Fogsheets**

Opacity is controlled by a distance factor from the surface, to the camera. Optional texture slot.

### **Sunshaft**

Used with the Sunshaft/Long and Sunshaft/Short assets.

Cross-pans a sun shaft texture horizontally. And features distance and intersection fading. The Directional Light's color's alpha channel controls the intensity of the effect.

The Directional Light's color's alpha channel controls the intensity of the effect.

### **Sunshaft particle**

Does much of the same as the Sunshaft shader but is tailored to be used with a ParticleSystem. Where the "Color over lifetime" feature can be used to fade out the sunshaft through the alpha channel.

The Directional Light's color's alpha channel controls the intensity of the effect.

### **Water**

A simplified version of the [Stylized Water Shader](#), considered to be a "lite" version of the complete package. Limited in functionality and customization.

## **13. Vegetation Studio**

The package assets have been tested with [Vegetation Studio](#). Since version 1.0.5 compatibility was added.

Vegetation Studio makes excellent use of GPU Instancing (available since Unity 5.6), which allows you to create extensive dense vegetation at a fraction of the performance cost.

Vegetation Studio is currently in beta, and thus not publicly available yet. The VS settings file will be made available for download in some time. This way you'll be able to recreate this kind of scene with the optimal settings for the assets:



This frame is merely 140 drawcalls.

## 14. Troubleshooting

### Lightmapping

You might experience some issues with lightmaps, such as black spots. Though, this is not directly attributed to the asset. Since LOD1 and up do not support lightmaps, but are rather lit by light probes you may notice visible popping.

It is recommended to not bake lighting but use precomputed GI instead.

### Grass is grey

This means the grass material is using a pigment map, but there is none available.

Adding the PigmentmapGenerator script to your terrain will elevate this.

If you don't wish to use this functionality, turn down the "PigmentmapInfluence" parameter on the grass material.

### Object appear completely black

This was a shader issue attributed to OSX or DirectX 9, which has been fixed since version 1.0.3

### Cliffs turn black when re-importing the package





Ugh, this is such a bummer, I can't quite pinpoint what is causing this. For now, there is a workaround:

Go to the FAE\_RockDetail Substance material, right click, and choose "Reimport".

**Trees and vegetation turn white in Unity 2017.1 (and newer)**





A separate version of the package was submitted for Unity 2017.1, because the shaders require some modification to work. To elevate this issue, re-download the package from the Asset Store in Unity 2017.1

## 15. Using the shaders with custom assets

Should you like to use the *FAE/Branch* shader on a tree outside of this package it must conform to a requirement, namely the Ambient Occlusion (AO). Which must be baked into the mesh's vertex colors. This is used for shading and animation purposes.

Certain information is baked into a tree mesh's vertex colors:

Red: Ambient Occlusion

Green: Wind influence

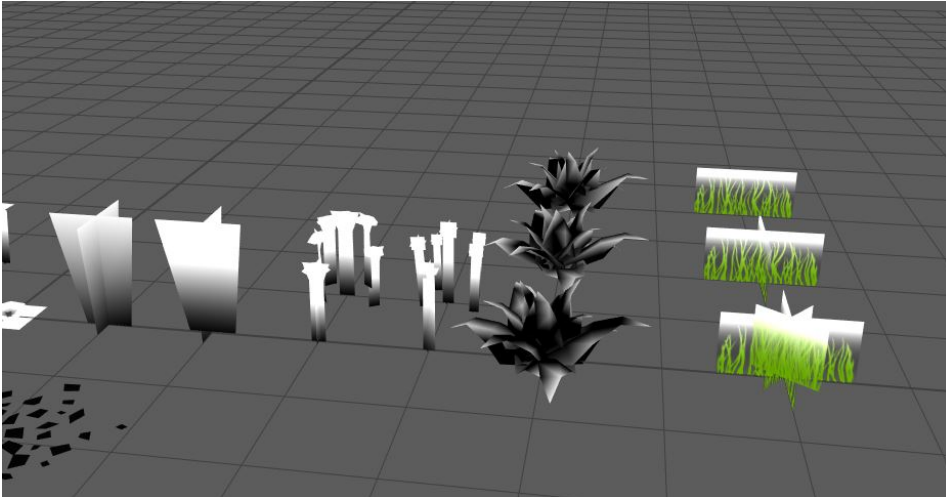
Blue: Stiffness

Alpha: Thickness

This information was calculated and baked using a proprietary tool, which will not be made available to end-users. The alpha channel remains unused, but may be utilized in the future.



For vegetation assets using the *FAE/Foliage* shader much of the same holds true. Where the AO information is used to determine which parts are not affected by wind or player interaction. As well as several other shading functions.



The branch shader will also work with SpeedTree trees, since they also have the AO baked into the vertex colors. Unfortunately, the global wind motion (swaying motion) will not work correctly, since the aforementioned “stiffness” information will be missing. Causing the base of the tree to also move. Setting the “trunk weight” parameter to 0 on your Wind Controller object will negate this effect.



Shaders used on the Standard Assets SpeedTree trees



## 16. Substance materials

The behavior of all Substance material has been configured to bake the Substance to texture when you build your project. So they will not incur a loading time, as they would have to be generated otherwise.

All Substance materials can be found under *Fantasy Adventure Environment/Resources/Substances*.

*Source files (.sbs) for the Substances will not be made available.*

### 16.1. Lensflare

Composes a lensflare atlas texture. You can modify the intensity of the individual components.



If you'd like to change settings such as the size or the colors, go to the actual lensflare asset found under *Fantasy Adventure Environment/Resources/Effects/Materials*.

### 16.2. Particles

Used to generate particle sprites, limited options available.

### 16.3. RockDetails

Generates the global color- and detail normal map for the cliffs. This might be expanded in the future with more kinds of maps.

### 16.4. Trees

Holds all the texture outputs for the tree branches and trunks. This is where you can modify the colors of the trees.

The snow functionality is a little gimmicky at this point, but I saw no harm in leaving it in ?

### 16.5. Water

Outputs the maps needed for the water and waterfall. Please do note that the waterfall asset is not officially included, but only produced for the demo scene.

## **16.6. WindMap**

Generates the wind direction vectors. The WindController script drives its parameters, so no need to fiddle with this Substance.