NGSS features a ground-breaking combination of kernel filters mainly based on Monte Carlo. The result is a high quality smothered dynamic penumbra shadows with superior banding and aliasing removal, making extremely tiny shadowmaps look outstanding. NGSS also uses least amount of sampling to filter out shadows while skipping fully lit or fully shadowed areas making it the fastest solution on the market for realistic penumbra shadows.

Main filters: A PCSS filter (Area-like soft-shadows) and a PCF filter (uniform soft-shadows). A powerful denoiser that skyrockets the base filters, acting as a separable filter and features screen space infinite Frustum Shadows with bilateral filtering and edge tolerance. A complete shadows package to skyrocket your projects quality to the next level! :)

Compatibility: Works on any platform where Unity support real-time shadows with at least SM3.0 for PCF and SM3.5 or better for PCSS. Does not work well with DX9/GLES 2.

Important: Before installing v2, you have to delete any previous version of NGSS as explained in section **"Removing NGSS v1.9"** of this documentation. You should not move NGSS from it's default installed package Path. Failing to do so might lead to unexpected errors.

Note: If you are running cloud builds jump to section **Cloud Builds Library Integration**

Automatic install/uninstall of NGSS shadows libraries:

1 - Close Unity and re-open it with Admin rights (right click on Unity icon **Run as Administrator**). You can skip this step if you are on Mac or Linux.
2 - Open the NGSS install wizard at the top menu "**Tools - Psychose Interactive - NGSS Libraries Setup (Default Renderer)**".
This tool will install all required internal libraries for all lights types and backups Unity original files in case you want to revert to original files using the same tool.
3 - For spot or point shadows click on "**Install NGSS Spot/Point Libraries**". For directional shadows click on "**Install NGSS Directional Libraries**". Watch for any console warning or error. The tool also logs confirmation messages in the text area.
4 - If everything went fine you can restart the Editor in normal mode (not Admin) but before restarting the Editor add the **NGSS_Directional** component to your directional light and the **NGSS_Local** component to your spot/point lights, so when you get back after restart, internal shadow libraries are being properly feed by these components.
5 - To uninstall **NGSS v2** libraries, repeat steps from 1 to 3 and click on "**Uninstall**" buttons. This is the same step you must follow in order to update to future 2.x versions.

Note: If automatic install/uninstall fails for some reason, then follow the Manual install below.

Manual install/uninstall of NGSS shadows libraries:

1 – Before closing Unity, add respective NGSS component to your scene lights. Spot and Point lights requires the **NGSS_Local** component and directional light requires the **NGSS_Directional** component (located at "**Assets/Psychose Interactive/NGSS/Scripts**").
2 - Close the **Unity Editor**. Go to the directory where you Installed Unity and open the **Data\CGIncludes** folder. On Windows: **"C:\Program Files\Unity\Editor\Data\CGIncludes".** On Mac: **"/Applications/Unity/Unity.app/Contents/CGIncludes".**
3 - Rename the files **AutoLight.cginc**, **UnityDeferredLibrary.cginc** and **UnityShadowLibrary.cginc.** Example add them a "**.bak**" extension. It will allow you to revert to default Unity shadows in the future.
4 – Install the shadow libraries that you need. For directional shadows copy **AutoLight.cginc and UnityDeferredLibrary.cginc**. For Spot/Point shadows copy **UnityShadowLibrary.cginc** from your project "**Assets/Psychose Interactive/NGSS/Libraries**" folder into the **CGIncludes** folder.
5 - Delete the **ShaderCache** folder of your project (located in your project **Library** folder). This will force Unity re-import **NGSS** libraries when Unity start next time. You can open Unity now in normal mode (not admin).
6 - To uninstall **NGSS Shadows libraries**, revert to the original Unity libraries you backed up in step 3 and delete your project **ShaderCache** before restarting the editor. This is the same step you must follow in order to update to future 2.x versions.

Cloud Builds Library Integration:

If you are running cloud builds and you don't have access to the **Unity Editor/Data/GCIncludes** folder, you can always include the library directly on your shaders. Simply, add these lines to your shaders next to shader includes/pragma compile directives:

//for Forward rendering
#include "Assets/Psychose Interactive/NGSS/Libraries/AutoLight.cginc"
//for Deferred rendering
#include "Assets/Psychose Interactive/NGSS/Libraries/UnityDeferredLibrary.cginc"
//for Forward & Deferred rendering
#include "Assets/Psychose Interactive/NGSS/Libraries/UnityShadowLibrary.cginc"

Once you've added these lines to your shaders, you must right click and re-import your shader. **This forces Unity to recompile the shader using the NGSS libraries in your project instead of the ones in the Unity Editor Data/CGIncludes folder. Useful for remote builds.**

Note: If you messed up the installation of NGSS libraries or any Unity internal CG file, you can always re-install Unity and it will clean up everything. Then repeat the NGSS libraries install process again. The install process for **NGSS Shadows Libraries** must be done every time you update to a new version of NGSS or install a new version of Unity as Unity overwrites internal CG libraries on upon install.

Shadows components:

Directional Shadows: Directional shadows properties are tweaked within **NGSS_Directional** component. They are self documented (hover your mouse over any property to display popups info).

Local Shadows: Spot and Point shadows properties are tweaked within **NGSS_Local** component. They are self documented (hover your mouse over any property to display popups info).

Frustum Shadows: Add **NGSS_FrustumShadows.cs** to your **Main Camera** to enable infinite screen space shadows. Frustum Shadows properties are tweaked within that component.

Removing NGSS v1.9:

1. Close the **Unity Editor**. Go to the directory where you Installed Unity and open the **Data\CGIncludes** folder. On Windows: **"C:\Program Files\Unity\Editor\Data\CGIncludes".** On Mac: **"/Applications/Unity/Unity.app/Contents/CGIncludes"** .
2. Delete the file **UnityShadowLibrary.cginc** inside that folder and rename the "**UnityShadowLibrary.cginc.bak"** to **" UnityShadowLibrary.cginc"**
3. **Delete** the ShaderCache folder on your project. This will force Unity re-import NGSS library. To do it simply navigate to your project folder, open the Library folder and delete the ShaderCache folder.

Custom frameworks integration (Built-in Renderer):

If you are using a special shader effect or rendering framework (such as Lux, HxVolumetric, Aura, pre-integrated skin shader, etc) that relies on shadows opacity (internally mapped to the first component of **_LightShadowData**), you need to add one NGSS shader compile define. Otherwise your effect opacity might behave wrongly when you tweak shadows opacity**.** Search anywhere for **_LightShadowData** and add this before accessing to the first component of **LightShadowData**:

```
#if defined(NGSS_GLOBAL_OPACITY_DEFINED)
        _LightShadowData.r = NGSS_GLOBAL_OPACITY;
#endif
```

The NGSS_GLOBAL_OPACITY_DEFINED will ensure that nothing will break if you delete NGSS shadow libraries or of you update/install Unity. Notice that we are only looking to change the first component of **_LightShadowData** (.r or .x).

Useful Tips and Tweaks:

If your target platform is Desktop or Consoles, try to enable 32 bit depth buffer in Graphics Menu, this provide better shadows precision. Available only in Unity 2017 and up.

If you are targeting Mobile or low end devices, don't go crazy with the maximum quality. Start at the lowest quality possible the maximum recommended is ~8-16 samplers.

Always test your shadows in your in-game, not on empty scenes. NGSS shadows looks spectacular on high frequency details of your scene. You would be surprised how little amount of samplers NGSS need!

Try enabling shadows dithering and see how it looks. Dithering is highly recommended when doing less than 32 samplers.

Disabling Cascaded Shadows (through project Graphics Menu) will give you around 30-40% speed on low-end devices in Forward rendering as the shadows are sampled directly into the shader (Requires NGSS Directional libraries to be installed). This action will also disable the Denoiser automatically which is only recommended on Desktop with modern GPUs.

We always recommend **StableFit** projection over **CloseFit** as the later has projection problems and produces large shadows artifacts due to the shadows pancake algorithms.

You don’t need to install all shadows libraries, install only what you need (either Local or Directional libraries) but if quality is what you are looking for, it’s recommended to install them all.

All local lights (Spot & Point) don’t need the NGSS_Local component, only the main one which acts as the Manager requires it. You can still switch between PCF/PCSS filter and shadows softness using the native light properties “Shadows Strength and Shadows Type”.

OpenGLCore 4.1 (or older) the support is limited to PCF for Local Lights and you can’t install both Local and Directional libraries, only one should be installed or Local Shadows won’t show.

Forum support and contact:

For any question, issue, bug, custom inquiry, custom framework or renderer integration please **email support**: **support@psychozinteractive.com** with your invoice number.

Unity Forum NGSS thread: https://forum.unity.com/threads/next-gen-soft-shadows-2-sophisticated-dynamic-penumbra-shadows-for-unity.440088/