Lightmapping Guide

Aug 28 2023 - Patch 1.12.0 - Guide/Package Version: 12.0

Disclaimer

- All information in this guide is up to date as of **Onward 1.12** August 18th, 2023 and is subject to change. Changes and updates will be noted in the 'Change log'' section below.
- Updates to the custom content package files may cause inconsistencies with this guide
- If you encounter any issues with this guide or the custom content package files, please contact us using the **Onward Discord channel.**

➤ **IMPORTANT**

You must have only one Realtime light (total) in your scene. That light is to be set to Mixed mode. This is typically your Directional Light, "the Sun." If you have more than 1 realtime light, you will not be able to submit your map. All other lights must be in Baked mode. Lightmapping always takes time.

Light Setup

How do we ensure all of our lights are in Baked mode? Enter the Light Explorer. The Light Explorer can be accessed by going to your *"Window"* dropdown, then *"Rendering" > "Light Explorer"*
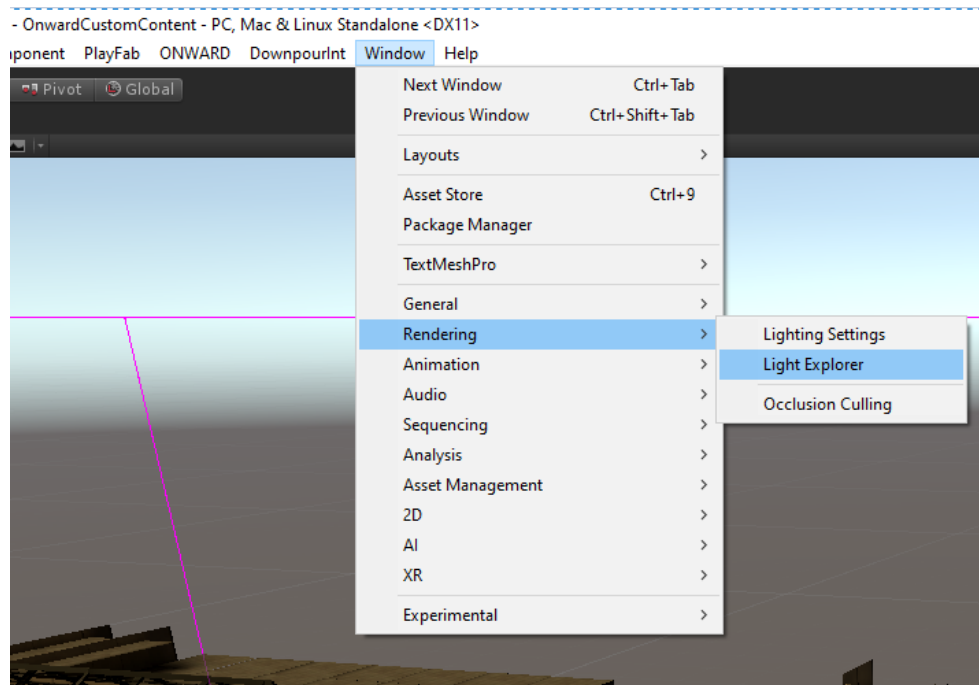
A new Light Explorer panel will appear that allows you to see some information about all the lights in your scene in a handy list. There are dropdowns for changing properties in groups.

Ensure ALL of your lights in this list EXCEPT your Directional Light are set to Baked in the 'Mode' dropdown, circled in Red. You can multi-select lights and change their properties at one time.

For the 'Shadows' dropdown (circled in Blue), you will want to ensure your lights are set to "Soft Shadows" or else that particular light won't draw shadows. You can multi-select lights and change their properties at one time.

Light Table   Reflection Probes   Light Probes   Static Emissives

Lock Selection

Enabled	Name	Type	Shape	Mode	Color	Intensity	Indirect Multiplier	Shadows
✔	Directional Light	Directional		Mixed		1	1	Soft Shadows
✔	Point Light (134)	Point		Baked		0.375	1	No Shadows
✔	Point Light (157)	Point		Baked		1	1	Soft Shadows
✔	Point Light (127)	Point		Baked		0.375	1	No Shadows
✔	Spot Light (11)	Spot		Baked		0.5	1	Soft Shadows
✔	Point Light (187)	Point		Baked		1	1	Soft Shadows
✔	Point Light (205)	Point		Baked		1	1	Soft Shadows
✔	Spot Light (14)	Spot		Baked		1	1	Soft Shadows
✔	Spot Light (6)	Spot		Baked		0.5	1	Soft Shadows
✔	AmbienceLight (1)	Point		Baked		0.3	1	No Shadows
✔	Spot Light (17)	Spot		Baked		0.5	1	Soft Shadows
✔	Point Light (175)	Point		Baked		1	1	Soft Shadows
✔	Point Light (145)	Point		Baked		0.125	1	No Shadows
✔	Spot Light (2)	Spot		Baked		0.5	1	Soft Shadows
✔	Spot Light (24)	Spot		Baked		1	1	Soft Shadows
✔	Point Light (151)	Point		Baked		1	1	Soft Shadows
✔	Spot Light (44)	Spot		Baked		1	1	Soft Shadows
✔	Point Light (215)	Point		Baked		1	1	Soft Shadows
✔	Spot Light (14)	Spot		Baked		2	1	Soft Shadows
✔	Point Light (224)	Point		Baked		1	1	Soft Shadows
✔	Spot Light (13)	Spot		Baked		1	1	Soft Shadows
✔	Spot Light (50)	Spot		Baked		1	1	Soft Shadows
✔	Spot Light (44)	Spot		Baked		1	1	Soft Shadows
✔	Spot Light (46)	Spot		Baked		1	1	Soft Shadows
✔	Point Light (152)	Point		Baked		1	1	Soft Shadows
✔	Point Light (177)	Point		Baked		1	1	Soft Shadows
✔	Spot Light (33)	Spot		Baked		1	1	Soft Shadows
✔	Spot Light (10)	Spot		Baked		0.5	1	Soft Shadows
✔	Spot Light (47)	Spot		Baked		1	1	Soft Shadows
✔	Point Light (194)	Point		Baked		1	1	Soft Shadows
✔	Point Light (121)	Point		Baked		0.375	1	No Shadows
✔	Point Light (137)	Point		Baked		0.375	1	No Shadows
✔	Spot Light	Spot		Baked		1	1	Soft Shadows
✔	Point Light (178)	Point		Baked		1	1	Soft Shadows
✔	Point Light (13)	Point		Baked		1	1	Soft Shadows
✔	Point Light (200)	Point		Baked		1	1	Soft Shadows
✔	Point Light (16)	Point		Baked		1	1	Soft Shadows
✔	Point Light (162)	Point		Baked		1	1	Soft Shadows
✔	Point Light (212)	Point		Baked		1	1	Soft Shadows
✔	Spot Light (28)	Spot		Baked		0.5	1	Soft Shadows
✔	Spot Light (43)	Spot		Baked		1	1	Soft Shadows
✔	Spot Light (45)	Spot		Baked		1	1	Soft Shadows
✔	Spot Light (3)	Spot		Baked		0.5	1	Soft Shadows

Static Geometry

Now you will want to ensure all of your geometry is set to static, this has a dual-purpose. The first purpose is that setting objects to static allows them to be "batched," a term for when similar GameObjects are rendered at the same time instead of sequentially. Secondarily, setting objects to static allows them to be Lightmapped.
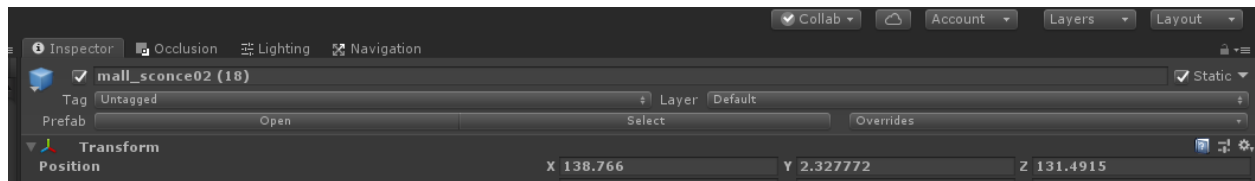

Any mesh not marked "Static" will not be considered for lightmapping.

An easy way to mark all your geometry to static at one time is to place it all under a new Parent GameObject, then mark that parent object as Static. A dialogue window will ask if you want to apply that change to children as well. Select "Yes" and all the children (and children's children, etc.) of that parent will also be marked Static.

GPU light mapping

The GPU lightmapper in Unity 2021.3.23f1 works much better than it did in Unity 2019. You can still use the CPU light mapper but you can get better and faster results using the GPU baker in most cases.

Recommended Settings
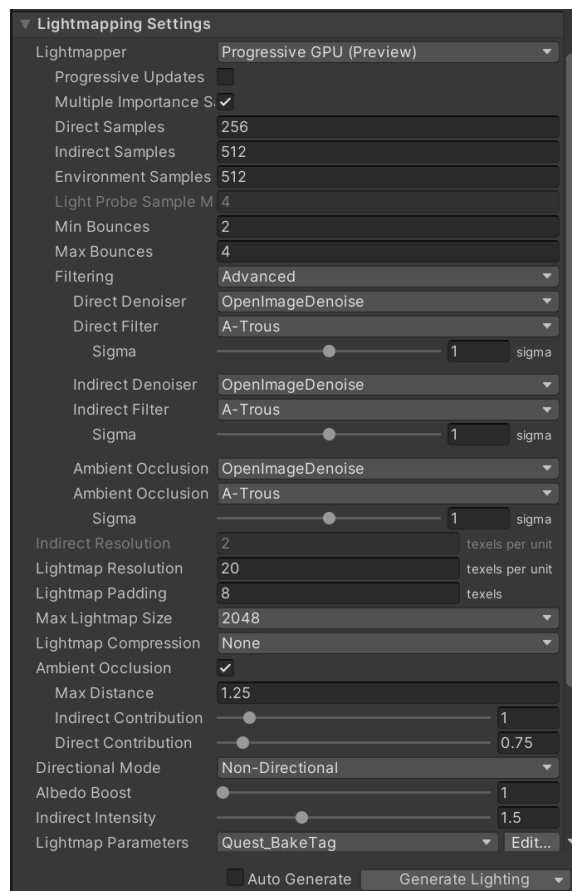
| Setting	Value	Info
Lightmapper	Progressive GPU (Preview)	

Progressive Updates	Off	The bake is fast enough that we don't need the real time preview and this setting can cause the gpu memory to explode.
Direct Samples	256-512 or higher if needed.	The cpu uses 32-64 We can use 2-4 times the samples that you would with the CPU light baker. This improves quality and only adds a minute or two to the bake time.
Indirect Samples	512-1024 or higher	
Environment Samples	512-1024 or higher	
Min Bounces	2	
Max Bounces	4	
Filtering	Advanced	
All Denoisers	OpenImageDenoise	OpenImageDenoise runs on the CPU+system memory and frees up the GPU memory.
Lightmap Resolution	10-60	Large or Dense scenes use 10-20, smaller compact scenes use 40-60.
Max Lightmap Size	1024-2048	this you may need to play with depending on the map. Higher resolutions can exceed the GPU memory. 4096 seems to fail even on GPUs with 12-16gb of VRAM
Lightmap Compression	None	we'll compress it ourselves.
Ambient Occlusion	On	
Directional Mode	Non-Directional	
Albedo Boost	1 - ?	This depends on the map. If it's too dark bump it up.
Indirect Intensity	1 - ?	This depends on the map. If it's too dark bump it up.

Steps to light bake

1. Open the Scene.
2. Open the lighting window.
3. Ensure that the settings look correct (see above)
4. Select the Environment tab and check that the scene has a sky box.
5. It's recommended that you do a test bake with lower settings first. To do so, set the light map resolution to a low value of 5 vs 40. The bake should take a few seconds vs a few minutes.
6. Click "Bake". The time estimates can change quite a bit. They may start out at 30 seconds and jump up to 5-10 minutes, or they can start at 45 minutes and come down quickly. Overall expect around a 10 minute bake time. You should see the light map count increasing, the timer in the bottom right, and the ray counts going up and down.
7.
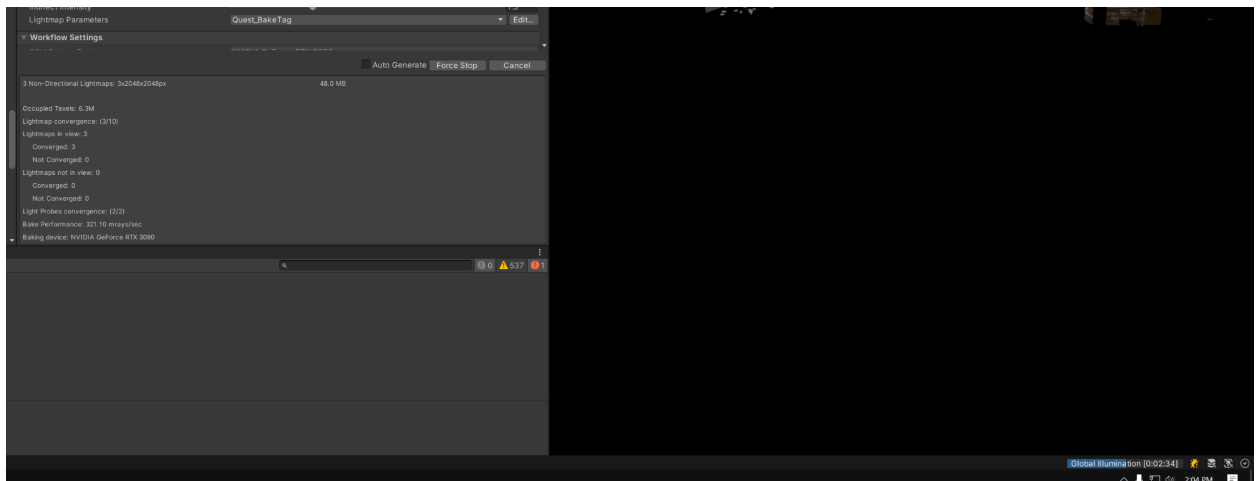
8. Wait for the bake to finish
9. Select the light maps and light probes and compress them to ASTC 8x8.
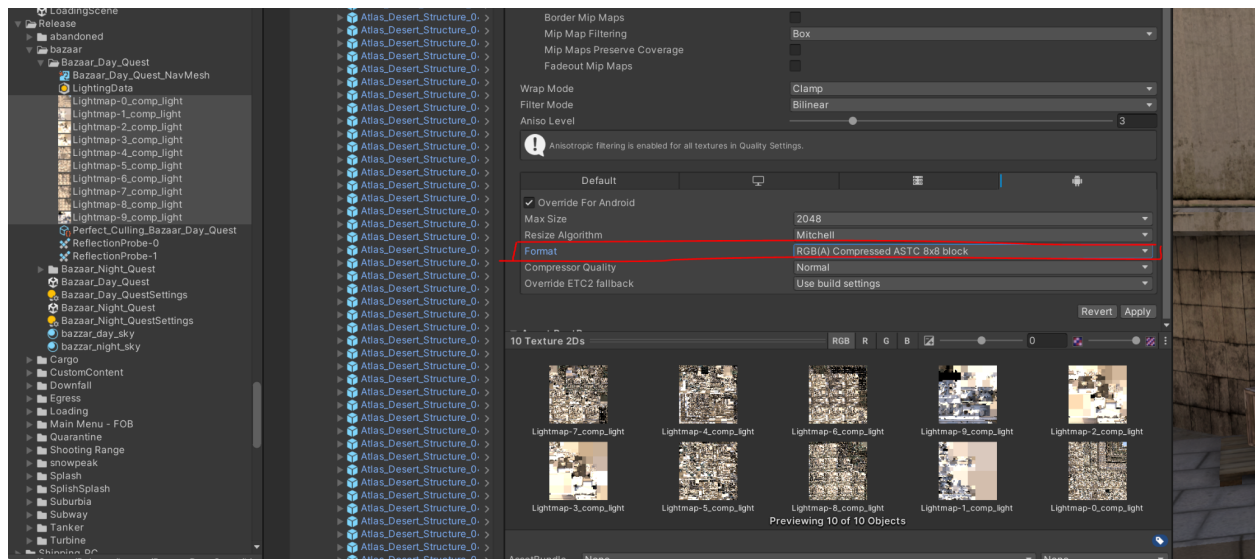
Troubleshooting

Noticeable light bleed

Check the models import settings. Ensure "Generate Lightmap UVs" is on. Then look at Lightmap UVs settings and set the Min Lightmap Resolution to something smaller than the bake setting. The setting seems to be defaulted to 40. It needs to be lower than the light map resolution you are using. If it's higher then texels could get stretched between UV groups. Setting it to 1-5 produces good results but can take a while to import.

Unity Crashed!

There are a few reasons this will happen but the main one is that your GPU runs out of memory.
1. Restart unity
2. Open the scene
3. Clear all baked light maps.
4. Check that nothing else is running and using the GPU.
5. Start the bake again.

If it fails a second time, try lowering the light map resolution. (note lower resolution, not texel density) If it continues to fail, restart the PC. Our version of unity has a memory leak issue in the GPU light mapper.

And if it continues to fail after that, then lower other settings like the texel density, ray count, and try disabling Ambient Occlusion.