# Multiplayer Lighting Workflow

Getting up and running with functional lighting in an mp map.

1. **DEFAULT LIGHTING PREFAB**

- …\map_source_prefabs\lights\mp_default\mp_default_lighting.map
- This prefab should be your first step. Just drop it in the map, set the origin to 0, 0, 0 and STAMP IT DOWN.
- This contains all of your basics including , sun volume, fog volumes set up for score streaks and a post fx PGB box.
- The volumes are set up with the default mp lighting settings that should work for a majority of maps.
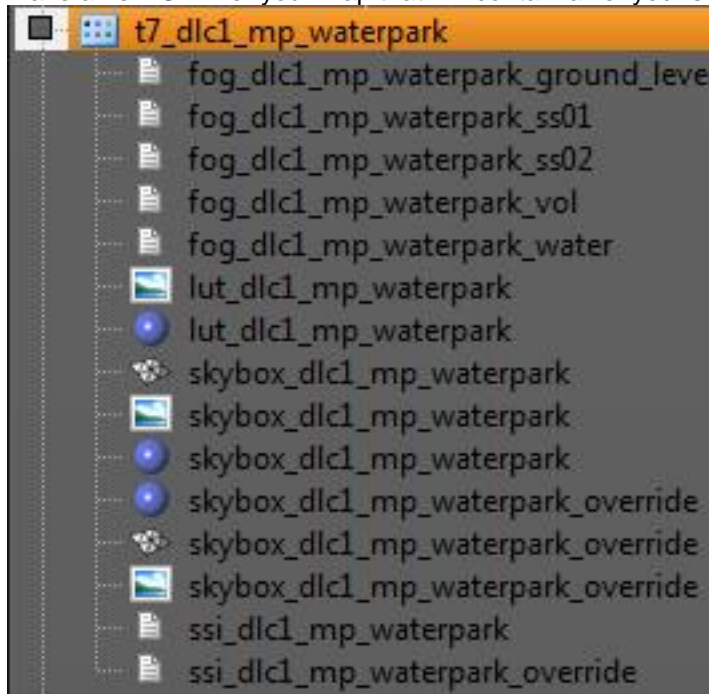
   Prefab Contents
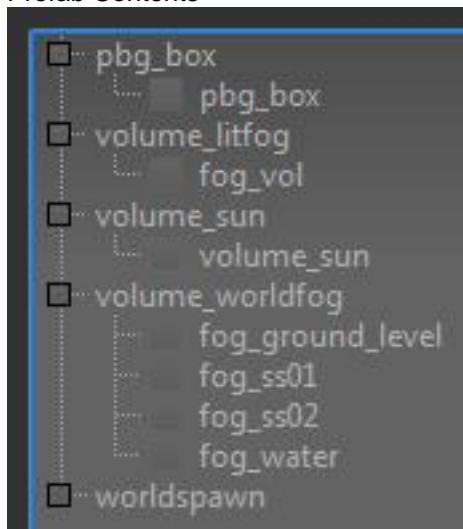
- There are also some default post fx for bloom, midtone contrast and a lut curve.

2. NEW MAP GDT

- Every map will now have it's own lighting GDT.

- Make a new GDT for your map that will contain all of your sun, sky and fog files.

3. SUN AND SKY OVERRIDES

- All mp maps now make use of the override state in the sun volume to display a sun and sky intensity different from what is baked into the probes. Note that going to far with this can start to look bad as your reflections will not match the visible sky.
- The sky override is used to get the color of the shadows and density of the shadows independent from the visible sky. Doing more of the color work in the baked / dynamic lighting has produced a cleaner look than the use of heavy post fx color grading. Do the heavy lifting with the overrides.
- Using the sky override value has been a quicker workflow than using the UKKO sky stops. It was faster to dial in the look with the override since you get a live update in Radiant.
- Since we set the shadow intensity to better match what the eye sees, it also makes since to add some compensation to the sun. This has varied from map to map but in general +1-2 stops of sun bake has produced a good look and has greatly increased player visibility.
- Since the use of probe brightness tends to mute some of the natural bounce look, the override is a good tool to get some of that back in the case that the sunlight is bouncing through an interior.
- overrides for the sun and sky are set up in the mp_default_lighting prefab.

4. PROBE RESOLUTION AND AMBIENT OCCLUSION

- All Probes are set to a **resolution of 4x**. This gives us a the desired light resolution and helps prevent seams from ambient occlusion across probes. This also makes it easier on you as one Ambient Occlusion setting works for 99% of probes.
- Ambient Occlusion settings worked in most cases at Power=1, Range=8 and strength=1. This made for a good visual result and worked well for player visibility. A very broad global ambient occlusion has proven to be a problem for visibility.

    Probe Default Settings

2_DIFFUSE_GI	
adapt_better	False
adaptive_quality_boost	Off
ao_power	1.00
ao_range	8.00
ao_strength	1.00
ao_strength_double_sided	1.00
box	True
brightnessAdjust	0.00
evcomp	0.00
inpaint_occluded_rays	True
override	False
resolution	4x
smooth_post_process	False

5. SCENE EXPOSURE, PROBE EXPOSURE AND DYNAMIC RANGE

- Exposure will **ALWAYS** be set within the range of **8 - 12 stops**. This is a hard number to prevent fx from having to create fx specific to every map.
- While working in **Radiant** it is best to work with the **exposure locked** at the value that looks good while in the sunlight. Once you have the "worldspawns" set and exposed you will light everything relative to that. So, if your exterior sunlight exposure is EV 12, then you will make a dark interior look dark at EV 12. This way when you look in, you will always see a reasonable amount of illumination and when looking out from the darkness the exposure will not dive down and blow out the exterior.
- To help with getting the exposure correct in the interiors it has been helpful to start with **probe brightness = 2** on the interior probes. You can adjust it from there after more lighting comes in, but in general it's a good starting point.
- That said, **avoid evcomp** on probes. Pretend it doesn't exist, unless you have a special case where it is needed. The artifacts and look of evcomp on probes is not desired.
- The average **dynamic range** for all mp maps is **1.5 stops,** meaning that your scene exposure will not vary more than 1.5 stops through the map. Some maps get up to 2.5 stops of range, but the transition is gradual and there is no line of sight that you can see the shift between 2.5 stops of range.
- Usually the interior to exterior exposure shift is only 1 stop. So if you're outside at ev 12 and step into a doorway the exposure will be at 11 or greater. If there's another interior inside of that one that doesn't have visibility to the exterior then you can drop again to 10 - 10.5.
- We are finding that as soon as exposure drops 2 or more stops below the scene exposure, visibility will start to become a problem This is why an interior is only one stop darker than the exterior. While corners and occluded areas will go darker the major gameplay space is only 1 stop darker.

5. FOG HEIGHTS AND FOG BANKS.

- Specific heights are used to display fog for various score streaks. The Dart, Hellstorm (remote missile) and Mothership can be controlled from high above and from the device pov. The Talon

(sentinel) and HC-XD are also controlled from the device pov, but they don't rise above 2048 units.

- **Fog volumes are named** according to the score streak heights. Fog for the player on ground level up to 2048 units use **"ground level"**, score streaks at 2048-5500 units (Mother Ship) use **"ss01"** and score streaks above 5500 (remote missile) units use **"ss02"**.
- Volumetric Fog was a problem for performance as we got higher in elevation and were rendering the entire map. To get around this, **fog bank 2** was used for score streaks above 2048 units **(Mother Ship and Remote Missile)**. Since Volumetric fog is only used in Bank 1, this allows us to turn off the Volumetric Fog for high elevation score streaks. This saves us nearly 1ms.
- The **Dart** is unique in that it is the only score streak that can travel up and down from ground level to above 2048 units and back down. We were seeing pops in the fog volumes, so to get around this we put the Dart on **fog bank 3**. This way it always travels within the same fog for all elevations. Usually **SS01** fog is used for the **Dart**.
- These volumes are set up in the mp_default_lighting prefab with the proper heights and default fog files. If you stamp it down in the map you should just have to plug in the new fogs you make for your map.
- Notice that the **"probe look up"** and **"enable lights"** is set **False** for the litfog volume. We can't afford these features as a global setting. If these are needed make another volume for the isolated area with these toggled true.