



MULTI SPORT STADIUM

UNITY STORE ASSET

BY HOTWIRED GAMES

e INTOXIO



Multi Sport Stadium V1.0

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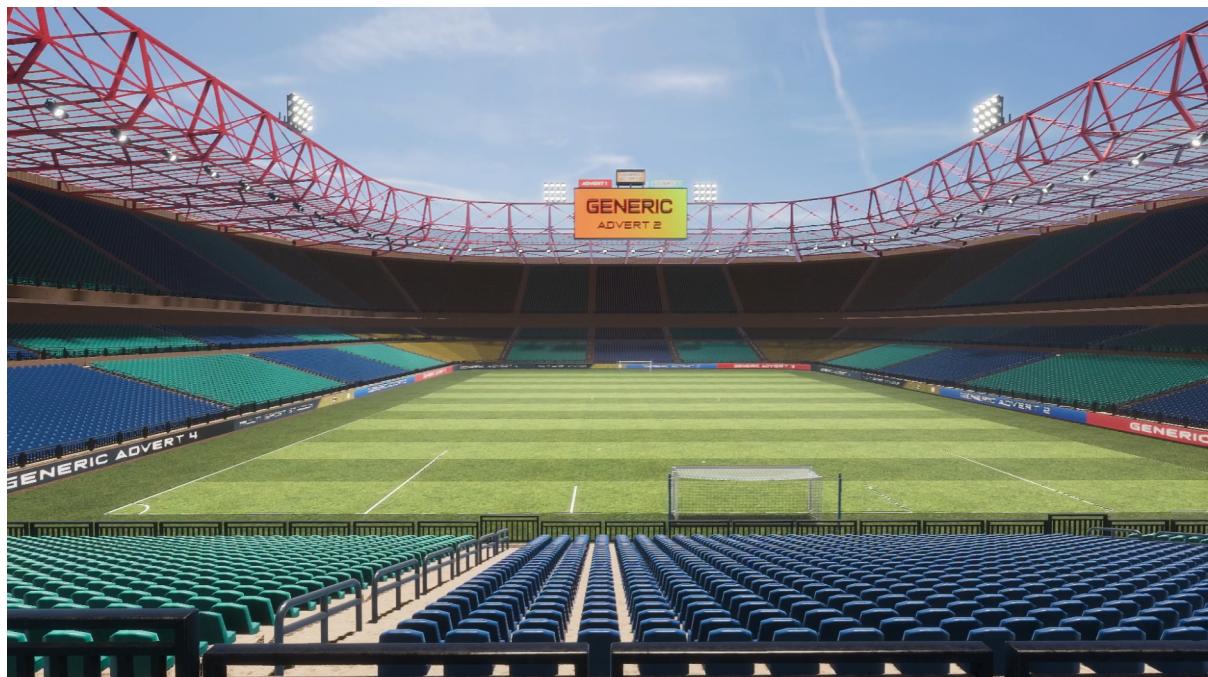
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Introduction

The Multi Sport Stadium asset is designed to give anyone wishing to develop a 3D sports game a head start. The asset ships with a built-in Unity configurator tool that fully automates the customisation process. You can quickly configure the stadium for four different sports, six pitch grass designs and three lighting setups. The stadium contains animating billboards and screens that are easy to customise.



The HDRP version may also be a cost effective way of producing custom stadium imagery to aid in the production of sport-based illustrations. This can be done by moving the camera and taking screenshots.

More advanced users may want to use the stadium for rapid prototyping. Alternatively, they may want to use it as a starting point for a fully customised stadium.

Key features:

- Large textured stadium model with stands and seating.
- Fully configured materials featuring PBR materials where applicable.
- Choice between complex or simple seating models (for optimisation)
- Stadium configurator for 'out of the box' rapid customisation.
- Versions for both HDRP (high definition) and URP (universal) rendering engines.
- Accurate polygon pitch markings and models for Soccer, Rugby, Hockey and Cricket.
- Access to all future upgrades and extensions (future sports and features).

This asset will be expanded in future releases, depending on customer feedback.

Overview

The stadium and game objects are all built to world scale (1 Unit² = 1 Metre²). Pitch markings for Soccer are very accurate, while other sports are based on a mix of plan and image reference. Sports equipment such as goals, posts and cricket stumps are built to an accurate scale.



The asset has been developed for both HDRP and URP rendering engines. The HDRP (High Definition Render Pipeline) version is for more realistic, high fidelity rendering. The URP version (Universal render Pipeline) is designed for fast rendering.

These engines are mostly incompatible with each other - therefore you must follow the installation instructions to ensure the correct assets are used!

The asset is provided with a handful of C# scripts. These primarily govern the billboard animations (pitch adverts) and Editor Tools. The customisation tool turns on and off banks of GameObjects, depending on the sport selected. It also adjusts lighting and some settings within the rendering engine. The customisation tool is only designed to work in the Editor, not in game. Customised stadiums can be saved as their own Scenes.

HDRP -v- URP. Which should I use?

The High Definition Render Pipeline (HDRP) is designed to provide high fidelity artwork. Therefore, it stands to reason that this version of the Unity engine has a greater processing overhead - and slower potential FPS (frames per second) compared to the Universal Render Pipeline (URP). The HDRP renderer is better suited to more powerful systems such as PC

and console, whereas the URP renderer is geared towards less powerful platforms such as mobile. Please note that the asset has not been tested on mobile devices and may require optimization.

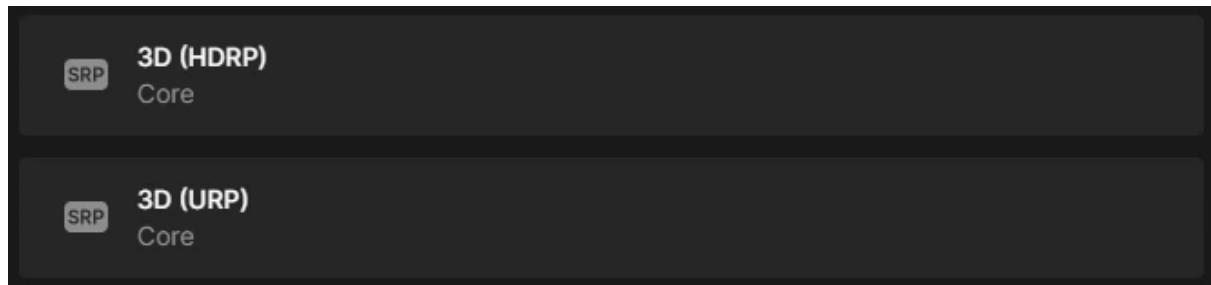
From a visual standpoint, the HDRP version renders more realistic volumetric lighting and shadows. It is also able to display more real-time lights. The URP version is restricted to 8 realtime lights for performance reasons (all 8 are in use). However, baking the lighting may yield better results.

Both engines are supported by this asset. Care has been taken to keep HDRP and URP assets separate, so that there are no redundant / unused files in the project.

Installation Process.

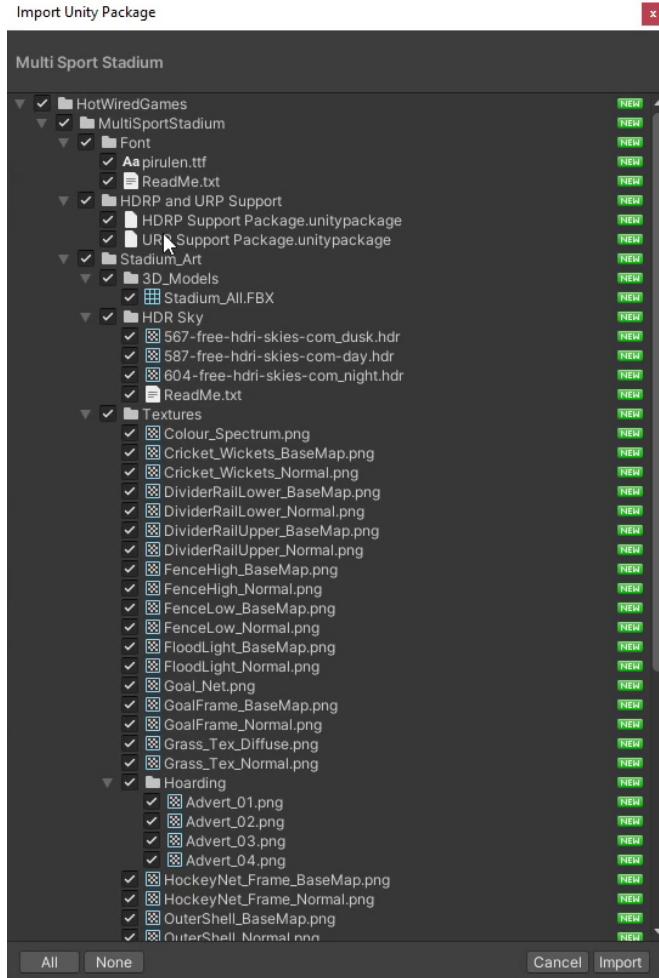
The installation process for the Stadium Asset is a two stage process, with a small manual adjustment on the URP version. In step 1, the shared files are installed. In step 2, the files specific to each rendering engine are installed.

Start with an empty Project template. On the Unity Project Menu, select either the 3D (HDRP) or 3D (URP) option depending on your requirements. Set the project name and location, then select Create Project.



It could take up to four minutes for Unity to create your project environment. Once it is ready, both HDRP and URP templates start with an Inspector Panel (right hand side) with links to Documentation, Forums and Bugs. At the bottom there is a button to “Remove Readme Asset”. Select this to remove all the unwanted sample files.

Next, download the Multi Sport Stadium from the Asset Store. You should see a panel like this:

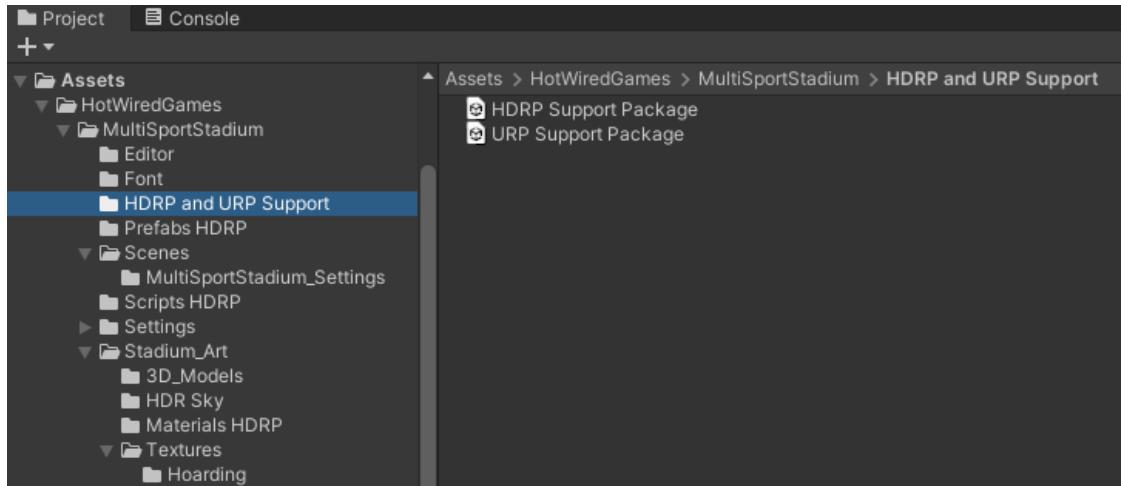


The folder “HDRP and URP Support” contains the Unity packages needed for each renderer. Both these files are checked by default. However, you can deselect either the HDRP or URP .unitypackage files depending on which platform you are using.

Select ‘Import’.

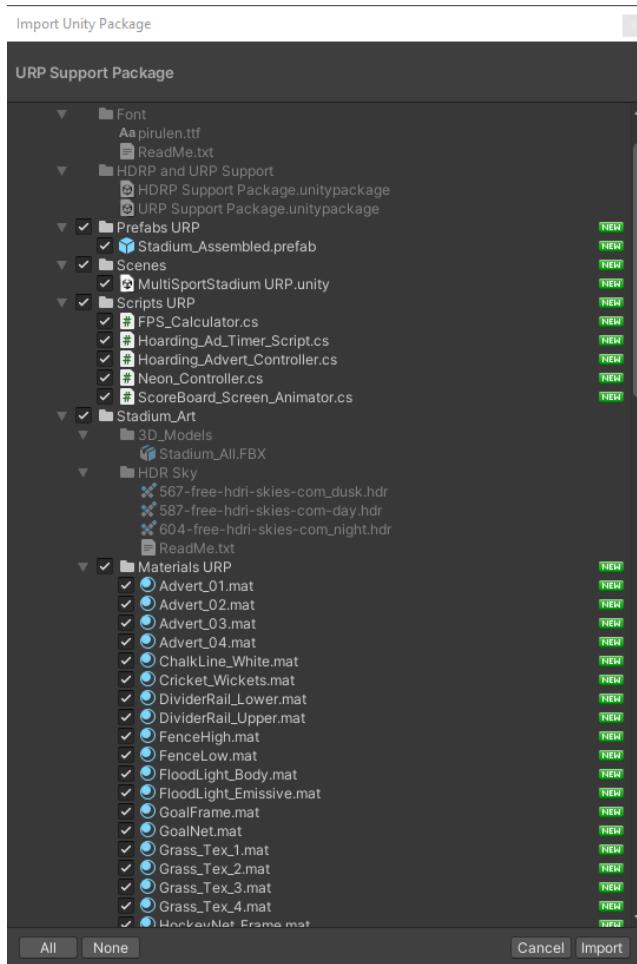
When the files have been imported, the Assets should appear in your Assets folder under the Folders **HotWiredGames > MultiSportStadium**.

You now need to install the support files for the version of the renderer you are using (HDRP or URP). The Unity Package(s) can be found in the HDRP and URP Support folder:



Double-click on the package to start step 2 of the installation.

When the import panel (below) appears, leave everything selected and click on Import. All the engine support files will then be installed.



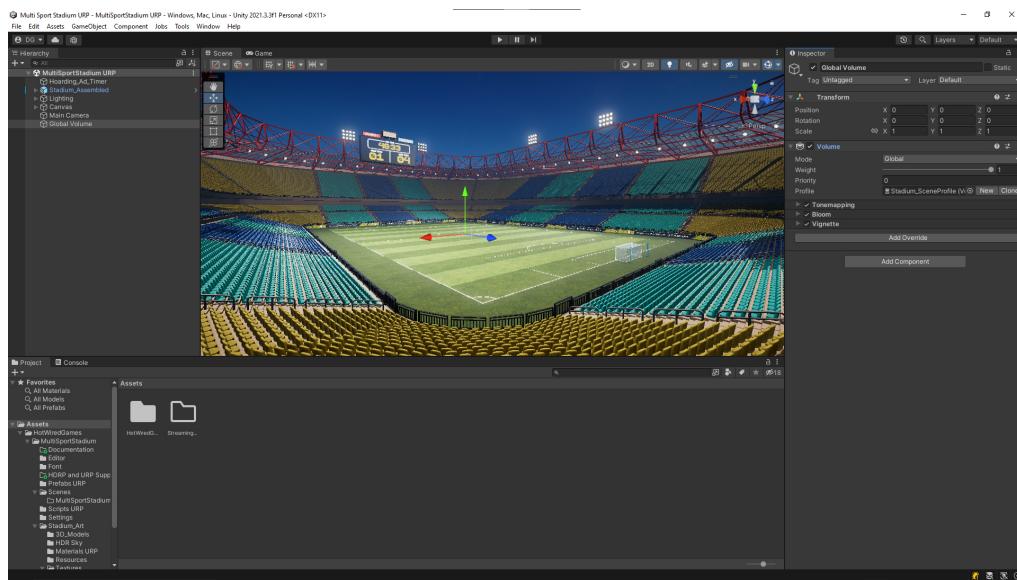
Finally, you can load the **Scene** that contains the stadium setup. You can find it in here:

Assets/HotWiredGames/MultiSportStadium/Scenes

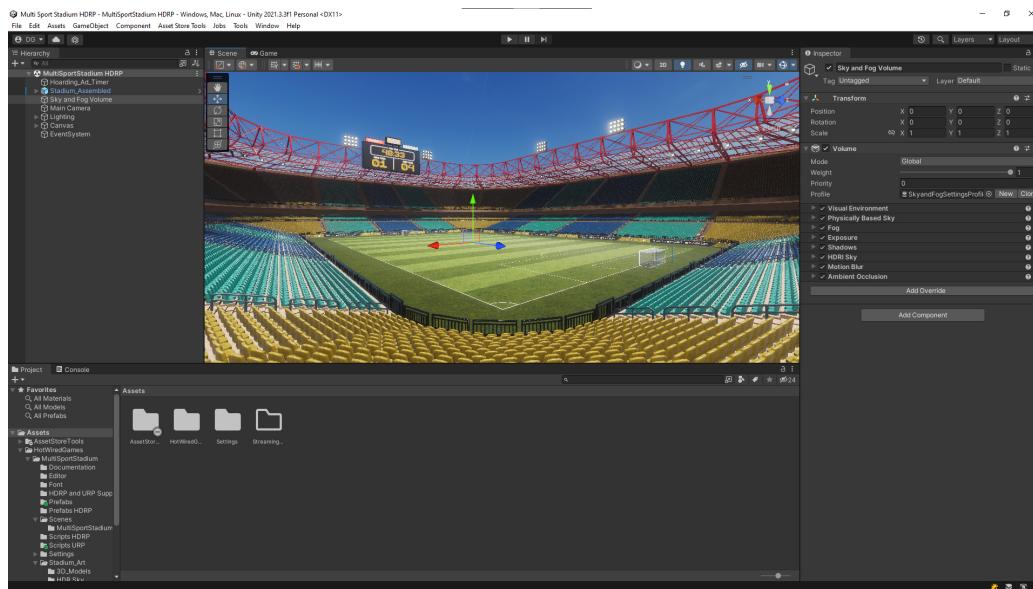
Finalising the URP Installation

The URP and HDRP versions look slightly different in the Editor due to the differences in the engines and the way the lighting and materials have been set up in each Scene:

URP Engine:



HDRP Engine:



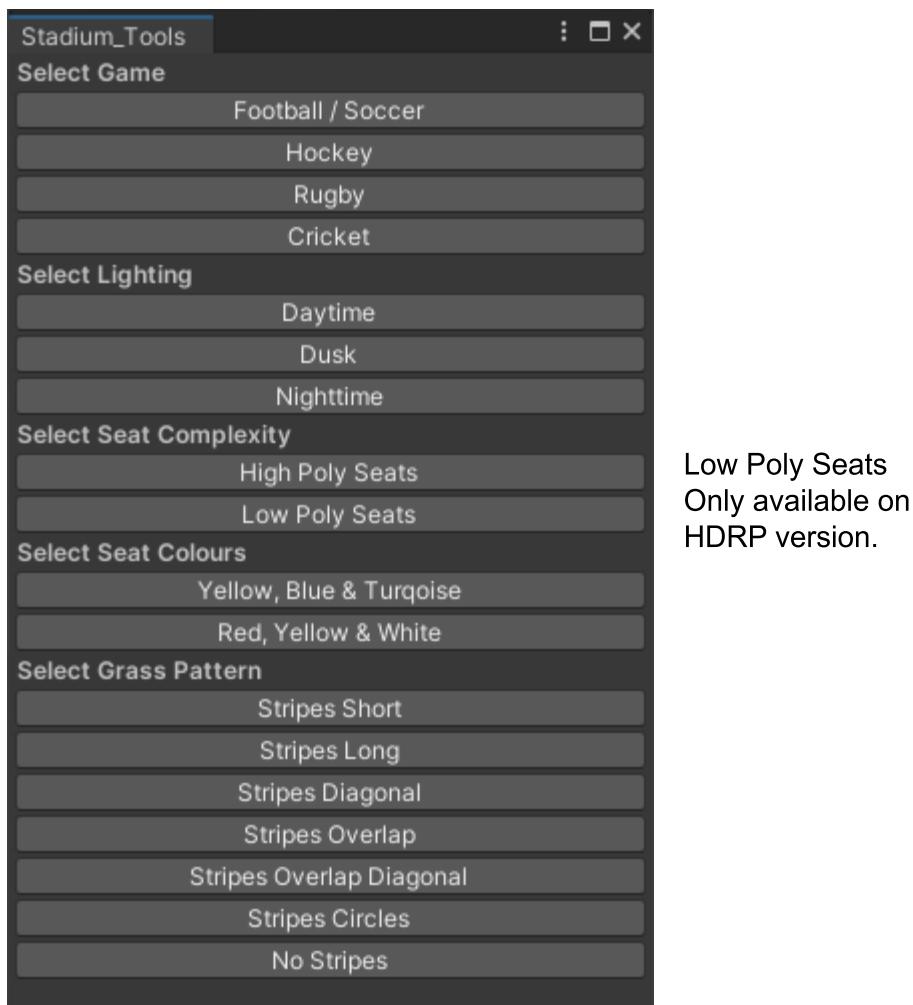
UI adjustments

By default, a FPS counter is included on a UI Canvas. This will be visible in the sky. To hide this, go to the Layers panel at the top / right of the Editor. Find the entry for 5:UI, then toggle the eye icon to turn it off.

You also may want to turn off the grid. This can be done using the Grid icon at the top of the editor window.

Using the Stadium Tools

You can view the Stadium Tools by going to Tools > Stadium Tools in the File Menu. Once done, a box will appear with the configuration buttons. You may need to drag this box out to display all the buttons.



The toolbox contains the following options:

1. **Select Game.** Here you can select the type of game you want to work on. At the moment, we have Soccer (UK Football), Hockey, Rugby and Cricket. The pitch markings will change and the correct game objects will appear. Note: The game objects have basic collision detection already applied.
2. **Select Lighting.** Here we have the choice of Day Time, Dusk and Night Time. Each lighting setup uses different skyboxes, realtime lights and tweaked render settings (such as fog colour). Note that some of the materials such as the hoarding adverts, screens and stadium lights use Emissive materials.
3. **Select Seat Complexity.** There are over 70,000 seats built into the stadium model! Therefore, having the ability to switch between models and simple quad patches is useful. If your game is particularly complex, it may be necessary to only use the single quad versions of the seats to ensure good performance. NOTE: The option for low poly seating was removed from the URP version as it is presently unable to distance-sort polys with transparency effectively.
4. **Select Seat Colours.** There are two seat colour combinations built into the configurator. You can of course set your own colour, by modifying the existing materials or creating your own.
5. **Select Grass Pattern.** Here you are able to select different grass patterns to suit your scene. These range from basic stripes through to quilt patterns and circles.

Once you have configured your scene, save it out as a brand new scene with the name of your choice. If you want to use more than one configuration, load the Default scene again, configure it, then save another version.

Important: The configuration tool uses hardcoded links to the various scene settings. Therefore, moving the assets to different locations may break these links causing the configuration to stop working on the copied model. The configurator is designed primarily to give you a ‘head start’ at getting a game up and running quickly - it isn’t designed to handle the switching of assets mid-game.

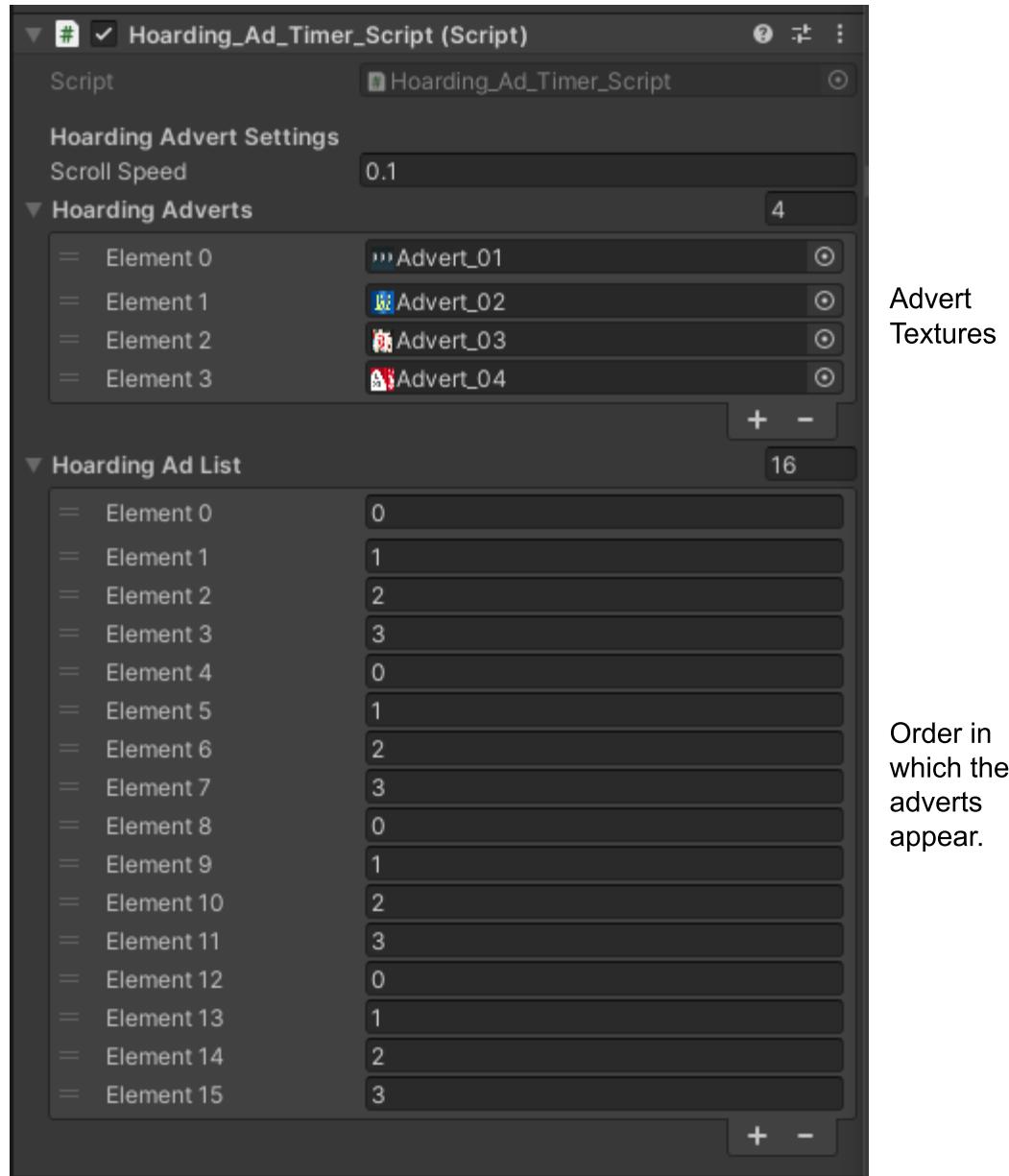
The Frames Per Second (FPS) Counter

I have provided a FPS counter with the asset so you can monitor the speed at which the stadium is rendering. If you do not need this, delete the Canvas object in the root of the Hierarchy.

Customising the Pitch Advertising

Billboard Advertising

The stadium contains an animated advertising hoarding that surrounds the pitch. The asset contains four sample adverts, which can be replaced with your own artwork. The code that runs these adverts is designed to ensure the hoarding art remains high resolution - and doesn't pixelate close up.



Changing the advert art is as simple as overwriting the existing PNG files. These can be found here:

[Assets/HotWiredGames/MultiSportStadium/Stadium_Art/Textures/Hoarding](#)

Important! When saving your own art, you need to ensure that you leave a 1 transparent pixel gap down each side of the graphic. This gap is important, as it is used to clear the texture area that trails artwork as it is scrolled off the polygon.

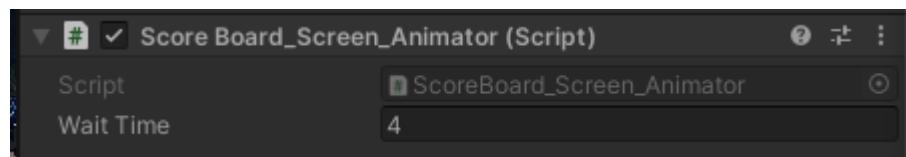


The hoarding is controlled by two scripts:

Hoarding_Ad_Timer_Script	This sits on an empty GameObject in the root of the hierarchy. Here you can set the Scroll Speed (positive or negative for different directions). Links to the advert textures are set up here. And, the order in which the adverts are shown are defined here ('Hoarding Ad List' array). You can change any of the above.
Hoarding_Advert_Controller	Each piece of hoarding around the pitch looks at the Hoarding_Ad_Timer_Script to find its UV offset value. It also listens out for an Event Trigger, which so it knows when to display the next advert. You should never need to update this script.

Screen Advertising

The large screen at each end of the Stadium uses one large texture that is divided into four quadrants. Each screen has a script attached containing a Wait Time variable. When the Wait Time has been reached (in seconds) it changes the UVs to point to the next quadrant.



You can change what appears on the screen by changing the artwork contained here:

Assets/HotWiredGames/MultiSportStadium/Stadium_Art/Textures/ScoreBoards/ScoreBoard_Large_Screen.png

The smaller screen graphics may also be changed by updating the graphics here:

Assets/HotWiredGames/MultiSportStadium/Stadium_Art/Textures/ScoreBoards/ScoreBoard_Small_Screens.png



Pitch Lines

The pitch lines are polygonal objects contained in the model, not bitmaps. This is to maximise sharpness when viewed close-up. To ensure they display over the top of the grass surface, the line models are elevated a tiny distance above the grass - but not significant enough to be noticeable. This prevents Z fighting - where polygons sharing the same space visibly flicker.

One advantage of splitting the pitch grass and pitch lines, is you can use any combination of pitch stripe and line pattern. You can add your own pitch lines using the same modelling technique.

The Stadium FBX Model

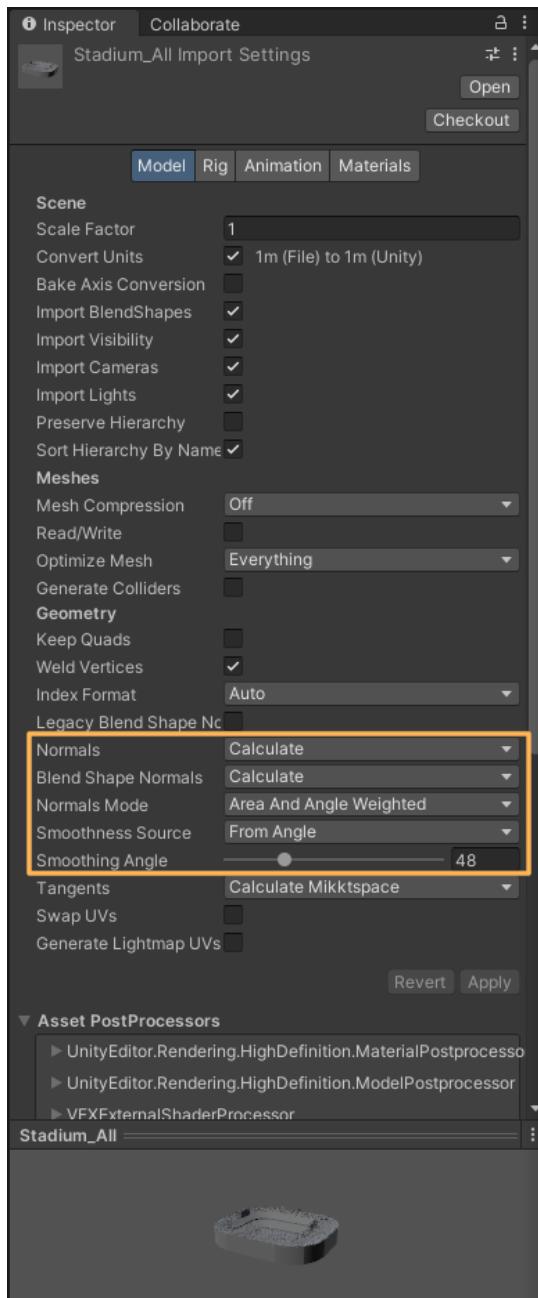
The Stadium model was constructed using 3D Studio Max. It was exported to Unity using the Autodesk FBX format.

Model grouping and positioning is done within 3D Studio. However, the scale and position of the different elements can be modified within Unity. For example, the goal sizes can be resized (complete with collision detection) if required.

Exporting

Unlike Blender, 3D Studio Max uses the Z axis for 'up'. This is taken care of by Unity during the import process by rotating the model data by 90° on the X axis.

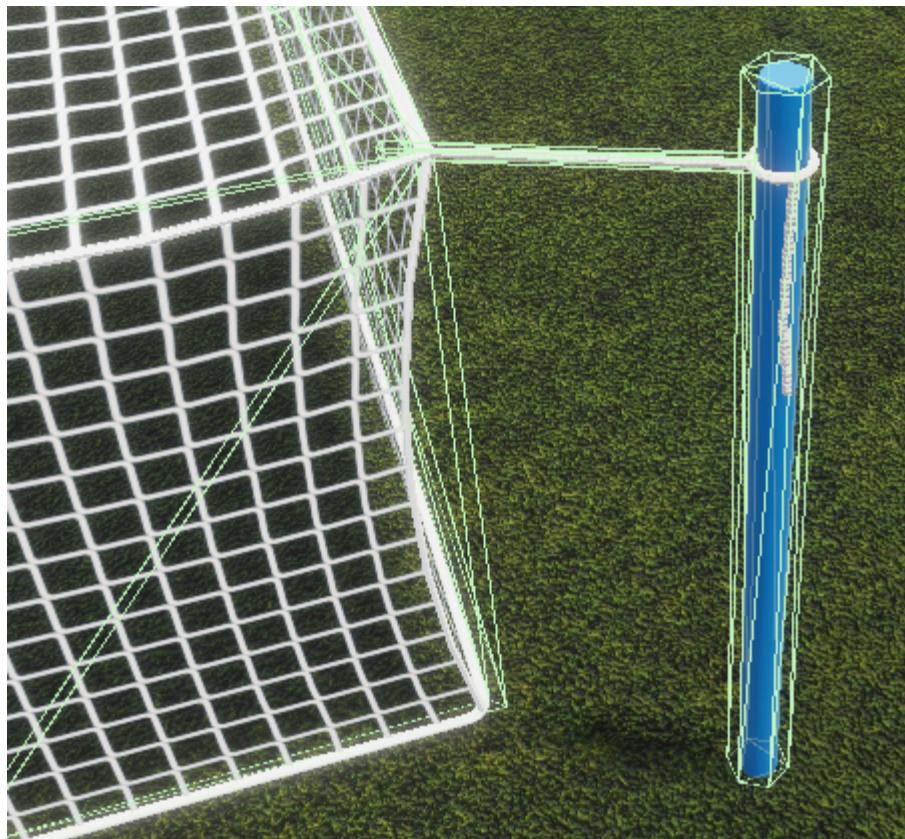
During development I became aware of a bug in the FBX exporter that caused errors in face Normals. This affected the lighting. The solution to this was to let Unity process the imported model and calculate its own Face Normals. Doing this meant I also needed Unity to create its own Smoothing Groups based on angle. You can see the model import settings here:



Therefore, if you decide to edit the FBX model with your own 3D software, you may need to use the same import settings in order to avoid similar issues with the normals.

Collision Detection

The Stadium and game models have basic collision detection added. The lower part of the stadium has a collision mesh defined. And, the sport models (goals etc.) each have detection. The collision meshes are incorporated into the FBX as objects and are grouped with the appropriate model. The models have their Mesh Renderer component removed and a Mesh Collider is added.



Textures

The textures incorporated into the Asset are mostly stored at 2048 x 2048 pixel resolution. This was to ensure high fidelity in rendering, however it might be necessary to reduce the resolution if optimising the model for use on mobile devices.

It is worth noting that as a 'starter' model, the textures and UVs aren't fully optimised. The effects maps (Metallic Smoothness and MaskMaps) were exported from Substance Painter and may not be fully utilised.

Development of this asset is an on-going process. Therefore, improvements and suggestions made by customers will be made for future updates.

Materials

The HDRP and URP versions have different Material types applied, to suit the different Shaders. It is fair to say that the HDRP materials have a lot in common with traditional image rendering whereas the URP materials are closer to gaming applications.

Both share the BaseMap and Normal Maps. However, HDRP uses a MaskMap (a combination of maps on different RGBA channels) while URP uses Metallic Maps. Only the textures needed are unpacked when installing the Stadium Asset, depending on which renderer is chosen.

Advanced Customisation

This Asset is designed to be used ‘out of the box’ with minimal changes. However, if you want to make changes to the model or add your own customisations, below are a few pointers.

As mentioned previously, due to the nature of Unity links, changing or altering the Asset in any way may result in the Scripts not working. Changing filenames, locations or material names may result in the scripts no longer being able to find the target GameObjects.

URP Tips

How do I change the SkyBox?

The provided skybox art is stored in the following path:

`Assets/HotWiredGames/MultiSportStadium/Stadium_Art/HDR Sky/`

To add your own skybox art, drop the texture into the Unity Assets folder in the location of your choice. Then, in the Inspector, change the Texture Shape to ‘Cube’ and the Mapping type to suit your image. In the skies provided, we use Cylindrical Mapping.

Next, create a Material for your Skybox. The skybox materials can be found in the following path:

`Assets/HotWiredGames/MultiSportStadium/Stadium_Art/Resources/`

We use the ‘Resources’ folder name as this makes the contents available to Unity Scripting. The Stadium Configurator script needs this, but you can place your material where you like.

Create the skybox material, then set the Shader to Skybox/Cubemap.

Next, in the Cubemap (HDR) slot select the skybox texture that you added. Your skybox is now ready to use.

Finally, go to the Window > Rendering > Lighting panel.

Select the 'Environment' TAB and you will see the Skybox Material slot is at the top of the panel. You can select your skybox here.

NOTE: You may need to fine-tune the intensity of the light emitted by your new skybox. To adjust it, go back to the skybox Material and adjust the Exposure setting until you are happy.

General Lighting

The Scene uses a combination of the following:

- A Directional Light (representing the Sun)
- A number of Spotlights
- Skybox Lighting

Some Materials are Emissive and glow within the environment (the billboards, screens and neon lighting).

The lights are stored as children of the Lighting GameObject. Shadows are only turned on for the Directional Light for performance purposes. You can change the angles, colours and intensities of the lights as required. Note that the URP renderer has a maximum of 8 lights. Using more than 8 lights can result in lights randomly turning off as the camera moves around.

All the lighting in the Asset is done in real-time. You may be able to improve the lighting by baking it into a series of lightmaps.

How do I adjust Emissive Materials?

If you want to change the brightness of the screens, or any of the glowing materials, first find the material in the Materials folder.

In the Inspector, find the Emission section. The Emission Map will most likely contain a copy of the BaseMap. Click on the HDR panel next to the Emission Map. At the bottom of this panel you will find an Intensity slider. Adjusting this will change the intensity of the light output for this material.

How do I adjust Ambient Occlusion?

The settings for the URP-High Fidelity Renderer can be found in the following Asset folder:

Assets/HotWiredGames/MultiSportStadium/Settings

This folder contains a number of profiles, however this Asset specifically uses “URP-High Fidelity-Renderer”. Select that profile from the list.

In the Inspector, you can now see the render settings. At the bottom, you will see SSAO (Screen Space Ambient Occlusion). Here you can adjust all the settings relating to ambient occlusion shading.

Note: SSAO may need adding to a brand new project using the ‘Add Render Feature’ button at the bottom of this panel.

HDRP Tips

How do I change the SkyBox?

The provided skybox art is stored in the following path:

Assets/HotWiredGames/MultiSportStadium/Stadium_Art/HDR Sky/

To add your own skybox art, drop the texture into the Unity Assets folder in the location of your choice. Then, in the Inspector, change the Texture Shape to ‘Cube’ and the Mapping type to suit your image. In the skies provided, we use Cylindrical Mapping).

Unlike the URP renderer, you do not need to create a material for your skybox.

The skybox is controlled by the ‘Sky and Fog Volume’ GameObject at the root of the Scene Hierarchy. Find and select the ‘Sky and Fog Volume’ object.

In the Inspector, in the Volume component, find and open up the HDRI Sky panel. Drag your new Sky into the Hdri Sky slot. If you need to fine-tune the exposure of the Sky, use the Exposure Compensation slider.

General Lighting

The Scene uses a combination of the following:

- A Directional Light (representing the Sun)
- A number of Spotlights
- A number of Point Lights
- Skybox Lighting

Some Materials are Emissive and glow within the environment (the billboards, screens and neon lighting).

The lights are stored as children of the Lighting GameObject. Shadows are only turned on for the Directional Light for performance purposes. You can change the angles, colours and intensities of the lights as required. Unlike the URP renderer, we are not limited to 8 realtime lights in the scene. We therefore have some extra lighting in the Stand objects.

How do I adjust Emissive Materials?

If you want to change the brightness of the screens, or any of the glowing materials, first find the material in the Materials folder.

Next, find the Emission Inputs panel within the Inspector. You will probably notice that a copy of the BaseMap is in the Emissive Map slot. To change the emissive amount, adjust the Emission Intensity setting.

How do I adjust Ambient Occlusion?

The Ambient Occlusion setting can be found in the Sky and Fog Volume GameObject stored in the root of the hierarchy. The Ambient Occlusion settings can be found at the bottom of this panel.

Note that the Ambient Occlusion, HDRI Sky and Motion Blur panels are not visible on a brand new project. Each item has to be added to the list using the 'Add Override' button at the bottom of the Volume component. In the case of the Stadium Asset, the overrides have already been added.

Also note that the Motion Blur override was added in order to REMOVE the Motion Blur effect from the renderer. I personally do not like the Motion Blur effect. To remove it, you need to add the Motion Blue override, then set the intensity value to zero.

Production Notes

This Asset was created using the following software:

Unity 2021.3.3f1	(development)
3D Studio Max 2016	(modelling)
RizomUV RS RS 2022	(UV mapping)
PixPlant 5	(texture production)
Photoshop CS4	(texture production)
Affinity Designer	(texture production)
Substance Painter 2021	(texture production)

3rd Party Assets Used:

- 3 x HDRI Skies were used courtesy of **HDRI-Skies.com** (thanks to Agata Galewska)
- The FPS Font ('pirulen') is freeware and provided by **LARABIE FONTS**.

This asset took approximately 2-3 months to create. I would like to offer my thanks for purchasing this asset and supporting my business. If you have any problems, please contact me at contact@davegarrison.co.uk.

If you are interested in having custom components made for this asset, please contact me.

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