



3D Data Hack Dublin

Unity Starter Guide



**Building
City
Dashboards**



dashboards.maynoothuniversity.ie
dashboards@mu.ie
[@dashbuild](https://twitter.com/dashbuild)



3D Data Hack Dublin

- The following guide has been prepared as part of the Building City Dashboard project, a Science Foundation Ireland initiative based at Maynooth University, Ireland.
- The guide outlines how the resources provided for the 3D Data Hack Dublin can be used with a game engine to facilitate real-time interaction and visualization.
- Following the guide is expected to take between 45 mins and 1 hr 30 mins to complete.
- This guide is not intended as a comprehensive instruction manual.
- It has been provided to help those who are new to real-time, interactive visualisation to get up and running quickly so that they can start exploring their own ideas.
- Suggestions for next steps are provided toward the end of the guide.

NOTE: This guide was tested with Unity version 2019.1.0f2. As functionality and menu options can change between versions, please be prepared to refer to online help:

- Documentation: <https://docs.unity3d.com/Manual/index.html>
- Forums: <https://forum.unity.com/>



Download the 3D Data Hack Dublin Resources

Organisation

Transport and Infrastructure Manage

PRIVATE Give feedback on dataset

3D Data Hack Dublin Resources

Resources for the 3D Data Hack Dublin Updated Mapping and Modelling of environment from stereoscopic aerial photography dated 2018 to LOD 2. Plus buildings added to LOD3 level from various planning data sets 2015 / 2018.

Data and Resources

| | | | | |
|---|--|--|-----------------------------|--|
|  | Move_File_ITM.txt |  Preview | Download |  Edit |
|  | SDZ_Model_ITM_20190424.FBX |  More information | Go to resource |  Edit |
|  | SDZ_Model_ITM_24.max |  More information | Go to resource |  Edit |
|  | SDZ_Model_ITM_Textures_20190424.zip |  More information | Go to resource |  Edit |

3D Data Hack Dublin Resources are available in the following location:
<https://data.smartdublin.ie/dataset/3d-data-hack-dublin-resources>



3D Data Hack Dublin Resources

- Contents

- **SDZ_Model_ITM_20190424.FBX** – The 3D model we will be using in this guide. This file is suitable for use in many 3D modelling packages such as 3ds Max or Blender, but also in game engines like Unity or Unreal Engine.
- **SDZ_Model_ITM_Textures_20190424.zip** – A folder containing textures that can be used to enhance the FBX model's appearance.
- **SDZ_Model_ITM_24.max** (Not used in this guide) – The original Autodesk 3ds Max project used to assemble the 3D data in the FBX file.
- **Move_File_ITM.txt** (Not used in this guide) – A file describing the spatial offset (in metres) which has been used in the 3ds Max project to bring original survey data in the Irish Transverse Mercator (EPSG:2157) coordinate projection system to the world origin in 3ds Max for modelling.

Technical Note:

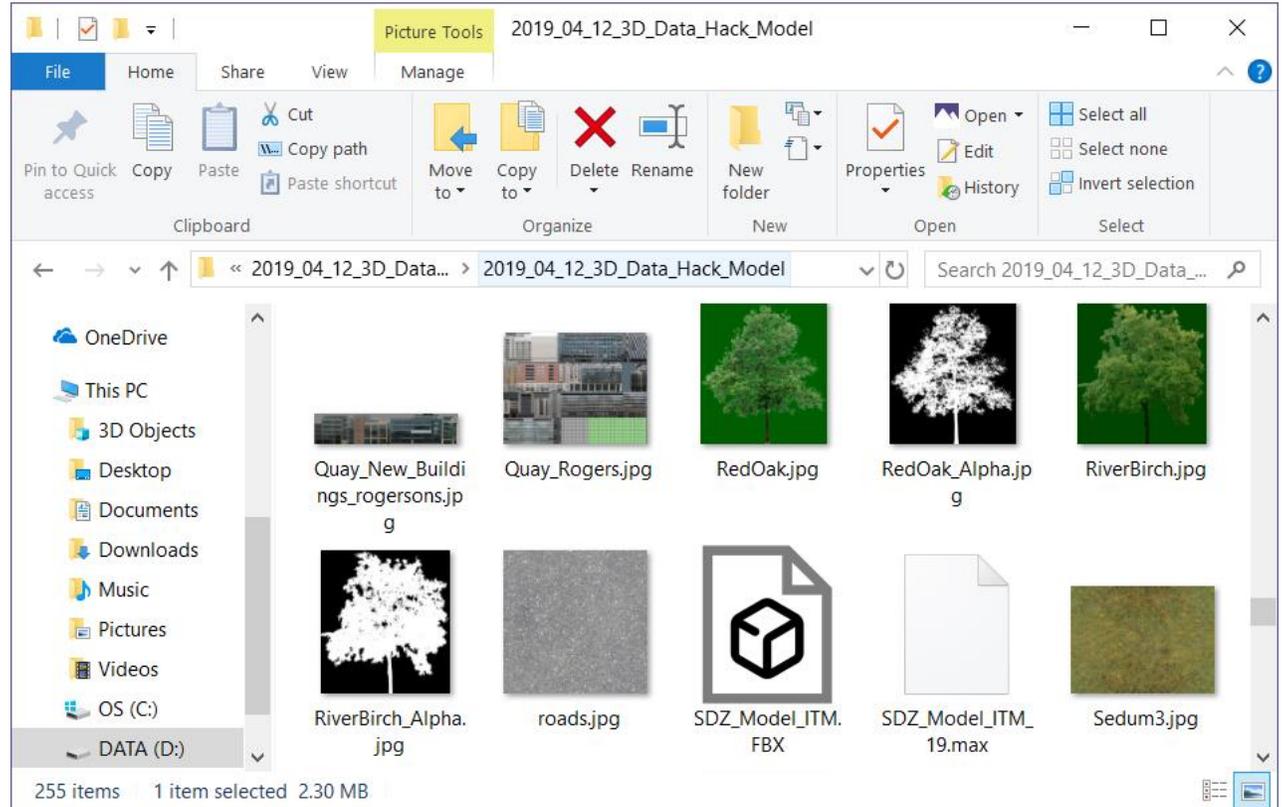
The spatial offset described by the move file can be used to determine the real world coordinates of objects that have been placed in the 3ds Max project. The offset is required because 3D modelling and visualisation software has tended to use a single precision floating point number format to describe spatial location: https://en.wikipedia.org/wiki/Single-precision_floating-point_format. This is commonly done to help improve computational performance, but entails a tradeoff in loss of spatial precision as objects move further away from the world origin (0,0,0). Simply put, single precision floating points do not provide sufficient precision over great enough distances to describe real world geographic coordinates. Attempting to do so can result in visible jitter of objects due to spatial uncertainty, or else their failure to render, resulting in a blank screen. One solution to enable rendering of objects with positions described in a real world geographic coordinate system is to apply an offset to their coordinate position that brings them back toward the world origin.



Preparing your files for this tutorial

- Download the FBX file and the zip file containing the textures.
- Unzip the textures.
- Place the FBX and textures together in the same folder on your computer (any location of your choice is fine).
- Remember the location of the folder as you will need to access it later to import the 3D model into Unreal Engine.

NOTE: You can download the other resources but they will not be used in this guide.





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Unity for all

Start bringing your vision to life today. Unity's real-time 3D development platform empowers you with all you need to create, operate, and monetize.

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Unity: <https://unity.com/>



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Support to accelerate learning & development

Benefits with Prepaid plan only:

- Learn the essentials of game development with 12 months access to Unity Game Dev Courses (\$144 value)
- Get 25GB Unity Cloud Storage (\$60 value)

Benefits with all Plus plans:

- Attend monthly Expert Live Sessions. Speed up your development with technical know-how from Unity engineers (\$240 value)
- Limited access to a Customer Success Advisor: get help finding the tools and resources you need to succeed
- Collect valuable device information in real-time such as crashes, exceptions, and user feedback at all times
- Save 20% on top-rated assets in the Asset Store*

Financial eligibility:
I or my company generate annual revenue or funds raised of \$200K or less

FOR TEAMS AND FREELANCERS

Pro Best value

\$125 per month

Includes priority access to Unity experts, Success Advisors & Customer Support

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Hide benefits

\$800+ in powerful benefits included

Advanced support for professional creators

- Join best-in-class Expert Live Sessions per month with senior Unity engineers. Sessions cover advanced technical problem-solving. Ask questions and chat directly with our experts (\$480 value)
- Get priority access to a Customer Success Advisor, who will help you get the most from your investment with Unity
- Get faster license and account support with Priority Queue for Customer Service

Advanced features for team and project efficiency (\$108 value)

- Save, share and sync your projects easily with your entire team
- Get more cloud storage for bigger projects, so it's backed up and accessible anywhere
- Save time by streamlining how you create and distribute builds to your entire team
- Notifications available through seamless integrations with your preferred collaboration tools like email, Slack, Discord, and JIRA

Advanced features for game performance

- Get total visibility into what is happening when users are in your game
- Collect valuable device information in real-time such as crashes, exceptions, and user feedback at all times

New! Reduce costs with access to free professionally produced art content

- Get free access to comprehensive AAA art packages that include characters, animations, environments, music, sound, cameras, trailers, source files, trailers, and concept art created by top-talent industry icons

20% off in the Asset Store

- Get 20% off time-saving plugins and assets from the Unity Asset Store to help you create more efficiently*

Unity t-shirt

- All Unity Pro purchases include a free limited-edition "Profabulous" t-shirt while supplies last

Financial eligibility:
No limits on revenue or funding

FOR BEGINNERS

Personal

Available to use if your revenue or funding (raised or self-funded) does not exceed \$100K per year.

[Try Personal](#) [Learn more >](#)

Hide info

A free version of Unity for beginners. Does not include additional support, training and services.

Financial eligibility:
I or my company generate annual revenues or raised funds less than \$100K

FOR BEGINNERS

Personal

Available to use if your revenue or funding (raised or self-funded) does not exceed \$100K per year.

[Try Personal](#)

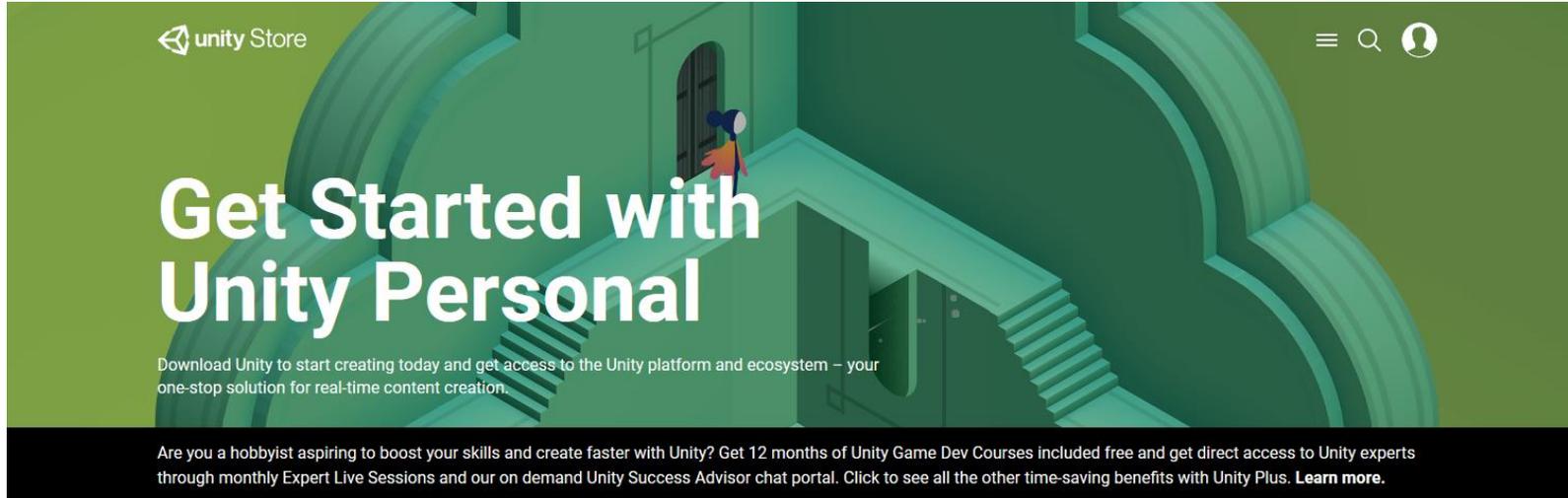


Hide info

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- Do not make more than \$100k in annual gross revenues, regardless of whether Unity Personal is being used for commercial purposes, or for an internal project or prototyping.
- Have not raised funds in excess of \$100K.
- Not currently using Unity Plus or Pro.

If you are not eligible to use Unity Personal, please [click here](#) to learn more about Unity Plus and Unity Pro.



Download Unity Hub

Looking to download Unity Hub for Mac OS X?
[Choose Mac OS X](#)



Install Unity Hub

1 Unity Hub Setup

License Agreement
Please review the license terms before installing Unity Hub.

Press Page Down to see the rest of the agreement.

Unity Terms of Service
Last updated: May 24, 2018

Unity Technologies ApS ("Unity", "our" or "we") provides game-development and related software (the "Software"), development-related services (like [Unity Teams](#) ("Developer Services")), and various Unity communities (like [Unity Answers](#) and [Unity Connect](#) ("Communities")), provided through or in connection with our website, accessible at [unity3d.com](#) or unity.com (collectively, the "Site"). Except to the extent you and Unity have agreed a

If you accept the terms of the agreement, click I Agree to continue. You must accept the agreement to install Unity Hub.

Unity Hub 1.6.1

I Agree Cancel

2 Unity Hub Setup

Choose Install Location
Choose the folder in which to install Unity Hub.

Setup will install Unity Hub in the following folder. To install in a different folder, click Browse and select another folder. Click Install to start the installation.

Destination Folder
 Browse...

Unity Hub 1.6.1

< Back **Install** Cancel

3 Unity Hub Setup

Completing Unity Hub Setup

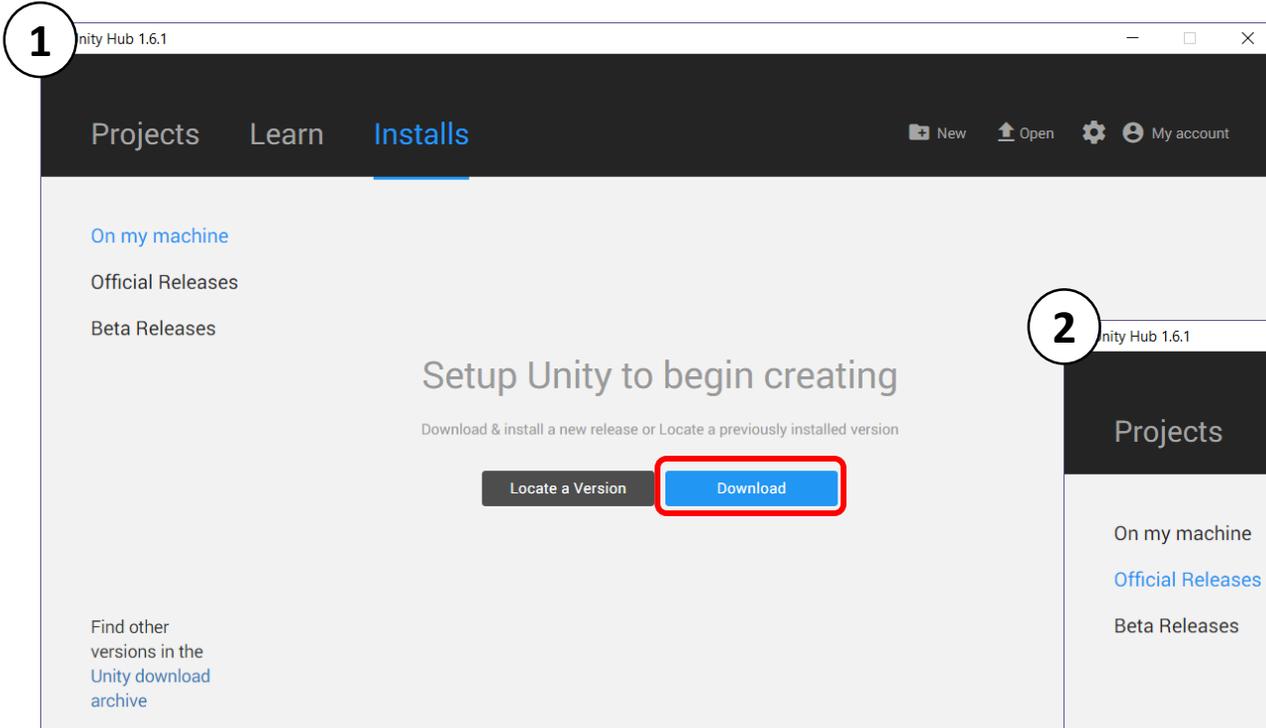
Unity Hub has been installed on your computer.
Click Finish to close Setup.

Run Unity Hub

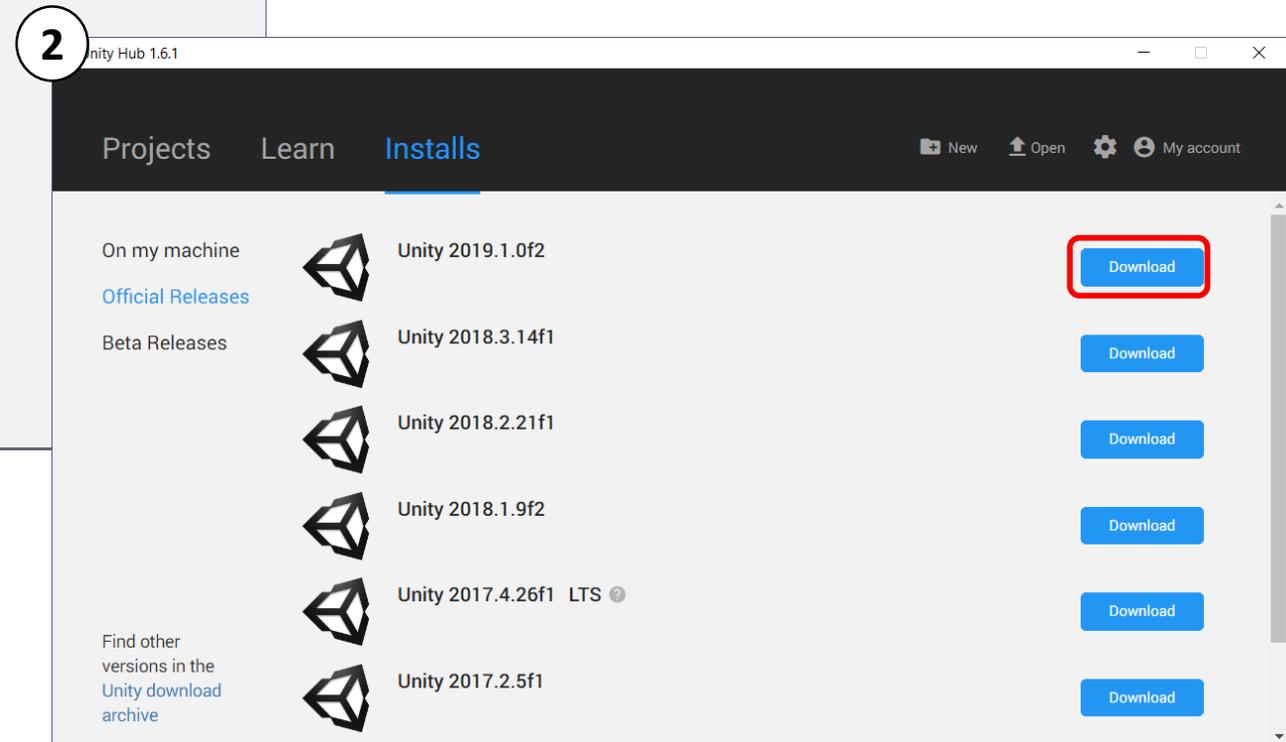
< Back **Finish** Cancel



Install the latest version of Unity



Unity Hub is useful for managing your projects and multiple versions of the Unity Editor.





You can select components to install

| Component | download size | install size |
|---|---------------|--------------|
| <input checked="" type="checkbox"/> 2019.1.0f2 | 765.0 MB | 2.4 GB |
| Platforms | | |
| <input checked="" type="checkbox"/> Android Build Support | 481.4 MB | 2.0 GB |
| <input type="checkbox"/> Android SDK & NDK Tools | 891.8 MB | 2.8 GB |
| <input type="checkbox"/> iOS Build Support | 895.9 MB | 3.6 GB |
| <input type="checkbox"/> tvOS Build Support | 328.4 MB | 1.4 GB |

Total space required: 4.6 GB
Space available: 47.4 GB

Buttons: Cancel, Done

Unity allows you to add components to build apps for different platforms. You can accept the defaults for now as you can always add more of these components later.

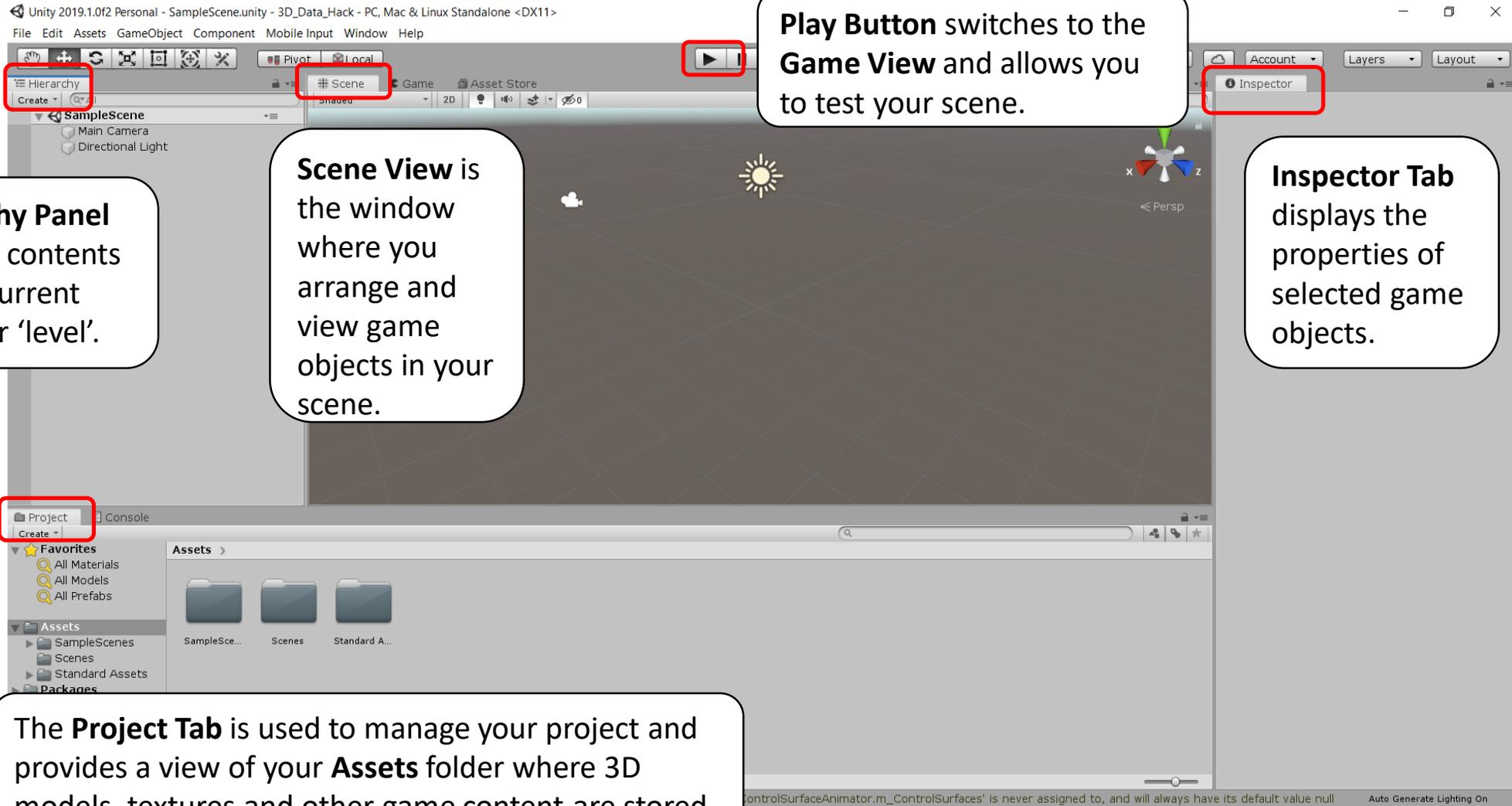


Create a new project

1. Start a 'New' project.
2. Give the project a name.
3. Choose the '3D' project template.
4. Specify the location on your computer to store the project.
5. Click 'Create Project'.



The Unity User Interface



Hierarchy Panel lists the contents of the current scene or 'level'.

Scene View is the window where you arrange and view game objects in your scene.

Play Button switches to the **Game View** and allows you to test your scene.

Inspector Tab displays the properties of selected game objects.

The **Project Tab** is used to manage your project and provides a view of your **Assets** folder where 3D models, textures and other game content are stored.



Create a new 3DModels folder

Unity 2019.1.0f2 Personal - SampleScene.unity - 3D_Data_Hack - PC, Mac & Linux Standalone <DX11>

File Edit Assets GameObject Component Mobile Input Window Help

1. Right Click in the assets panel at the bottom of the screen.

2. Hover the mouse over 'Create'.

3. Select 'Folder'.

4. Name the new folder '3DModels'.

This will help you find and manage your imported models in the Project Tab.



Import 3D Model

Unity 2019.1.0f2 Personal - SampleScene.unity - 3D_Data_Hack - PC, Mac & Linux Standalone <DX11>

File Edit Assets GameObject Component Mobile Input Window Help

Hierarchy: SampleScene, Main Camera, Directional Light

Inspector: Assets

Project: 3DModels

Import New Asset dialog: 2019_04_12_3D_Data_Hack_Model

Files in dialog: Quay_New_Buildings_rogersons.jpg, Quay_Rogers.jpg, RedOak.jpg, RedOak_Alpha.jpg, RiverBirch.jpg, RiverBirch_Alpha.jpg, roads.jpg, SDZ_Model_LTM.FBX, SDZ_Model_LTM_19.max, Sedum3.jpg

File name: [] All files (***)

Buttons: Import, Cancel

Callout 1: 1. Right Click on your '3D Models' folder in the Project Tab.

Callout 2: 2. Select 'Import New Asset'.

Callout 3: 3. Select the downloaded FBX model and all of the accompanying texture files and **click 'Import'**.

NOTE: You do not need the .max file in Unity. Also be aware that the .FBX file you download may have a different name to that pictured.



Generate Colliders for the model geometry

Unity 2019.1.0f2 Personal - SampleScene.unity - 3D_Data_Hack - PC, Mac & Linux Standalone <DX11>

File Edit Assets GameObject Component Mobile Input Window Help

1. Select the imported **FBX model** from the 3DModels folder in the Assets panel.

2. Select the **'Model'** tab.

3. Check **'Generate Colliders'**.

4. Ensure you **Click 'Apply'** to make the changes.

NOTE: This step enables objects in your scene to physically interact with each other. In basic terms it prevents your player walking through walls or falling through the floor.



Unpack the materials embedded in the model

1. Ensure the imported FBX model from the 3DModels folder is still selected.

2. Select the 'Materials' tab.

3. For 'Location' Select 'Use External Materials (Legacy)'.

4. Click 'Apply'.

RESULT: This will create a new Materials folder inside the 3DModels folder containing editable versions of the 3D models materials.



Drag the 3D Model into your scene hierarchy

Unity 2019.1.0f2 Personal - SampleScene.unity - 3D_Data_Hack - PC, Mac & Linux Standalone* <DX11>

File Edit Assets GameObject Component Mobile Input Window Help

Shaded 2D Gizmos

1. Drag the 3D model directly into the hierarchy from your assets collection.

2. Once the 3D model has been dragged into the hierarchy panel it should appear in your 'Scene' window. The model's pivot in 3D spaces should be at the following coordinates: X=0, Y=0, Z=0.

The screenshot shows the Unity 2019.1.0f2 interface. The Hierarchy panel on the left shows the scene hierarchy with 'SampleScene*' at the top, followed by 'Main Camera', 'Directional Light', and 'SDZ_Model_ITM'. The 'SDZ_Model_ITM' is highlighted with a red box. The Scene window in the center shows a 3D view of the scene with a sun and a 3D coordinate system. The Inspector panel on the right shows the 'SDZ_Model_ITM' selected, with the Transform component visible. The Position field is highlighted with a red box and shows X=0, Y=0, Z=0. The Assets panel at the bottom shows a grid of assets, with 'SDZ_Model...' highlighted with a red box. A red dashed arrow points from the 'SDZ_Model...' asset in the Assets panel to the 'SDZ_Model_ITM' in the Hierarchy panel.

| Property | X | Y | Z |
|----------|---|---|---|
| Position | 0 | 0 | 0 |
| Rotation | 0 | 0 | 0 |
| Scale | 1 | 1 | 1 |



Download Unity Standard Assets

1. Click on the 'Asset Store' tab.

2. Search for 'Standard Assets' in the input field.

3. Click 'Download' and then 'Import' when prompted.

4. Click 'Import' in the 'Import Unity Package' popup.

NOTE: If you can't see the Asset Store tab you can open it from the menu bar at the top of the screen: **Window > Asset Store**



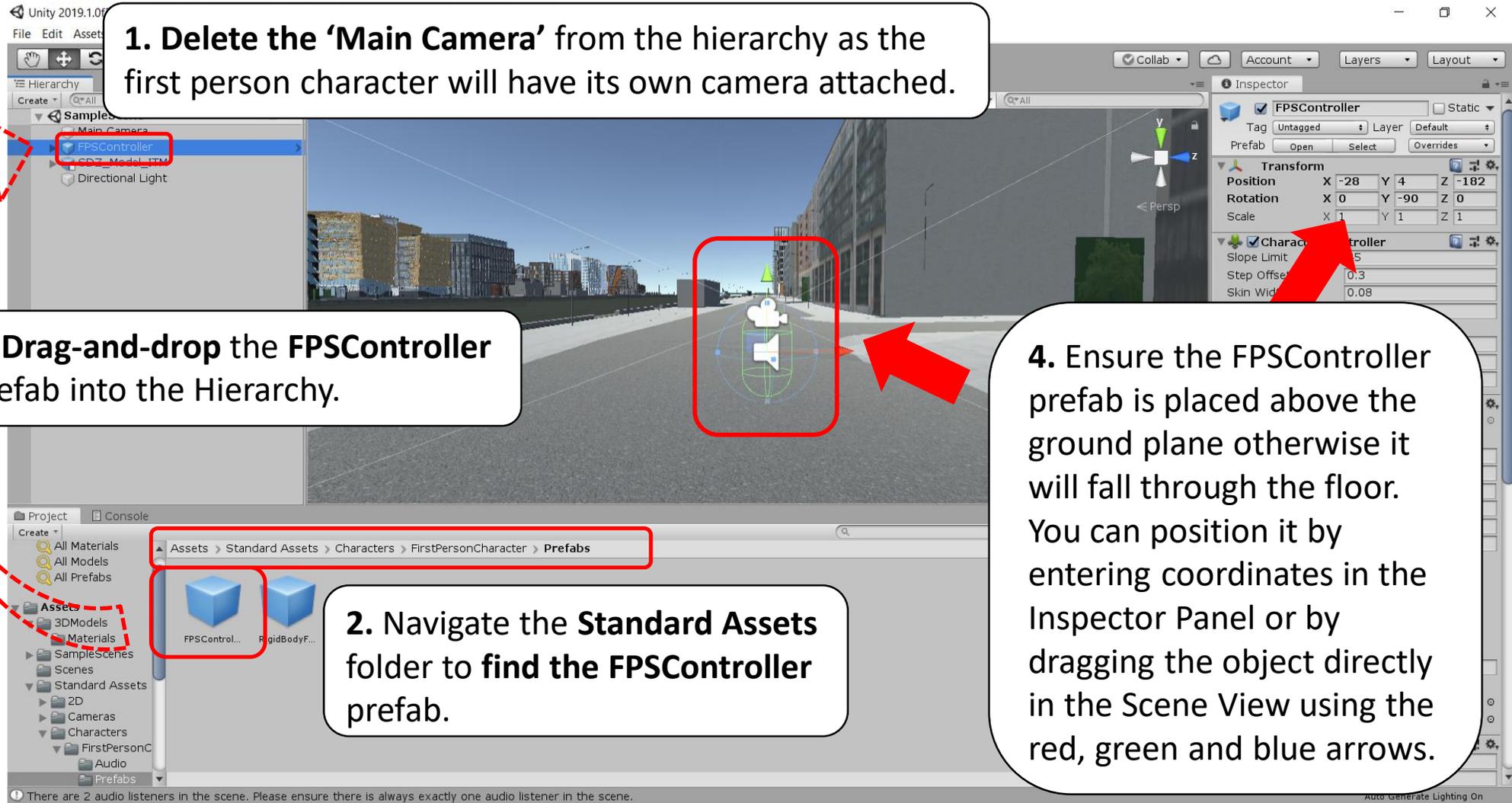
Add the first person character to your scene

1. Delete the 'Main Camera' from the hierarchy as the first person character will have its own camera attached.

3. Drag-and-drop the FPSController prefab into the Hierarchy.

2. Navigate the Standard Assets folder to find the FPSController prefab.

4. Ensure the FPSController prefab is placed above the ground plane otherwise it will fall through the floor. You can position it by entering coordinates in the Inspector Panel or by dragging the object directly in the Scene View using the red, green and blue arrows.





Press Play to test your scene

Unity 2019.1.0f2 Personal - SampleScene.unity - 3D_Data_Hack - PC, Mac & Linux Standalone* <DX11>

File Edit Assets GameObject Component Mobile Input Window Help

Press **'Play'** to test your scene. Pressing the **'Esc'** key will allow you to press the play button again to exit play mode mode.

While in play mode you can navigate your scene using WASD keys, cursor keys, and the mouse.

Inspector: FPSController, Transform, Character Controller, First Person Controller (Sc), Rigidbody



Save your Scene(s) as you update them

The screenshot shows the Unity 2019.1.0f2 Personal interface. The 'File' menu is open, with 'Save As...' selected. The 'Save Scene' dialog is open, showing the file name 'Dublin Docklands' and the 'Save' button. The 'Assets' folder is visible in the bottom left, containing folders for '3DModels', 'Ciconia Studio', 'SampleScenes', 'Scenes', and 'Standard Assets', along with an 'Escape' file. A red arrow points from the 'Assets' folder to the 'Save' button in the dialog.

1. From the menu bar Select **File > Save Scene**

2. In the 'Save Scene' popup provide a name and click **'Save'**.

3. The Scene will be saved in your Asset folder. You can change between scenes by clicking on them.



Save the Overall Project

Unity 2019.1.0f2 Personal - Dublin Docklands.unity - 3D_Data_Hack - PC, Mac & Linux Standalone <DX11>

File Edit Assets GameObject Component Mobile Input Window Help

- New Scene Ctrl+N
- Open Scene Ctrl+O
- Save Ctrl+S
- Save As... Ctrl+Shift+S
- New Project...
- Open Project
- Save Project**
- Build Settings... Ctrl+Shift+B
- Build And Run Ctrl+B
- Exit

From the menu bar Select **File > Save Project**. This ensures that project wide setting and changes are saved, not just the changes in a particular scene.

Inspector

Tag MainCamera Layer Rendering

FirstPersonCharacter Static

Transform

| | | | | | | |
|----------|---|---|---|-----|---|---|
| Position | X | 0 | Y | 0.8 | Z | 0 |
| Rotation | X | 0 | Y | 0 | Z | 0 |
| Scale | X | 1 | Y | 1 | Z | 1 |

Camera

Clear Flags Skybox

Background

Culling Mask Everything

Projection Perspective

FOV Axis Vertical

Field of View 60

Physical Camera

Clipping Planes Near 0.3 Far 1000

Viewport Rect X 0 Y 0 W 1 H 1

Depth 0

Rendering Path Deferred

Target Texture None (Render Texture)

Occlusion Culling

HDR Use Graphics Settings

MSAA Off

Allow Dynamic Res

Target Display Display 1

4 command buffers

- BeforeLighting: Deferred Ambient Occlusion (0 B)
- BeforeImageEffectsOpaque: Opaque Only Post-proc
- BeforeImageEffects: Post-processing (0 B)
- BeforeReflections: Deferred Ambient Occlusion (0 B)

Remove all

Audio Listener

Flare Layer

Post Process Layer (Script)

Volume blending

Auto Generate Lighting On



Save the Overall Project

The screenshot shows the Unity 2019.1.0f2 Personal interface. The 'File' menu is open, with 'Build Settings...' selected. The 'Build Settings' dialog is open, showing 'Dublin Docklands' selected under 'Scenes To Build'. The 'Platform' section is set to 'PC, Mac & Linux Standalone', with 'Target Platform' set to 'Windows' and 'Architecture' set to 'x86_64'. The 'Build' button is highlighted.

1. You are now ready to build your game. From the menu select: **File > Build Settings**

2. Make sure you 'Add Open Scenes' and select the particular scene[s] you want to include in the build.

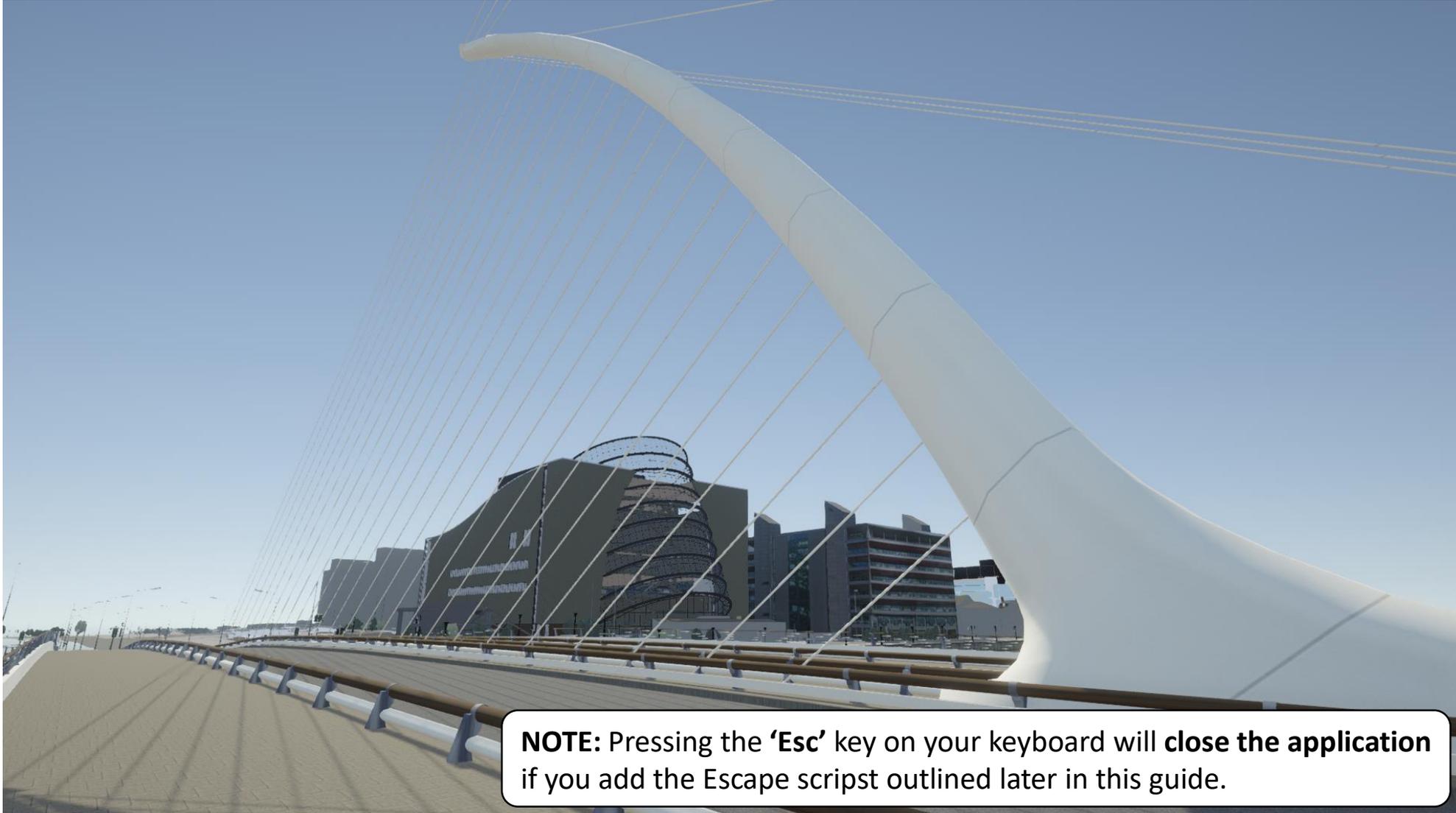
3. Choose the platform you want to build for e.g. PC or Mac.

4. Choose x86 for 32-Bit or x86_64 for 64-Bit builds.

5. Click 'Build' and choose a file output location.



Run your application .exe to test



NOTE: Pressing the 'Esc' key on your keyboard will **close the application** if you add the Escape script outlined later in this guide.



Trouble Shooting

- My character controller passes through the floor or walls when I press play
 - Ensure that the character controller is positioned fully above the ground plane.
 - Check that you correctly generated colliders for your models when you imported them as indicated earlier in the guide.
- I can't exit the application I built
 - Add the 'Escape' script to your project that is outlined further on in this guide.
- The model doesn't look how I'd expect
 - Experiment with the Unity Post Processing Stack as outlined later in this guide.
 - Try adjusting the model's materials and experiment with the 'Normal' maps provided for some of the textures:
<https://docs.unity3d.com/Manual/StandardShaderMaterialParameterNormalMap.html>
- I can't edit the materials on my model or they appear to be missing
 - Not all of the buildings in the model have photoreal textures for their facades.
 - Ensuring that you selected 'Use External Materials' when you imported the model should ensure the inclusion of any textures for those buildings that do have them. This will enable you to edit and adjust all of the materials that come with the model:
<https://docs.unity3d.com/Manual/Shaders.html>
- Trees and Railings look like billboards when they should be transparent
 - Use the process for adding transparency outlined later in this guide.
 - Alternatively you could try to create your own shader.
- My Trees or Railing are only visible from one side
 - Apply a double sided shader like the Ciconia Double Sided shader indicated later in this guide.

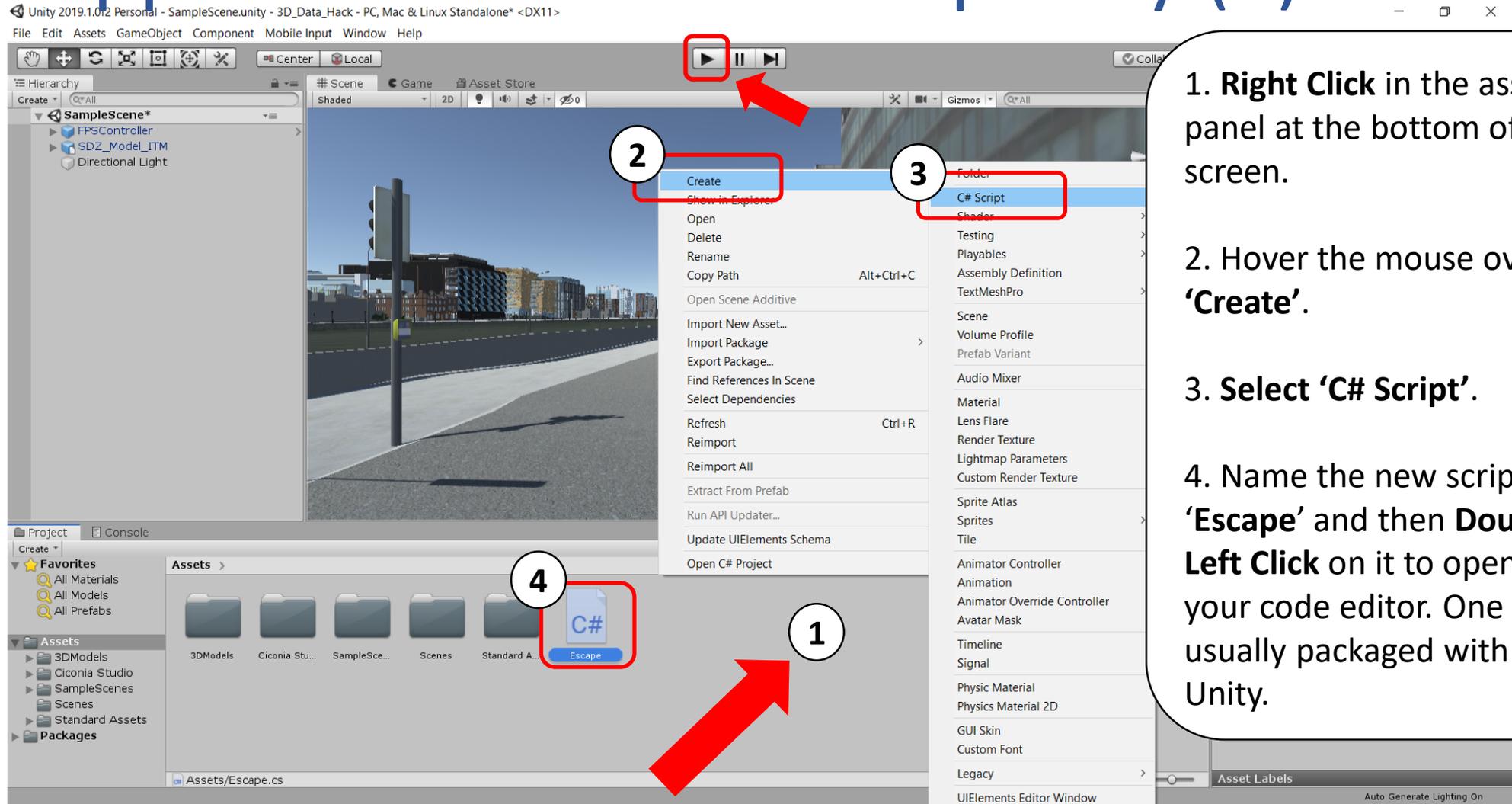


Further ways to enhance your scene

- Look at the other assets in the Standard Assets collection and use them to enhance your scene: <https://assetstore.unity.com/packages/essentials/asset-packs/standard-assets-32351>
- Use other free assets from the Unity Asset Store: <https://assetstore.unity.com/>
- Use shaders and take advantage of the Unity Post Processing Stack to improve the visual appearance of your scenes. Examples follow in subsequent slides.
- Add interactivity and further functionality through scripting in the C# language. A very brief but useful example follows on the next slide.
- Experiment with AR and VR in Unity.
- Make use of the extensive learning materials and tutorials provided on the Unity website: <https://unity.com/learn>



Add a script to close your built desktop application with the Escape key (1)



1. **Right Click** in the assets panel at the bottom of the screen.

2. Hover the mouse over **'Create'**.

3. **Select 'C# Script'**.

4. Name the new script **'Escape'** and then **Double Left Click** on it to open your code editor. One is usually packaged with Unity.



Adding a script to close your built desktop application with the Escape key (2)

The name of the class has to match the name of the script file, otherwise there will be an error.

The code in the Update function waits for the Escape key to be pressed and then quits the application.

```
using UnityEngine;
using System.Collections;

// This script exits the application upon pressing the Esc key
public class Escape : MonoBehaviour {

    // The default Start function is used for initialization
    private void Start ()
    {

    }

    // The Update function is called once per frame
    void Update ()
    {
        if (Input.GetKey(KeyCode.Escape))
        {
            Application.Quit();
        }
    }
}
```

NOTE: Make sure to save changes to your script before adding it to a game object in your scene or pressing play.



Add a script to close your built desktop application with the Escape key (3)

The screenshot shows the Unity 2019.1.0f2 interface. In the Hierarchy panel on the left, the 'FPSController' script is highlighted with a red box. A red dashed arrow points from this box to a 'C#' script icon labeled 'Escape' in the Assets panel at the bottom. Another red dashed arrow points from the 'Escape' script icon to the 'Escape (Script)' component in the Inspector panel on the right, which is also highlighted with a red box. A red arrow points from the Inspector panel towards the right side of the screen.

1. Drag the **Escape script** directly onto the **FPSController** in the hierarchy.

2. Check that the script has been added to the **FPSController** by checking in the **Inspector** panel.



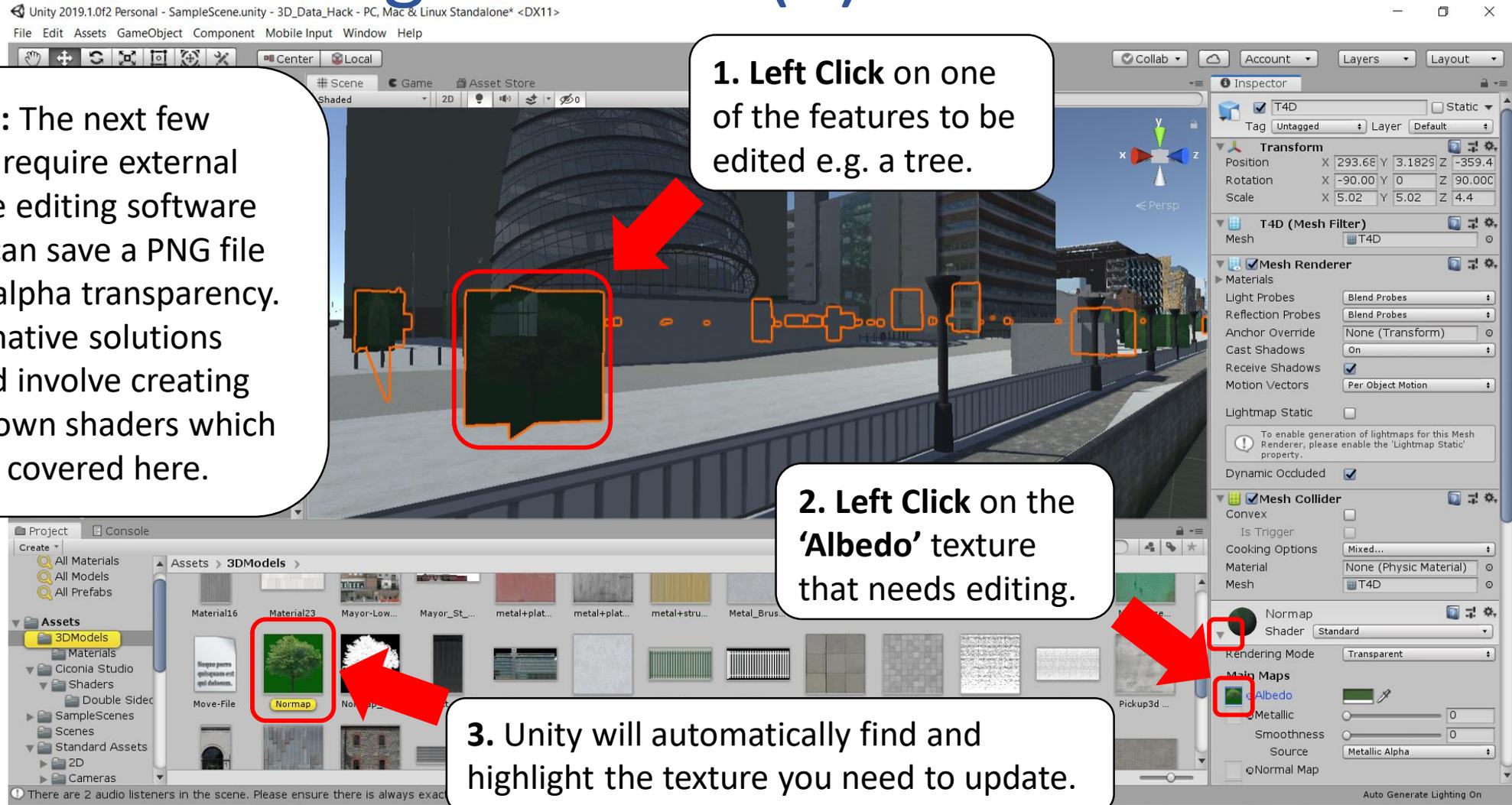
Quick solution for transparency on trees and railing textures (1)

NOTE: The next few steps require external image editing software that can save a PNG file with alpha transparency. Alternative solutions would involve creating your own shaders which is not covered here.

1. Left Click on one of the features to be edited e.g. a tree.

2. Left Click on the 'Albedo' texture that needs editing.

3. Unity will automatically find and highlight the texture you need to update.





Quick solution for transparency on trees and railing textures (2)

Unity 2019.1.0f2 Personal - SampleScene.unity - 3D_Data_Hack - PC, Mac & Linux Standalone* <DX11>

File Edit Assets GameObject Component Mobile Input Window Help

Center Local

Hierarchy Scene Game Asset Store Inspector

2. Left Click on 'Show in Explorer'.

3. Open the file with your favourite imaging editing software.

1. Right Click on the texture.



Quick solution for transparency on trees and railing textures (3)



The precise process here will depend on the software you use. Suitable choices include Photoshop or the FREE & Open Source GNU Image Manipulation Program (GIMP). Generically the steps are:

(1) Import the JPEG image; (2) Select the background pixels by colour; (3) Delete the background pixels; (4) Add the background to a transparent alpha channel; (5) Export the file with alpha transparency as a PNG file; (6) Save it in the same location as your other model textures.



Quick solution for transparency on trees and railing textures (4)

Unity 2019.1.0f2 Personal - SampleScene.unity - 3D_Data_Hack - PC, Mac & Linux Standalone* <DX11>

File Edit Assets GameObject Component Mobile Input Window Help

Center Local

Hierarchy

Scene Game Asset Store

Inspector

1. Reselect the object.

2. Drag-and-drop the new PNG texture into the objects **albedo** texture slot.

3. Set the Rendering Mode to 'Cutout'.



Download a FREE double sided shader

1. Click on the 'Asset Store' tab.

2. Search for 'Ciconia Studio Double Sided Shaders' in the input field.

3. Click 'Download' and then 'Import' when prompted.

4. Click 'Import' in the Import Unity Package popup.

The screenshot shows the Unity Asset Store interface. The 'Asset Store' tab is selected. A search bar contains the text 'Ciconia Studio Double Sided Shaders'. The search results show a pack of 'Double Sided Shaders' by Ciconia Studio, which is free. The 'Download' button is highlighted. The 'Import Unity Package' dialog is open, showing the 'Import' button highlighted.



Add the double sided shader to features that need it like the trees and railings

Unity 2019.1.0f2 Personal - SampleScene.unity - 3D_Data_Hack - PC, Mac & Linux Standalone* <DX11>

File Edit Assets GameObject Component Mobile Input Window Help

Center Local

Hierarchy

- Create > All
- Hannover_Quay
- Hines
- Jetty
- Layer:G902FENCE_PALASADE
- Layer:G902PILLAR
- Layer:G902WALL
- Layer:LTP002_Existing_Buildings
- LPHang_567
- LPMoern
- Macken Bridge
- Object162
- Object165
- OtherPole067
- P_Wave
- Project_09_SCA
- Quay_Wall_01
- Quay_Wall_02
- Rail
- Side North
- Side North01
- Side_South01
- Struts_59
- T1D
- T2D
- T3D
- T4D

Inspector

T4D

Tag Untagged Layer Default

293.68 Y 3.1829 Z -359.4

-90.00 Y 0 Z 90.000

5.02 Y 5.02 Z 4.4

Light Probes Blend Probes

Reflection Probes Blend Probes

1. Click on the 'Shader' dropdown of the selected object.

2. From the subsequent popup menu select: Ciconia Studio > Double Sided > Transparent > Diffuse Bump Cutout

Transparent

- Diffuse Bump Cutout
- Diffuse Bump2

Mesh Collider

Convex

Is Trigger

Cooking Options Mixed...

Material None (Material)

Mesh T4D

Normal Shader Ciconia Studio/Double Sided/Transp

Normal mapped shader without a normal map. Consider using a non-normal mapped shader for performance.

Diffuse Color

Diffuse map (Cutout A)

Tiling X 1 Y 1

Offset X 0 Y 0

Normal map

Auto Generate Lighting On

Project

Console

Create > All Materials All Models All Prefabs

Assets > 3DModels >

Material16 Material23 Mayor-Low... Mayor_ST... metal+plat... metal+plat... metal+stru... Metal_Brus...

Assets

- 3DModels
- Materials
- Ciconia Studio
- Shaders
- Double Sided
- SampleScenes
- Scenes
- Standard Assets
- 2D
- Cameras

Move-File Normap Normap Normap_AL... Object_Bol... Offices 02 ... OMP_Meta... Palicade_F...

There are 2 audio listeners in the scene. Please ensure there is always exactly one audio listener in the scene.



Enhance the look of your scene with the Unity Post Processing Stack

Unity 2019.1.0f2 Personal - SampleScene.unity - Windows_Hack - PC, Mac & Linux Standalone* <DX11>

File Edit Assets GameObject Component **1** Window Help

Next Window Ctrl+Tab
Previous Window Ctrl+Shift+Tab
Layouts
Vuforia Configuration Ctrl+Shift+V
Asset Store Ctrl+9
2 Package Manager
TextMeshPro
General
Rendering
Animation
Audio
Sequencing
Analysis
Asset Management
2D
AI
XR

3 Post Processing 2.1.6

4 Install

Post Processing
Version 2.1.6 (2019.1 verified)
[View documentation](#) - [View changelog](#) - [View licenses](#)
com.unity.postprocessing
Author: Unity Technologies Inc.
The post-processing stack (v2) comes with a collection of effects and image filters you can apply to your cameras to improve the visuals of your games.

| Package Name | Version |
|-------------------------|----------|
| Cinemachine | 2.3.3 |
| Core PP Library | 5.7.2 |
| Google Resonance Audio | 1.18.3 |
| Google VR Android | 1.18.4 |
| Google VR iOS | 1.18.5 |
| In App Purchasing | 2.0.6 ✓ |
| Lightweight PP | 5.7.2 |
| Mathematics | 1.0.1 |
| Multiplayer HLAPI | 1.0.2 |
| Oculus (Android) | 1.29.1 |
| Oculus (Desktop) | 1.29.1 |
| OpenVR (Desktop) | 1.0.5 |
| Package Manager UI | 2.1.2 ✓ |
| ProBuilder | 4.0.4 |
| Shader Graph | 5.7.2 ✓ |
| TextMesh Pro | 2.0.0 ✓ |
| Unity Collaborate | 1.2.16 ✓ |
| Unity Timeline | 1.0.0 ✓ |
| Windows Mixed Reality | 1.0.9 |
| Xiaomi SDK | 1.0.3 |
| XR Legacy Input Helpers | 2.0.2 |



Change project colour space to Linear

1 – 2. In the Menu bar select **Edit > Project Settings**
3 – 5. In the Project Settings select **Player > Other Settings** and change Color Space to **Linear**



Disable Anti Aliasing (to be reapplied later)

Unity 2019.1.0f2 Personal - SampleScene.unity - 3D_Data_Hack - PC, Mac & Linux Standalone* <DX11>

File Edit Assets GameObject Component Mobile Input Window Help

Project Settings

Quality

Levels

| Level | Very Low | Low | Medium | High | Very High | Ultra |
|----------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Pixel Light Count | <input checked="" type="checkbox"/> |
| Texture Quality | <input checked="" type="checkbox"/> |
| Anisotropic Textures | <input checked="" type="checkbox"/> |
| Soft Particles | <input checked="" type="checkbox"/> |

Default

Add Quality Level

Name: Ultra

Rendering

Pixel Light Count: 4

Texture Quality: Full Res

Anisotropic Textures: Cascaded On

Anti Aliasing: Disabled

Soft Particles:

Soft Particles require using Deferred Lighting or making camera render the depth texture.

Realtime Reflection Probes:

Billboards Face Camera Position:

Resolution Scaling Fixed DPI Factor: 1

Texture Streaming:

Shadows

Shadowmask Mode: Distance Shadowmask

Shadows: Hard and Soft Shadows

Shadow Resolution: High Resolution

Shadow Projection: Stable Fit

Shadow Distance: 150

Shadow Near Plane Offset: 3

Shadow Cascades: Four Cascades

Controller (Sci): FirstPersonController

Jump: 0

Land: 0

1

0

Drag

Auto Generate Lighting On

Assets\Standard Assets\ehicles\Aircraft\Scripts\AeroplanePropellerAnimator.cs(9,44): warning CS0649: Field 'AeroplanePropellerAnimator.m_PropellorBlur' is never assigned to, and will always have its default value null

In the Project Settings select **Quality > Rendering** and change Anti Aliasing to **Disabled**



Set Rendering Path to Deferred (For Desktop)

1. Find the Main Camera in your scene [in this case it is connected to the FirstPersonCharacter]

2. In the Inspector set the Rendering Path to **Deferred** [for mobile or AR/VR you would use Forward]

3. Finally **Enable Allow HDR** and **Disable Allow MSAA** [MSAA is Multisample Anti-Aliasing]



Add Post-process Layer to Main Camera

Unity 2019.1.0f2 Personal - SampleScene.unity - 3D_Data_Hack - PC, Mac & Linux Standalone* <DX11>

File Edit Assets GameObject Component Mobile Input Window Help

Inspector

FirstPersonCharacter

Tag MainCamera Layer Default

Transform

Position X 0 Y 0.8 Z 0

Rotation X 0 Y 0 Z 0

Scale X 1 Y 1 Z 1

Camera

Clear Flags Skybox

Background

Culling Mask Everything

Projection Perspective

FOV Axis Vertical

Field of View 60

Physical Camera

Clipping Planes Near 0.3 Far 1000

Viewport Rect X 0 Y 0 W 1 H 1

Depth 0

Rendering Path Deferred

Target Texture None (Render Texture)

Occlusion Culling

HDR Use Graphics Settings

MSAA Off

Allow Dynamic Res

Target Display Display 1

Audio Listener

Flare Layer

Add Component

Search

Post-process Debug

Post-process Layer

Post-process Volume

New script

1. For the object with the Main Camera [The FirstPersonCharacter] in your scene Click **'Add Component'** in the inspector.
2. Search for and **Select 'Post-process Layer'** from the dropdown.



Create a new 'Rendering' layer

1. Select the Layer dropdown on the object with the Main Camera [The FirstPersonCharacter].
2. From the dropdown **Select 'Add Layer'**.
3. Type **'Rendering'** on a blank layer.
4. Update the value for Layer from step 1 above to **'Rendering'**.

The screenshot shows the Unity 2019.1.0f2 Personal interface. The main window displays a 3D scene with a first-person character. The Inspector panel on the right shows the 'MainCamera' object selected. The 'Layer' dropdown menu is open, and the 'Add Layer...' option is highlighted. The Layers panel on the left shows a list of layers, with 'User Layer 8' containing the text 'Rendering'. The 'MainCamera' object in the Inspector has its 'Layer' dropdown set to 'Rendering'.



Setup Post Process Layer and add Volume

Unity 2019.1.0f2 Personal - SampleScene.unity - 3D_Data_Hack - PC, Mac & Linux Standalone* <DX11>
File Edit Assets GameObject Component Mobile Input Window Help

1. On the Post Process Layer select the **Layer** dropdown and set the value to **'Rendering'**.
2. Set Anti-aliasing Mode to **'Temporal Anti-aliasing (TAA)'**.
3. Add anew **Post Processing Volume** component in the same way that you added the Post Process Layer component previously.
4. **Check** the tick box **'Is Global'**.
5. For Profile click **'New'** and Unity will automatically generate a new Post Processing Profile to which you can add effects.

The screenshot shows the Unity Inspector panel for a 'Post Process Layer (Script)' component. The 'Layer' dropdown is set to 'Rendering' (1). The 'Anti-aliasing Mode' is set to 'Temporal Anti-aliasing (TAA)' (2). The 'Is Global' checkbox is checked (4). The 'New' button for the profile is highlighted (5). A 'Post Processing Volume' component is also visible in the hierarchy (3).



Try experimenting with the following effects and settings



Add effect...

Color Grading

All None Mode High Definition Range

Tonemapping

Mode Neutral

White Balance

Temperature 0
 Tint 0

Tone

Post-exposure (EV) 0.6

Color Filter HDR
 Hue Shift 0
 Saturation 0
 Contrast 0

Channel Mixer

Red Green Blue

Red 100
 Green 0
 Blue 0

Trackballs

Lift Gamma Gain

Bloom

All None Bloom On Off

Intensity 2
 Threshold 1

Soft Knee 0.5
 Clamp 65472
 Diffusion 7
 Anamorphic Ratio 0
 Color HDR
 Fast Mode

Dirtyiness

Texture None (Texture)
 Intensity 0

Vignette

All None Vignette On Off

Mode Classic
 Color

Center X 0.5 Y 0.5
 Intensity 0.2
 Smoothness 0.4
 Roundness 1
 Rounded

Ambient Occlusion

All None Ambient Occlusion On Off

Mode Scalable Ambient Obscurz
 Intensity 0.3

Radius 0.25
 Quality Medium

Color
 Ambient Only

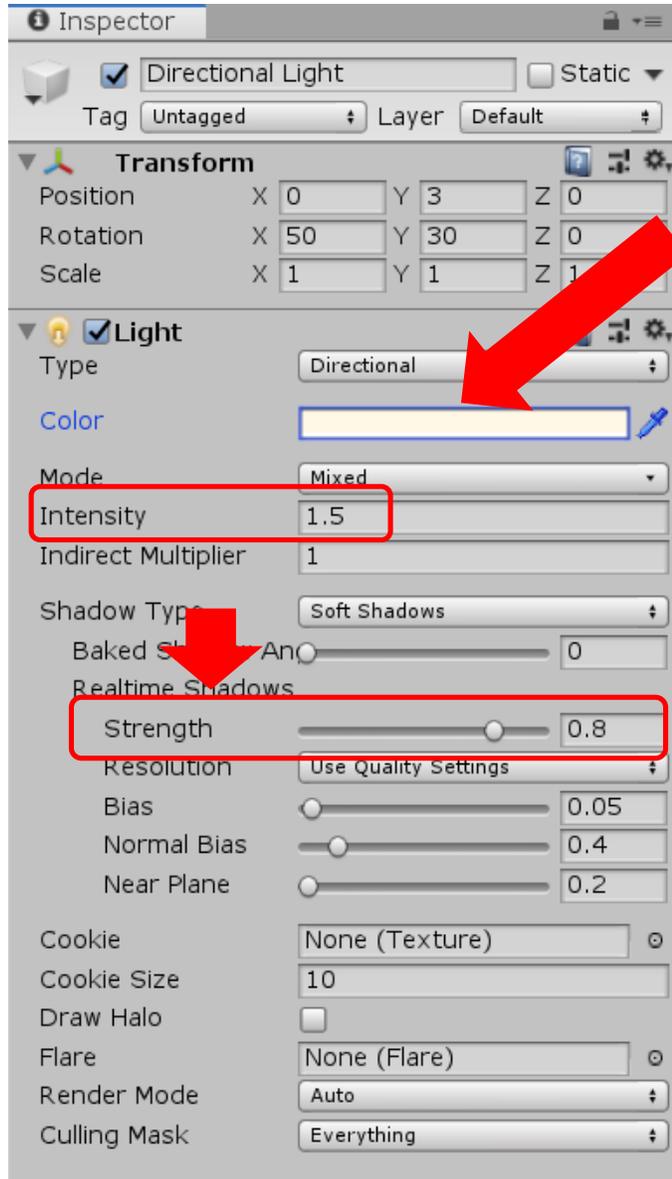
Ambient-only only works with cameras rendering in Deferred + HDR

NOTE: Appropriate values for post-processing depend entirely on the nature of your scene and the effect you intend.

You may also need to adjust lighting and brightness levels (SEE NEXT SLIDE)

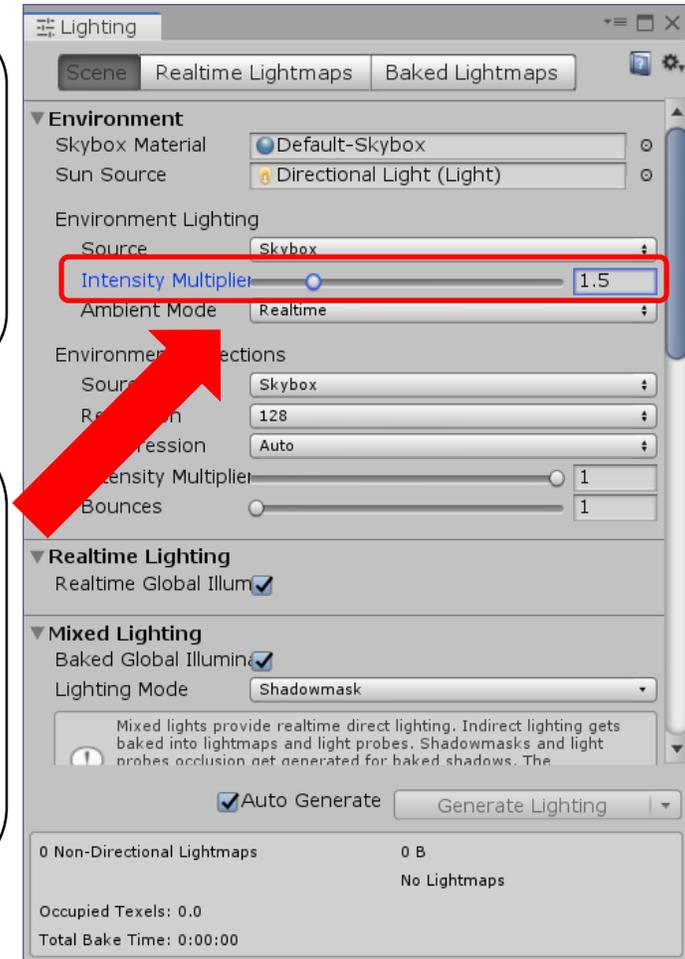


Experiment with the following values for lighting



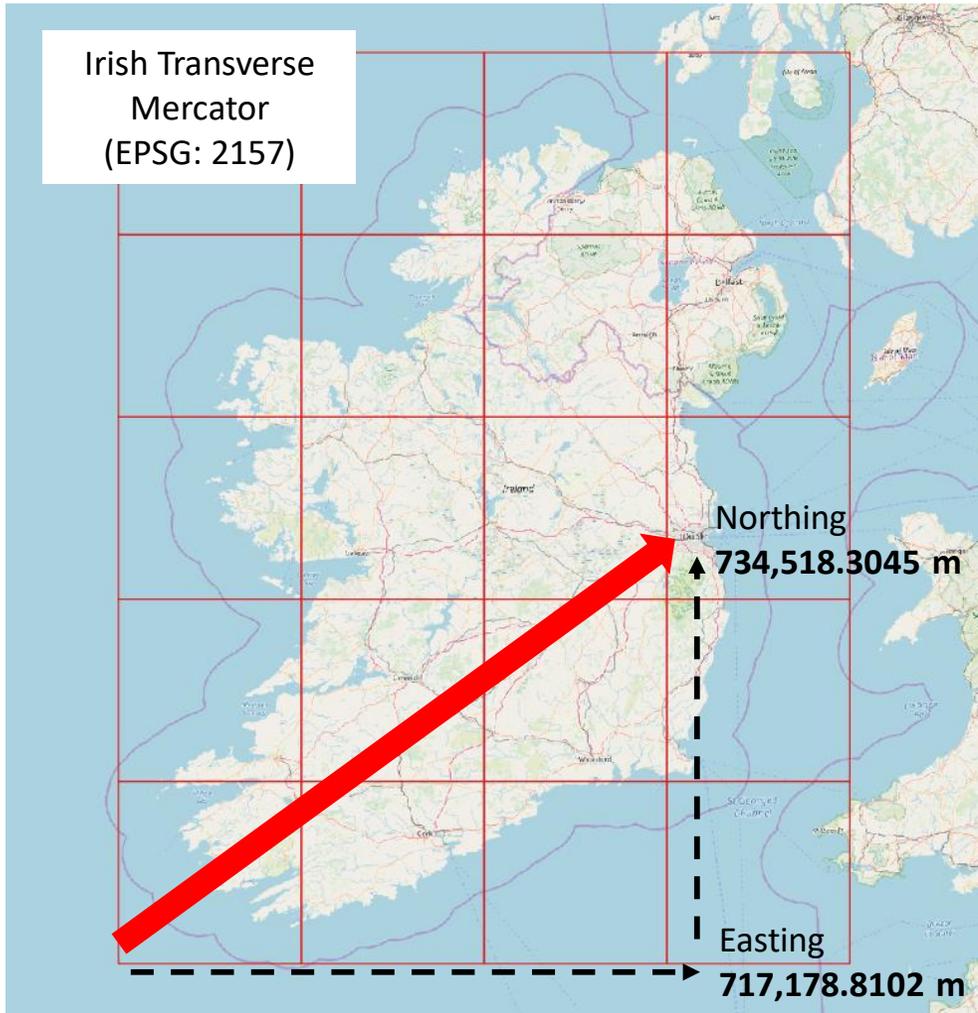
1. Go to main Directional Light and adjust Light Intensity
2. Slightly turn down shadow strength

3. Go to lighting settings
Window > Rendering > Lighting Settings
3. Turn up the Environment Lighting Intensity Multiplier

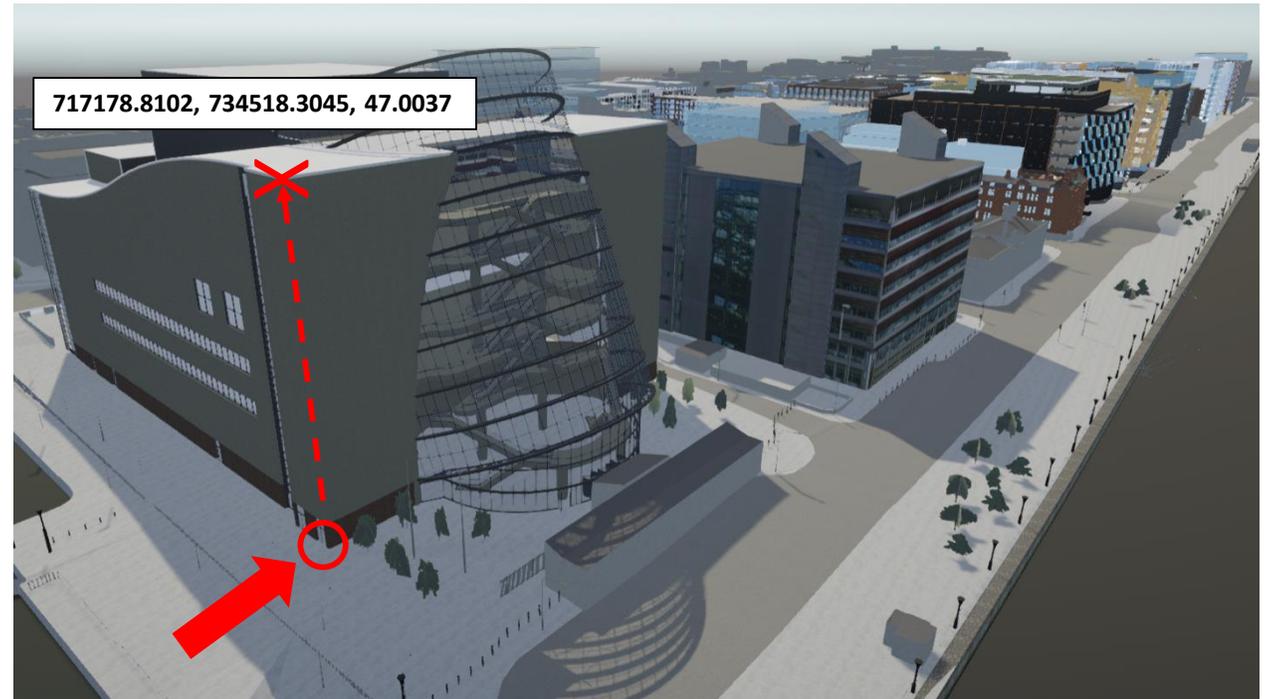




A spatial reference for geolocating data



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Coordinates for the roofline on the south east corner of the Convention Centre Dublin (CCD) in ITM (EPSG: 2157) are:

E: 717178.8102 m / N: 734518.3045 m / Alt: 47.0037 m

See: https://en.wikipedia.org/wiki/Irish_Transverse_Mercator



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