Landscape Builder 2

Landscape Builder is an editor extension for Unity that allows users to create realistic, detailed and consistent landscapes completely from scratch. It can generate topography, texture landscapes and populate them with trees, grass and prefabs. It can control scene lighting, weather, and day/night cycles. Designed from the ground up to be able to create an almost infinite variety of real-world results, it nonetheless is intuitive and easy to use so that you don't have to be a genius to achieve those results. When using Landscape Builder, you won't have issues with compatibility (as it uses standard Unity terrains), no special plugins are needed to get good results and those very results can be achieved within half an hour or less! Above all, Landscape Builder *just works*.

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Introduction

Important Upgrade Notes

Before you upgrade Landscape Builder in a Unity Project, take a full backup of the Unity project folder. Version 2.5.0 requires Unity (Personal, Plus, Pro or Enterprise) 2020.3.25 or newer. It is supported on Unity 2020.3.25+, 2021.x, 2022.x, and 6000.0. We will endeavour to provide support for anyone testing the latest Unity 6. We recommend using LTS or Release versions of Unity.

To upgrade Landscape Builder, open a new scene before importing the upgrade package. If you don't do this, the demo scene will not be upgraded correctly. Restart Unity or re-load the existing project. In the Landscape Builder window, on the Landscape Tab, verify that the Version number is 2.5.0.

If a landscape was created in an earlier version, you will be notified of this in the Landscape Tab after importing the new Landscape Builder package. Click "Fix Now" to automatically upgrade the landscape.

HELPFUL TIP: If you're wondering how to do something, check out our "Useful Forum Posts" at the end of this manual or check out one of the Video Tutorials in the Get Started section below.

Support Policy

For free support we will investigate reproducible bugs in our code. We may ask you to provide a simple scene with clear instructions on how to repro the issue. We can provide an upload area for the project files.

If this issue is critical to an announced game release date, we give it high priority. We also help with fleshing out new features that can improve gameplay and that we could add to a new version. In addition, we offer customer support for discovering existing features and how to configure them, both in our [Unity Discussions forum](#) or on our [Discord channels](#).

To add "polish" to a game or general help with implementing our products (and even writing custom gameplay code) we negotiate a flexible hourly rate which can be time-boxed to fit the studio or indie budget.

For ad-hoc on-going support, and to help us to keep supporting Landscape Builder for a long time, please support us on https://www.patreon.com/scsmmedia

We may alter this support policy from time to time without notice.

Demo Scene

The demo scene (LBDemoScene2), located in the Project window LandcapeBuilder\Demo Scene folder, uses a script to load scenes from Templates. These Templates are small meta-data files that let you transfer landscapes between projects or multiple computers.

After loading the new demo scene, ensure your Project Color Space is set to Linear before running the demo. You can do this from the Unity "Edit" menu, by selecting "Project Settings", "Player" and ensuring "Color Space" is set to "Linear".

The Templates in the demo scene are not highly optimised and only use Unity Standard Assets. If you have not added or removed the default Unity Quality settings you can switch between Simple, Good, Beautiful and Fantastic in the demo scene. The performance will depend on your computer's hardware, particularly the Graphics Processing Unit (GPU) and the amount of video RAM.

Later in this manual, there are instructions on how to load these Templates into new scenes so that you can see how we set things up.

NOTE: The demo scene template loader is not designed for builds – it is a tool designed to be run from within the Unity Editor.

What's Changed?

Version 2.5.0
[IMPROVED] Get Support buttons open Unity Discussions

Version 2.4.9
[NEW] LBLighting - IsSunShown, IsMoonShown
[NEW] LBStencil - Export navigation meshes to a project folder
[FIXED] LBStencil - WindowLayout.SaveWindowLayout not found in U2023.2+
[FIXED] LBStencil - no menu named Window/AI/Navigation in U2022.2+
[FIXED] failed because there is no menu named Edit/Frame Selected in Unity 6000.0+
[IMPROVED] NavMeshes do not affect lighmapping
[IMPROVED] Support for new NavMesh baking in U2022.2+
[IMPROVED] Support for Unity 6.0

Version 2.4.8
[NEW] LBLighting - Hide\Show Sun, Moon. External Culling Mask option.
[NEW] Runtime landscape finalise optimisations via API
[NEW] Extendable Floating-Point component - In Technical Preview
[NEW] Groups random seed advanced option
[IMPROVED] Runtime Perlin Additive or Subtractive topography layer checking
[IMPROVED] Render Pipeline detection in 2023+

Version 2.4.7
[NEW] LBStencil - replace existing stencil layer with PNG, Tex or heightmap
[FIXED] LBPath - CacheSplinePoints does not check for path with no points
[FIXED] WindowLayout.LoadWindowLayout not found in U2023.1+
[IMPROVED] Minor GC optimisation
[IMPROVED] Compatibility with U2023.1

For a full change log, see the Version History at the end of this document.

Product Integration – Better Together

The Landscape Builder team have worked with other vendors to ensure LB works well with other assets and provides additional features that will enhance your landscape or generally make your development easier. The following is a list of the 3rd party products that are certified to work with LB.

- AQUAS Water Set (version 1.5.3 recommended), AQUAS Lite
- EasyRoads3D version 3.1.9+
- HQ Photographic Textures Grass Pack Vol. 1 and 2.
- Rustic Grass 1.0
- Relief Terrain Pack version 3.3r (see the Texture Tab section in this document)
- Calm Water 1.5.9+
- River Auto Material 1.2+
- MegaSplat 1.73+ (See Texturing Tab, "MegaSplat Integration")
- MicroSplat 3.5+ (See Texturing Tab, "MicroSplat Integration")
- CTS 2019 (see "Complete Terrain Shader (CTS) Integration" section)
- Vegetation Studio 1.5.3+ (see the "Vegetation Studio Integration" section)
- Vegetation Studio Pro 1.1+ (see the "Vegetation Studio Pro Integration" section)

Beta Program

Landscape Builder customers get access to the LB Beta Program so that they can:

- Get early access to new features
- Get fast response to bug fixes
- Can contribute to the development of new features and how they work (you suggest; we implement).

If you have purchased Landscape Builder in the Unity Asset Store but don't have access to the Beta Program yet, send us your email address along with your Unity invoice number and we'll add you to the program.

The Beta Forum is accessible to everyone with a Unity account via the "Beta Program" button on the Landscape Tab in the Landscape Builder Window.

URP & HDRP Support

Some features of LB may not work correctly (or at all) with Universal or High-Definition Render Pipelines. For example, the following features are not supported with URP or HDRP at this time.

LB ImageFX (including weather)
LB Lighting System
Demo Scene
Runtimesample01,02.

For more information see the LB_SRP_Readme file in the LandscapeBuilder\SRP folder.

Features

Landscape Builder includes the following features:

Topography: Get the best of both worlds with Landscape Builder's topography layers system that combines procedural generation techniques with precise manual control. Noise layers allow you to generate topography features procedurally, with numerous presets included to get you started as quickly and easily as possible. This is combined with the image modifier layer which allows you to place terrain features directly into your landscape exactly where you want them, as well as numerous other layer types to suit more specific game needs such as rivers. Coupled with the ability to natively import real-world heightmap data as well as heightmap data from existing Unity terrains, Landscape Builder provides the flexibility to create topography of any shape or form.

Texturing, Trees and Grass: Texture your terrains and populate them with trees and grass procedurally with simple, intuitive rules and workflow. Also included is support for importing texture, tree and grass data from existing Unity terrains.

Object Placement: Populate your landscape with the powerful groups system which allows you to place objects around your landscape in a natural and intuitive manner. Making use of a modular design, the groups system makes it easy to fill your landscapes with whatever objects you like. The 3D Group Designer allows you to create the rules for your object placement visually in the Unity scene window, in a truly artist-friendly workflow. Programmers are not left out either, with fields in the editor able to produce exactly the same results as the group designer. 3D objects can also be procedurally placed along a spline with the Object Path Designer which is part of the groups system.

Stencils: Paint regions directly onto your landscape with stencils to control what appears where in your landscape. Stencils can be used to control topography, texturing, trees, grass and object placement.

Extras: Set up the atmosphere and time of day with ease with Landscape Builder's built-in lighting editor, generate normal-map and height-map textures for your albedo-maps, generate runtime scripts directly from the editor, use the weather image effects included to speed up your game development, and much more. Landscape Builder is just full of extra components designed to solve common game design problems frequently faced when designing and creating game worlds.

Integration: Freely integrate with a number of high-quality asset store products. Support for EasyRoads3D, Vegetation Studio, Vegetation Studio Pro, Relief Terrain Pack, AQUAS Water Set, Calm Water, River Auto Material (R.A.M.), HQ Photographic Textures, Rustic Grass, MicroSplat, and MegaSplat.

Ease of use: Enjoy a simple and uncluttered workflow, complete with artist-friendly in-scene design editors for features requiring a visual approach. With tooltips for all variables, a detailed manual and in-depth video tutorials, as well as developer support as standard, Landscape Builder leaves you free to spend your time actually making your game instead of trying to decipher complicated user interfaces and vague variable names. If that isn't enough, you can even join our beta program to test the latest versions of our codebase and suggest new features for future versions.

Performance: We use optimised algorithms to improve your workflow. When supported, for new landscapes, we use GPU acceleration for Topography, Texturing and Grass placement.

Get Started

Landscape Builder Window

The Landscape Builder window is the interface you use to build landscapes. To open it, click on the "Window" button at the top of the Unity window. A drop-down menu will appear. Select the submenu titled "Landscape Builder", then click "Landscape Builder Editor" to open the Landscape Builder window. Like other Unity windows such as the Inspector and Scene View windows you can drag and/or dock the Landscape Builder window.

There are nine tabs in the Landscape Builder window: Landscape, Topography, Groups, Texturing, Trees, Grass, Mesh, Export and Advanced. To navigate between them, click on each of the tabs.

Workflow

There are multiple ways to procedurally generate landscapes and place items within a landscape. Most features of Landscape Builder (LB), are complementary to each other. Most things you change as you build the landscape are saved, thereby giving you the ability to come back to them later and modify your work. When you exit your Unity project, then come back to it later, your latest changes will still be there as they will be saved with the scene. The exception is the Modifiers tab where changes are applied directly to scene objects. In future versions of LB, features on the Modifiers tab will be integrated into the overall workflow.

A typical initial workflow will include the following high-level steps:

1. Create a new project
2. Import Landscape Builder package
3. Save the scene
4. Create a new blank landscape using the Landscape tab
5. Add some topography using the Topography tab
6. Texture the landscape using the Texturing tab
7. Optionally import a 3rd party Water asset (e.g. AQUAS, Calm Water etc.)
8. Optionally add an ocean using the Landscape tab (Scene Settings)
9. Add some trees using the Trees tab
10. Add some grass using the Grass tab
11. Import your models and prefabs
12. Add rocks, prefabs, models etc. using the Groups tab
13. Import Unity Standard Assets – Characters
14. Remove the default camera and add the Unity First Person to the scene so you can play the project and walk around the landscape

Your workflow would then turn to building on that initial landscape by providing more detail and tuning placement.

1. Add lighting and weather using LB Lighting from the Landscape tab (Scene Settings)
2. Add a path or walk trails using MapPaths from Landscape tab (Scene Paths)
3. Use Stencil layers (Landscape tab, Stencils) and / or Map Paths to refine placement of items within your landscape

4. Add a Camera Animator and path (Landscape tab, Scene Paths) so you can look around the scene without having to walk
5. Optimise performance by adjusting grass density (Grass tab), number of trees (Trees tab), and overall landscape settings (Landscape tab, Terrain Settings).
6. If you want a road system, import 3rd party products like "EasyRoads3D"
7. Configure and test Screen Space Ray-traced Reflection on road or flat surfaces (LB Image FX)
8. Take some screen shots (Landscape tab, Scene Settings – Screenshot Device)
9. Add some lakes using Topography Image Modifiers
10. Add some wind zones (Landscape tab, Scene Settings)

Videos Tutorials and Demos

Name	URL
Workflow Basics	https://youtu.be/rDAEwIOX4Ww
Topography Layer Modifiers	https://youtu.be/rTJDdDWcV2Y
Group Basics	https://youtu.be/ImQskPbNLVk
3D Group Designer	https://youtu.be/C4U2RXA4xZM
Group Proximity	https://youtu.be/3sS5JzacAIc
Group Zones (includes texturing and grass placement within Groups)	https://youtu.be/db3c8RY5CcI
Group Object Path Basics	https://youtu.be/jafUXesio90
Group Object Path Bridge	https://youtu.be/QP-U1Jn0Sbg
SubGroups and Import Group	https://youtu.be/kPSOhHAhe_k
Group Copy Tutorial	https://youtu.be/SveSGfys0Ac
Importing Real-world data (GeoTIFF)	https://youtu.be/9Kv3V93h3hI
Stencils *	https://youtu.be/O4unA4OzdEU
NavMesh Basics	https://youtu.be/l4bHUruBjpE
Lighting	https://youtu.be/ydWqx_Yo0kI
Topography (Part 2) - Layers	https://youtu.be/Q_yoL9JvZSI
Texturing	https://youtu.be/8e1_W1BTV1A
Runtime	https://youtu.be/MMLKkZI1G8E
English country village Demo	https://youtu.be/dzF8SKVlCXg
LB Enviro Pack 1 Demo	https://youtu.be/sFOSUlfSOU8

* Native Stencil filters can now be applied to Topography, Texturing, Trees, Grass, and Groups. You no longer need to create a Map texture file.

Older videos – some concepts still apply and may be useful to understand LB basics.

Name	URL
Topography (Part 1)	https://youtu.be/wUiU3qWwH8g
Workflow	https://youtu.be/rDAEwIOX4Ww

Landscape Tab

The Landscape tab is used for the creation, selection and general modification of landscapes. When you first open the Landscape Builder window, this tab will be displayed by default.

Creating A Landscape

When you first open the Landscape Builder window, the "Generate Landscape" button will be available. Above the button some options will be displayed – The landscape settings and the terrain settings. The landscape settings control how the landscape is generated and cannot be changed after the landscape is generated. The terrain settings control the behaviour of the terrains that make up the landscape, and can be modified after the landscape has been generated. What each of the settings does is detailed below:

Property:	Function:
Landscape Name	The name of the landscape in the hierarchy. You are free to change this in the hierarchy after the landscape has been created.
Landscape Size	The total size (in metres) of the landscape.
Start Position	By default, the landscape is created with the left-bottom corner placed at (0, 0, 0). You can instead choose to have it created at the value you specify for the start position. NOTE: If the landscape transform position is changed AFTER creating the landscape, the position must be refreshed in Landscape Stats.
Terrain Width	The width (in metres) of each terrain in the generated landscape. A smaller terrain width means you will have more terrains in your landscape but potentially more detail and visual quality. A larger terrain width will do the opposite.

Property:	Function:
Terrain Settings Preset	Options include Default, Quality 1 and Performance 1. These are designed to quickly configure the Terrain Settings for you. Settings can be changed after a Preset is selected.
Material Type	This is the material and shader used when rendering the terrains in the landscape. The LB Standard Material Type can be used when rendering steep cliffs or canyons. It prevents Texture tiling from looking stretched. If you have the excellent Relief Terrain Pack v3.3[1] or newer installed, this can be selected then configured according to the vendor's documentation. If you own MegaSplat or MicroSplat[2], these are selectable from within LB. See the section titled "MegaSplat/MicroSplat Integration" under the "Texturing Tab" chapter later in this manual for more information. For Lightweight Render Pipeline, select "LWRP".
Heightmap Resolution	The resolution of the heightmap of each terrain in the landscape. Heightmap data is stored in a two-dimensional float array (you can think of it as a grid) and the width and length of the array is equal to the heightmap resolution. Increasing the heightmap resolution will increase the detail of the terrain

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[1] Relief Terrain Pack is a 3rd party product available from the Unity Asset Store.
[2] MegaSplat and MicroSplat are 3rd party products available from the Unity Asset Store.

	topography, but will increase topography calculation times, file size and rendering time.
Terrain Height	The maximum height (in metres) of the terrain.
Pixel Error	The pixel error controls the detail level of distant terrain geometry – the lower the pixel error the higher the detail level, but also the higher the rendering overhead, so increasing pixel error will improve performance. When pixel error is set to 0 detail level is reduced only for extremely distant terrain patches, but the rendering overhead will be severely increased. Recommended only for screenshots or completely static scenes.
Base Map Distance	The maximum distance (in metres) from the camera at which terrain textures will be displayed at full resolution. Beyond this distance, the textures will be as a composite (combined) texture at a lower resolution. Increasing this value gives better visual quality at the cost of performance. The Unity default range is 0-2000, but you can increase it up to 5000 if needed to improve visual quality for large (> 10000m) landscapes.
Base Texture Resolution	The resolution of the composite (combined) texture used at distances from the camera beyond the Base Map Distance (see above).
Alpha Map Resolution	Sometimes called the Control Texture resolution, it determines the splatmap resolution which contains the textures for the terrains. The default is 512, however it may be increased to 1024 or even 4096 (on 2019.3+) if a finer level of detail is required, especially if narrow paths are used. However, typically, you'll want to reduce this tiling effect with texture blending (i.e. overlapping Textures in the Texture tab)
Tree Distance	The maximum distance (in metres) from the camera at which trees will be rendered. Beyond this distance, they will be culled. This setting does not work with SpeedTree trees.
Tree Billboard Start	The distance (in metres) from the camera at which trees will be rendered as 2D billboards instead of 3D objects. This setting does not work with SpeedTree trees.
Tree Fade Length	The distance (in metres) over which trees will transition between 3D objects and billboards. This setting does not work with SpeedTree trees.
Grass (Detail) Resolution	Determines the number of separate patches of detail (grass) within a terrain. Lower resolutions will provide more sparse grass and/or can be used with terrain sizes less than 1000x1000. (Default: 1024)
Grass (Detail) Distance	The maximum distance (in metres) from the camera at which terrain details (such as grass and flowers) will be rendered. The Unity default range is 0-250, but you can increase it up to 500 for cases where you need to see large amounts of grass. For performance reasons, this is not recommended – the higher the detail distance, the greater the performance cost.
Grass (Detail) Density	The global density at which terrain details (grass) will be rendered (Default is 1). Lower values will affect how much grass can be applied on the Grass Tab.
Grass Scatter Mode	How grass (detail) is scattered on the terrain. New in Unity 2022.2, LB expects this to be InstanceCountMode. If you need to use CoverMode, chat to us on Discord and we'll see what we can do.
Draw Instanced	Terrain drawing will happen on the GPU. Requires Unity 2018.3 or newer.
Per Pixel Normals	Terrain normals are per-pixel and are generated from the heightmap independently of the mesh LOD. When enabled, pixel error can be reduced to decrease terrain vertex count. Requires U2018.3 and LWRP 4.0.1 or newer.
Auto Connect	Used in U2018.3+ to set terrain neighbours. All terrains with the same GroupingID are automatically connected for LOD etc.

Grouping ID	Used in U2018.3+ when Auto Connect is enabled to set terrain neighbours. All terrains with the same GroupingID are automatically connected for LOD etc.
Store TData in Project	Store the terrain data files in the project folder rather than the scene (only recommended for large landscapes with 25+ terrains). Can be used to reduce scene save time when not modifying terrain data in huge landscapes and can avoid the 4GB per scene limit.
Terrain Data Folder	Only applicable when Store TData in Project is enabled. This is the location in the project where the terrain data files will be created. After it is set the (F)ind button will locate the TerrainData parent folder in the Project pane. To (R)elink the TerrainData files to the landscape, first move the folder in the Project pane, then click the Relink button and select the new folder location. Finally, click "Apply Terrain Settings".
Grass Wind Settings	Settings for the waving grass.
- Speed	The speed of the wind that affects the grass. Setting this to zero won't disable wind for grass.
- Ripple Size	The size of the grass "ripples".
- Grass Bending	The degree to which the grass is bent by the wind. Settings this to zero will disable wind for grass, which will improve performance.
- Grass Tint	The colour of the waving grass. Typically set to white so grass textured keep their original colour. The Unity default is #B2997F00.

Once you are happy with your landscape and terrain settings, you can click the "Generate Landscape" button to create your landscape. If your main camera far clipping plane is not optimal for general topography creation and editing, you will be prompted once to automatically adjust it. When you're ready to compile your game or project, you may wish to modify the camera far clipping plane accordingly.

After you have created the landscape, the Landscape Builder will automatically switch to the Topography tab, but you can of course go back to the Landscape tab at any time and change the terrain settings. Once you are happy with the settings, you can click "Apply Terrain Settings" to apply all your settings to the terrains in your landscape. You can also click the "Restore Default Settings" button to restore the default terrain settings. These settings are only restored in the window, to apply these settings to your landscape you will have to click "Apply Terrain Settings" as per usual.

Alternatively, if you are not opening the Landscape Builder window for the first time, your workflow may be slightly different.

If you have already created a landscape and have it selected, you can create another landscape by clicking the "Create New Landscape" button located near the top of the Landscape tab. This will bring up the landscape settings and the "Generate Landscape" button as before.

Selecting A Landscape

You can select which landscape in the scene you want to edit by clicking the small circle next to the "Landscape to Edit Field" (which can be found at the top of the Landscape tab). A window will appear, and you can select any of the landscapes that you have in the scene. If the only option is "None", then you don't have any landscapes in the scene.

Terrain Settings

See the above section "Creating A Landscape" for a description of the options available. To change a "Terrain Settings Preset", select one from the dropdown, click "Get [Preset Name] Preset", then "Apply Terrain Settings". If you select the Preset, but then choose not to apply it, click on another Landscape Builder Tab, then return to the Landscape Tab. The original settings will now be visible in the editor window.

Landscape Stats

At a glance, you can see useful information about your landscape. It includes the overall landscape size, the size and resolution of each terrain, the number of terrains and the number of trees in the landscape.

For your convenience, there is also a handy Height Picker, which when enabled allows you to see the height (and slope) of the landscape at the position of your mouse in the scene view.

To change the world space position of a landscape, in the editor, select the parent gameobject and adjust the position's x,y,z values as required. Then, in the Landscape Builder Editor, on the Landscape tab, under Landscape Stats, click the "Refresh" button. This will update the landscape start position, and will move any existing MapPath, CameraPath, and Manual Clearing Group positions.

Scene Settings

The scene settings give you additional control over your scene. You can quickly add water, lighting, wind zones and/or a screenshot device.

Scene Settings - Water

With the scene settings, it is simple to add water to your scene. Typically, you'll want to build the topography before adding water to the scene. Once you've added some topography, drag your desired water prefab into the water prefab slot. You will notice that if "Primary Body of Water" is selected, the "Add Water to Scene" button becomes available. If it doesn't, make sure you have a landscape selected. A "Primary Body of Water" is used for oceans or very large bodies of water that span your entire landscape. They should also be the lowest body of water in the scene so that they don't "flood" other lakes or ponds that are added later.

Specify the water level – this is a measurement in metres above the start height of your landscape that the water will be placed. Don't be too worried about the level you give it as it can be adjusted later. To estimate your water level, expand the "Landscape Stats", click the "Toggle Height Picker" button and move the mouse around the scene view noting the height of the terrain. Collapse Landscape Stats and enter the value in the "Water Level" property field.

The "Primary Body of Water" has a scale factor that is proportional to the size of the entire landscape. The default is 2x, or twice the size of the landscape. Some water prefabs don't have circular or square meshes. If this is the case, you may wish to tick "Keep Aspect Ratio" to prevent the water from being distorted.

Now select the correct resizing mode. Transform Scaling resizes the water to fit your landscape by the scaling of the transform. Duplicating Meshes resizes the water by duplicating all of its meshes. The Standard Assets option should be chosen if you are using a water prefab from the Unity standard assets. It will automatically detect the type of water prefab and scale the water correctly. The Duplicating Meshes option should be used with caution as it does exactly what the name suggests. To prevent users accidently attempting to add tens of thousands (or even millions) of new meshes to a scene, a 5,000-mesh threshold is enforced by LB for water objects. If a water prefab contains a few very small meshes, Duplicating Meshes will not be a great option.

Landscape Builder also supports:

Product	Available from
AQUAS Water Lite	https://www.assetstore.unity3d.com/en/#!/content/53519
AQUAS Water Set	https://www.assetstore.unity3d.com/en/#!/content/52103
Calm Water 1.5.9+	https://www.assetstore.unity3d.com/en/#!/content/50834

If you have one of the above products, ensure you have Imported the Asset into your project, the correct prefab has been selected and the product is selected in the Water Resizing Mode dropdown.

Finally, when you are happy, click the "Add Water to Scene" button to add the water to your scene. It will automatically scale the water prefab to fit your landscape, and place it correctly in the scene. You can move the water up and down by adjusting the water level if you need to.

To change the "Primary Body of Water", ensure the prefab has been added and the "Primary Body of Water" is ticked. To change the type of water, simply select a different prefab. This time, when you click "Add Water to Scene" you will be prompted to replace the existing Primary body of water.

Scene Settings – Adding Lakes and Ponds

To add lakes and ponds to the scene perform the following tasks:

1. On the Landscape Tab, expand "Scene Settings"
2. Drag your desired water prefab into the water prefab slot
3. Untick "Primary Body of Water"
4. Set "Keep Aspect Ratio" and "Water Resizing Mode" as required
5. Set the "Water Size". This is the diameter or size of the water body as it will appear in the scene (don't worry, you can adjust the size of it later if required)
6. Arrange the landscape in the Scene View so that you can easily see where the water will be positioned.
7. Now, click the "Toggle Highlighter" button, move the mouse into the scene view where your landscape is, move the highlighter to cover the area where the water will go.
8. Increase or decrease the size of the water highlighter with the [ ] keys
9. Click the left mouse button to add the lake or pond to the scene.
10. The water level will be 10 metres above the centre of where the highlighter was positioned over the terrain. You can adjust this with using the Water Level slider in the water that was just added.
11. To resize the lake, adjust the Water Size X and Z values accordingly, and click "Resize Water"

A landscape can have multiple secondary bodies of water but only one Primary. Secondary water bodies can be used with the Landform Lakes and Valley's modifiers using the following workflow or by adding the water at the same time using the "Add Water" option on the Modifier Tab:

1. Identify in the scene view where you'd like the new lake
2. Click the Modifier Tab
3. Ensure the "Select Entire Landscape" is not ticked
4. Select an approximate radius with "Selection Radius"
5. Set the "Modifier Type" to "Landform"
6. Set the "Category" to "Lakes" or "Valleys"
7. Select a Lake or Valley from the dropdown list
8. Tick "Overwrite Terrain Noise" (this will typically give a flatten bottom of the lake or valley which will align with the water level)
9. Select the Depth Scale of the Lake or Valley
10. Adjust the other Landform values as desired
11. Move the mouse into the Scene View, position the highlighter and adjust the size as required with the [ ] keys
12. Click the left mouse when the highlighter is in the correct position in the landscape
13. If the lake doesn't look right, click "Undo Heightmap Modification" and adjust values and try again
14. Click the Landscape Tab
15. Expand "Scene Settings"
16. Now add a secondary body of water to the landscape with approximately the same size as the Lake or Valley.
17. Adjust the Water Level to the new water body as required (the new water body will be added to the end of the list)
18. Sometimes, you can achieve better results from adding the water first, then adding the Lake or Valley Landform modifier. It all depends on what topography exists around were you are placing your lake, valley or small pond. The main thing to remember is that you only have one level of Undo with heightmaps. However, you can add, remove, change water levels and resize water as many times as you like.

Scene Settings – Adding Flowing Rivers

To add flowing rivers to the scene with AQUAS 1.3 or newer, perform the following tasks:

1. Create a river bed or path in the topography using a "LB Map Path" (see "Scene Paths" section below)
2. If you haven't already done, so, download "Flow Map Painter" by clicking on "Get Flow Map Painter" and setting the installed path in the LB Advanced Tab under "AQUAS Integration".
3. Set "Water Resizing Mode" to "AQUAS"
4. Enable "Is River"
5. Adjust the "Water Level"
6. If "Primary Body of Water" is Click "Add Water To Scene"
7. Click "Create River Ref Texture"
8. Open "Flow Map Painter" but clicking the "Flow Map Painter" button (if it still says "Get Flow Map Painter" then you probably haven't set the installed path to the EXE or APP on the Advanced Tab.
9. Add the path of the reference texture created above into the Flow Map Painter "custom Texture Path"
10. In FMP, set "UV Tiling" to 1.
11. Click "Load Custom Tiling Texture" button
12. Click "Flow Lines (F)"
13. Using FMP, draw the flow map in the texture on the right (it takes a bit of practice).

14. Set Save to file name
15. Click "Bake to Texture"
16. Back in Landscape Builder, add the new flow map (PNG texture file) to the water "Flow Map".
17. Adjust the "Flow Speed" with the slider. Negative values make the water flow in the reverse direction.

Scene Settings - Lighting

The scene settings also make it easy to set up per-scene lighting. All you have to do is click the "Set Up Scene Lighting" button. If the "Remove Directional Lights" option is checked, all existing directional lights (and the GameObjects they're attached to) will be removed from the scene. When you click the "Set Up Scene Lighting" button, Landscape Builder adds a new GameObject to the scene called "LB Lighting". This has two components attached – a reflection probe and the LB Lighting script. There is also a light called "Sun Light" attached as a child gameobject. The script controls the lighting, giving you customisable static or dynamic lighting. The first property of the script is the "Lighting Mode" property, which allows you choose whether the lighting is static or dynamic. In static mode, the lighting doesn't change at runtime. In dynamic mode, a customisable day/night cycle is implemented. For more information on using the lighting system, see the Lighting System section on pages 69 – 77.

The "Remove Directional Lights" option and the "Set Up Scene Lighting" button will only appear if you haven't already set up the lighting in your scene with Landscape Builder.

Scene Settings – Wind Zones

Additionally, the scene settings allow you to add wind zones to your scene based on presets. Once you have selected a preset from the list, you can click the "Add Wind Zone To Scene" button to add a wind zone to the scene. Note: If you have a landscape selected, it will create the wind zone as a child of the landscape.

Scene Settings – Screenshot Device

The Screenshot Device enables screen shots of the Game view area to be quickly saved to disk as a PNG file. A configurable gameobject called "LB ScreenShot" is added to the scene. To modify the key used to take screenshots, select the gameobject and select a key from the Screenshot Key popup. When the game is running in the editor, pressing the Screenshot Key will save the PNG file to the LandscapeBuilder/ScreenShots folder outside the project Assets folder. The file format used is "yyyy-MMM-dd_hhmmss.png". If you wish to remove the Screenshot Device from the scene, in Landscape Builder click "Remove Screenshot Device from Scene" on the Landscape Tab, or simply delete the LB Screenshot gameobject from the scene.

NOTE: If the Screen Shot device produces a black image, in Project Quality settings, disable Anti-Aliasing (this is a known issue with Unity 5.x).

If you tick "Standalone Build" the screenshot device will be available in a Unity Standalone Build for PC or Mac.

Build Type	Screenshot output folder
Editor (Windows or OSX)	<Projectfolder>/LandscapeBuilder/ScreenShots

Standalone Windows	C:/Users/<UserName>/AppData/LocalLow/<YourCompanyName>/<YourAppName>/ScreenShots
Standalone OSX	/Users/<UserName>/Library/Application Support/<YourCompanyName>/<YourAppName>/

NOTE: On Windows builds, by default, AppData is a hidden folder. In Windows Explorer, navigate to the C:\users\<username> folder, select the "View" tab, and tick "Hidden Items".

Scene Paths - Add Camera Animation to Scene

This provides a quick way to set up the Camera Animator in the current scene. See "Camera Animator" later in this manual for more information about configuring Camera Paths and the Animator.

Scene Paths - Add Map Path to Landscape

TIP: If you haven't tried them yet, check out (newer) Object Paths in the Groups system.

A Map Path is a powerful tool that will enable you to:

- Alter the topography of the landscape using a custom shape that follows a path
- Create a river bed or valley
- Texture a path in your scene (or exclude a path from being textured)
- Get trees, bushes, grass or meshes to follow a path (or exclude them from being place along the path)

The basic workflow is:

1. Create a Map Path in the scene
2. To alter the topography, add a Map Path Layer OR create a new Topography Perlin Additive, Subtractive or Detail Layer, then add a Layer Filter with the Map (NOTE: Map Path layers don't require you to first create a Map from the Map Path).
3. Create a Map from the Path (1 click)
4. Use the Map with a placement mode of "Map" or "Height Inclination Map" on one of the other Tabs.

A landscape can have multiple Map Paths. These are placed in the Scene Hierarchy under the Landscape GameObject.
To add a new Map Path:

1. In the Landscape Builder Editor, on the "Landscape" tab, expand "Scene Paths" and click "Add Map Path to Landscape"
2. A new Map Path will be added and briefly highlighted in the scene Hierarchy window.
3. Align the scene view to approximately where you wish to start the path (you should be able to see the landscape in the centre of the scene view where you want the first point). If the landscape isn't in view, the first point will be added near the corner of the landscape.
4. Switch from the LB Editor to the Inspector
5. Click the small arrow to the left of "Path Points" in the inspector
6. Click the "+" sign to add your first path point (if the handle in the scene is selected, can also press "+" key while holding down SHIFT).

7. Click the "+" sign to add your second point.
8. Now drag the handle in the scene view to start creating your path
9. Repeat steps 7 & 8 a few times
10. To change the position or width of a single point click the "F" in the Inspector next to the point under the "Path Points" foldout.
11. To change the position of all the path points at the same time, hold down the CONTROL (Ctrl) key while moving the point handle
12. To change the width of a single path point, press W or select the Scale icon on the Unity toolbar.

Property:	Function:
Show Path in Scene	This will display the path points and the path dimensions in the scene view.
Closed Circuit	Sometimes you may wish to create a circular path where the start and end are joined. This works best if the path is a reasonable length and the start and end points are within 20 metres of each other.
Path Resolution	A path consists of segments. The resolution is the length of each segment.
Edge Width	This is used when blending the output Map, for example when using it to create a Topography Filter. The wider the edges, the more blending takes place. It is also used for Edge Smoothing with Topography MapPath Layers in Flatten mode.
Blend Start	Blend the starting edge of the curve with the surroundings using the Edge Width when a Map is created. Not available when Closed Circuit is enabled.
Blend End	Blend the ending edge of the curve with the surroundings using the Edge Width when a Map is created. Not available when Closed Circuit is enabled.
Remove Centre	When enabled, only the left and right borders of path are included when a Map is created when using the "Create Map" button. This could be used when creating a path that has Texture in the centre and another Texture along the borders of the path. The first Map would be created using a path width of say 10 (with Remove Centre disabled). You could then set the width of the path to say 30, enable "Remove Centre" and set the left and right border widths to say 10 metres. Click "Create Map" to produce a second map. On the Texturing tab, add two Textures with a "Texture Mode" of "Map". Select the Map, tick "Is Map from Path", for both Textures, then click "Texture Landscape" to see the results. This same method can also be used placement of Grass, Trees, Meshes, and/or Prefabs. If creating multiple Maps from the same MapPath, don't forget to rename the previous Map in the Project LandscapeBuilder\Maps folder before creating the next one to avoid the first one being overwritten.
Left Border Width	When "Remove Centre" is enabled, the width of the left border or indent that will be included when a Map is created using the "Create Map" button.
Right Border Width	When "Remove Centre" is enabled, the width of the right border or indent that will be included when a Map is created using the "Create Map" button.
Snap To Terrain	The path will follow the terrain height when in the scene view. A RE-SNAP button is also provided for those circumstances when the path is no longer snapped to the terrain e.g. When all points are moved at the same time by holding down SHIFT, or when the topography is rebuilt, or when a path is imported with a Template which had a different original offset position.
Height Offset	When "Snap To Terrain" is enabled, the points will maintain the height specified as they are drawn in the scene view.
Zoom On Find	When using the F button for finding a path point in the scene view, when this is enabled, the scene camera will be centred on the path point at the current "Find

Property:	Function:
	Zoom" distance. Sometimes when you are zoomed out a long way, and wish to adjust several points one at a time, it can be useful to disable "Zoom On Find".
Find Zoom	When the F button is used to locate a point in the scene view, this is the zoom distance of the scene camera from the point.
Map Resolution	This is the resolution of the Map texture that is created when "Create Map" is used.
Use EasyRoads	If you have EasyRoads3D v3 Pro installed in your project, you can create a path from one or more roads.
Mesh Landscape UV	This may be enabled when creating a mesh from a Map Path. Textures can be mapped onto the new mesh surface using X, Y coordinates (which are denoted as U, V or simply UV coordinates). On the generated mesh, the U is from left to right across the Map Path mesh, while V is from start to finish. The Landscape UV will assume the whole Landscape X and Z plane is being textured when the mesh is created (in this situation the Y upwards axis of the landscape is ignored). This can be useful when a water shader assumes that the water plane would take up the whole landscape.
Mesh UV Tiling	When creating a mesh from the Map Path, LB will add UV coordinates to the mesh. The Map Path width and/or length can be changed during scene modification which may make texture tiling cumbersome. To improve the workflow the UV tiling can be changed at the mesh level so that the same material can be used for multiple Map Path meshes.
Mesh Y Offset	The offset on the Y-axis between the Map Path gameobject and the mesh. This can be useful when the mesh is created for a river surface. If the mesh is used as a path or road on top of a Topography Map Path Layer, try setting this value to a small positive value to avoid Z-fighting with the terrain (e.g. 0.02).
Mesh Edge Snap	When creating a mesh, the edges of the mesh will be snapped to the height of the terrain. This will override the current height of the Map Path in the scene.
Edge Snap Type	Determines how to snap the edges to the landscape. Options include "Both Edges" (each edge will be snapped to the height of the landscape under the points along each edge), "Avg Left Right Edges", and "Min Left Right Edges"
Is Double-sided	When enabled, the mesh is created with the same number of verts but twice the number of triangles. The mesh will be rendered on both sides.
Mesh Include Edges	When creating a mesh, include the edge of the Map Path. See also "Edge Width" above. It can be useful to disable this when creating a flattened path using a Topography Map Path Layer that has its edges blended with the surroundings.
Mesh Include Water	When enabled, the mesh will be configured for popular water assets.
Water Resizing Mode	When "Mesh Include Water" is enabled, the resizing mode can be used to configure common water assets including AQUAS and water from Standard Assets.
Water Main Camera	AQUAS water an additional script to be added to the camera(s) in the scene.
Mesh Material	This is the material that will be added to the Mesh when it is created.
Add to Project folder	Save the Mesh to the Assets/LandscapeBuilder/Meshes Project folder. Typically, this is used if creating a prefab of the mesh for export to another scene. By default, the mesh is only created in the scene. Ensure the MapPath in the scene has a unique name for the current project. NOTE: This is not required if creating a LBTemplate to send to someone else as the mesh can be recreated from the path.

The following controls will only be available if "Use EasyRoads" is selected and you have it installed in your project.

Button:	Function:
Get Roads button	If using EasyRoads, this button will return a list of all un-finalised roads in the scene.
v	Move the road down one place in the list. If it is the last in the list it will wrap around to become the first in the list (only available when using EasyRoads)
Road Selection box	Select or unselect a road to include or exclude a road when the Update Path command is issued (only available when using EasyRoads3D).
R	Reverse the order of the points in this road. This is helpful if you want the path to start or continue at the opposite end of the road (only available when using EasyRoads3D).
	Name of the road as defined in EasyRoads3D
Update Path button	Replace the existing Path Points with the points from the selected roads

The following controls are available to all Map Paths.

Button:	Function:
Set Width	This will set the width of all path points. Enter the number and press RETURN or press ESC to cancel the operation. Clicking elsewhere in Unity will also cancel the operation.
Add Width	Will increase (or decrease) the width of all path points. Enter the number and press RETURN or press ESC to cancel the operation.
Duplicate	Will create a duplicate of the Map Path in the same landscape and will append "(Dup)" to the name. "Show Path in Scene" will be disabled for the current Map Path, and enabled for the duplicate. If a Mesh exists under the current Map Path it will not be duplicated. To create a mesh for the new Map Path, use the "Create Mesh" button. NOTE: Duplicating the Map Path in the Hierarchy using the Unity duplicate gameobject feature will not work correctly – use this button instead.
Create Map	This will output the path as a Map texture which can be used with other features in Landscape Builder.
Create Mesh	This will create a mesh from the Map Path in the scene. It will become a child of the Map Path gameobject. Typically, this action is used after flattening the topography with a Map Path Topography Layer.
Delete Mesh	Delete the current mesh (if any) for this Map Path
Bake	Bake Unity NavMesh navigation data. If a mesh has been created for this Map Path, it will be included in the Bake process.
Navigation Settings	This will take you to the Unity Navigation window which will help you configure settings used during the Bake process.
Path Points	Expand this foldout to see and edit the path points in the scene view
+	Add a new point to the end of the path (SHIFT & "+" key in Scene View)
-	Delete the last point in the path
F	Find the point in the scene and zoom in to see it.
I	Insert a new identical point before the existing point
X	Delete the point from the path

Stencils

Stencils allow you to quickly paint in the editor, where you want things to appear in your landscape. The Stencil editor is a top-down painting tool which allows you to map out where you want things placed. A Stencil can consist of multiple Stencil Layers, much in the same way a paint program has multiple drawing layers.

Stencil Layers can be used to filter where Topography Layers are applied to a landscape. They can also be used as filters for Texturing, Trees, Grass, Mesh or Prefab placement.

Optionally, Stencil Layers can be saved to produce texture Maps that can be used with procedural placement features in Landscape Builder, like Texturing, Trees, Grass, Mesh or Prefab placement tools.

NOTE: Most of the time, you'll not need to Save Maps. Using a Stencil Layer as a Filter is typically easier, faster, and will produce the best results. The Stencil tutorial video was produced using version 1.4.0, which only supported using Stencil Layer Filters for Topography.

Stencil Layers – HDRP

HDRP 10.x has a few quirks with Landscape Builder and Stencils. When you click "Show Stencil" in Unity 2021.2 you might see a solid colour, rather than a top-down view of your landscape and Stencil Layers.

If this happens, simply untick the Show Stencil, then go back to the Stencil in the Hierarchy again and click "Show Stencil" again. This seems to be an issue with the Unity not compiling the shader immediately.

In HDRP 10.x and Unity 2020.3 the shader doesn't get compiled unless the Material is expanded in the inspector (weird but true). As a work around, after clicking Show Stencil, in the Hierarchy expand the Landscape gameobject, and the Stencil, then on each stencil layer, expand the material in the inspector (which forces the shader to compile).

Stencils – Adding

To add a new Stencil to an existing landscape, in the Landscape Builder Editor window, click on the Landscape tab, expand "Stencils" and click "Add Stencil to Landscape". Once the Stencil has been created in the scene, set the "Stencil Name". This should be unique to the whole project so that any Map files saved don't overwrite files created for other Stencils in the same project. If required, you can add multiple Stencils per scene, although typically you'll only need one Stencil with multiple Stencil Layers.

Property:	Function:
Stencil Name	This is the name of the Stencil object in the scene. It is recommended that this be unique in the project so that Stencil Layers can be saved into a unique folder of the same name in the Project folder.
Auto Show LB Editor	Automatically show and select the Landscape Builder Editor window when the Show Stencil check box is turned off. Typically, this will occur after you have finished painting a Stencil Layer and wish to apply those changes to the landscape using one of the LB Editor placement tools.
Render Resolution	This is the resolution all the Stencils will be displayed in the Scene view during editing. It does not affect the Stencil Layer resolution. Lower resolutions will be

Property:	Function:
	updated slightly faster in the editor and may improve editing performance on lower powered computers.
Import Source	PNG (default), Texture2D or Terrains. Set the source to "Terrains" when you wish to use the "Import" button to add a new Stencil Layer based on the exiting landscape heightmaps.
Import Method	The method for importing a texture file into a new Stencil Layer. The data for the Stencil Layer can come from the Alpha, Red, Green or Blue channel of the texture. There is also an option to use the Grayscale of the texture.
Import Flip Texture	If the texture is a LB Map Texture, select this option when importing a Texture into a new Stencil Layer. This will flip the input texture top to bottom.
Save Map As RGBA	Used for 3rd party products like Vegetation Studio. By default, Map textures are saved uncompressed for use as Maps for Texturing, Grass, Trees, and Meshes.
1 Map per Terrain	Used for 3rd party products like, Vegetation Studio, that require texture filters or masks for each terrain in the landscape. By default, a single map texture is created for the whole landscape.
Mesh Offset Y	When adding meshes for use with NavMesh, this can place them slightly below the landscape to avoid flickering.
Layers	This can expand or collapse the list of Stencil Layers within the inspector

Button:	Function:
S	Script the Stencil out to the console. This is helpful when creating runtime scenes through C# scripting.
Import	When the "Import Source" in "Stencil Settings" is set to "PNG", this button will import a square PNG image file from disk into a new Stencil Layer using the Import Method from the Stencil Settings. When "Import Source" is set to "Terrains", it will add a new Stencil Layer using the current landscape heightmap data from the terrain(s). Use "Texture2D" to import psd, tif, jpg, or png files from the assets folder or a subfolder of the project.
Save Maps	Save the enabled layers to Map textures in the Assets\LandscapeBuilder\Maps folder. These texture files can be used with any Map placement mode or filter within LB.
+	Add a new Stencil Layer at the end of the list
-	Delete the last Stencil Layer in the list. Use with caution as there is no undo function for this operation. NOTE: Previously save texture Map files will not be removed from the project.

Stencil Layers - Overview

Stencil Layers contain the painted data in a compressed format within your scene. It can be helpful to think of Stencil Layers as a group of placement data that will be applied in a particular way. For example, you might want grass and rock prefabs to appear in some areas but trees in another. The grass and rock areas would appear in one Stencil Layer, and the tree areas in another. The two areas can overlap one another. Each Stencil Layer can be saved to a different Map texture for use elsewhere in LB.

The Stencil Layers can be independently rendered over the landscape in the editor Scene view by turning them on or off. When there are multiple Stencil Layers, it can sometimes be useful to change the order they are rendered in the Scene view.

Each Stencil Layer has the following properties or buttons.

Property:	Function:
Layer Name	The user-defined description of the Stencil Layer. It is recommended that the names be short, but descriptive as there is no other way to determine why you first created this Stencil Layer!
Resolution	This is the resolution the compressed data is stored. Changing the resolution will affect the data stored in the Stencil Layer. Be careful changing this after you've started painting into the Stencil Layer, as you may lose information.
Colour	This is the colour, at maximum strength, that your Stencil Layer will be rendered in the Scene view. It can be any colour you like and can be changed at any time. It does not affect how the compressed data is stored. We recommend that each colour is visually distinctive from others use in the same Stencil.

Button:	Function:
Toggle	Show or hide the Stencil Layer in the Scene view
A	Make this the active Stencil Layer
N	Negative Image - reverse or invert the data in the layer
V	Move the Stencil Layer down one place in the list. If this is the last Stencil Layer, it is moved to the top of the list.
I	Insert a duplicate Stencil Layer above the current position
Show / Hide	Show or Hide the Stencil Layer details in the inspector
X	Delete the Stencil Layer, including any painted data. Use with caution as there is no undo function for this operation. NOTE: Previously save texture Map files will not be removed from the project.

Stencil Layers – Painting

To paint into a Stencil Layer, first the Stencil must be visible in the scene. This is done by selecting the Stencil in the project Hierarchy and clicking "Show Stencil" in the editor.

If you don't have any Stencil Layers, click the "+" button to add a new layer. It is a good idea to give your layer a short descriptive name and change the render colour of the layer. It is important to have a different distinctive colour for each layer in your Stencil so that you can tell them apart when painting.

A Stencil Layer must be active in order for it to be paintable. If a Stencil Layer is not visible in the scene and the **A**ctive button is clicked, the Layer will immediately become enabled. Only one Stencil Layer can be active at any one time.

Button:	Function:
Paint	Toggle painting on / off for the current Active Stencil Layer
Zoom All	Zooms out so that the whole landscape is visible in the Scene view. Keyboard: \
Zoom +	For zooming in the Scene view. Keyboard: [
Zoom -	For zooming out in the Scene view. Keyboard:]
Undo	Undo the current painting session. All changes to the currently active layer will be lost. This button is only available when the Paint button is pressed.
Smooth	Smooth the edges of the whole active layer, at the specified smoothness strength. Brush size does not affect smoothing.
Arrows	Use to navigate around the view. Hold down SHIFT for faster scrolling. Keyboard: WASD
Mouse Right or middle button	Click the right or middle (scroll) button in the Scene view to centre the Stencil in the view. This can be faster than using the Arrow buttons.

LB uses brushes to paint onto a Stencil Layer. Currently, there are three brush types.

Brush:	Function:
Circle Solid	Used to paint solid circles onto the active Stencil Layer
Circle Gradient	Used to apply a blended circular gradient onto the active Stencil Layer
Circle Smooth	Used to smooth or blend areas of the Stencil Layer with the surrounds
Reduction	Used to reduce the effect or strength of the Stencil Layer pixels
Circle Eraser	Used to erase or remove data from the active Stencil Layer

Property:	Function:
Brush Size	The brush size, in metres.

Stencil Layers – Meshes

Stencil Layers can be used to create heightmap-shaped meshes. These transparent meshes can be used with the Unity Navigation system to create routes for Non-Player-Characters (NPCs) in your game.

To get you started, LB comes with a test NPC which can be located in the DemoScene\Prefabs folder. The low-poly sheep is designed to work with the Unity NavMesh system.

Button:	Function:
+ Mesh	This will create or update meshes from the Stencil Layer. They will become children of the Stencil gameobject. For complex layers, this may take a considerable time to create.
- Mesh	Delete the current mesh (if any) for this Stencil Layer
Mesh >>	Export Meshes. This is only required if you want to move them to another scene or project.
Bake	Bake Unity NavMesh navigation data. If meshes has been created for this Stencil Layer, they will be included in the Bake process.
Navigation Settings	This will take you to the Unity Navigation window which will help you configure settings used during the Bake process.

When meshes are added to the landscape, they are offset slightly below the terrains to avoid flickering at runtime. This can be adjusted by setting the "Mesh Offset Y" value in "Stencil Settings" before clicking the "Add Mesh" button.

Templates

Templates enable you to quickly copy the landscape settings and move them to another project, another computer, or send them to a friend. You can also send a copy to the LB Team so that they can see what you're seeing when we are helping you game development.

Templates – Saving

To save a Template, perform the following tasks:

1. Create a Landscape and add Topography. Optionally, use the Texturing, Trees, Grass, and/or Mesh tabs to procedurally populate the landscape. You could also add a path or two using the Scene Path tools from the Landscape tab.

2. On the Landscape tab, expand "Templates"
3. Give template a unique name and select the appropriate options (see table below). If you wish to send it to a team mate or use it in another project, also tick "Export Package" and click "Save Template".

IMPORTANT: We currently don't store any Unity Terrain data in templates. That means that Topography Layers which are "Unity Terrain" layers (or Imported layers), are NOT included in template backups.

Property:	Function:
Template Name	The name of the Template file that will be created in the Assets/LandscapeBuilder/Templates folder within your project. If a Template of the same name already exists when you click "Save Template", you will be prompted to overwrite the existing file.
Include LB Lighting	LB Lighting settings will be included with the Template
Include Paths	Camera and Map Path points will be included with the Template
Include Path Mesh Mat	If a Map Path Mesh has been created in the scene (like a pathway or road), you may wish to save this material (and texture) with the template so that it can be available when the template is applied (like at runtime). It is off by default as it may be a purchased texture which you may not wish to share if sending the template to someone outside your company or development team (so that you don't breach use-rights of the texture).
Export Package	When checked, the Template prefab file will be packaged and added to the LandscapeBuilder/TemplatePackages folder in the project folder. It will overwrite any packages of the same name.
Include Map textures	Maps are often used to restrict the placement of Texture, Trees, Grass, Meshes, Prefabs and sometimes Topography layers. Including the Map textures in the Template package that define these restricted regions or locations on a landscape can streamline sharing landscapes between projects or team members. NOTE: These include the actual PNG texture files so they could make your Template packages significantly larger.
Save Template	Click this button to save the Template as a prefab or Export it as a package.

Templates – Loading

There are two methods for loading templates. The first method is used when you want a lot of control over which components of a template are importing into an existing landscape. Use method 2 when you want to quickly test a template in another project or scene.

Load Template Method 1

To apply a Template already located in this project:

1. If you have a Template Package, import it into the project using the standard Unity tools (Asset\Import Package\Custom Package)
2. To view the information about the Template, select the Unity "Project" pane, drill down to LandscapeBuilder\Templates and select the package. If using 2018.3+ click "Open Prefab". Basic information about the package will be displayed in the "Inspector".
3. Create a new Landscape (if the original landscape was procedurally generated with LB, the new landscape can be the same size or different)

4. In the LB Editor window, drag the Template from the Project pane into the "Template to Apply" slot
5. Click "Apply Template". If the Landscape already contains configuration information like Topography Layers, Textures, Trees, Grass, Groups, and Meshes etc., you will be prompted to overwrite all these settings with those from the Template.

NOTE: Templates will not save manual changes you've made to the terrains using non-Landscape Builder tools like the Unity Terrain Tools unless you have imported the terrains into a Topography Layer or used a placement mode of "Imported".

The following options are available when importing a Template:

Property:	Function:
Template to Apply	The name of the Template prefab to apply
Create New Landscape	Create a new landscape from this Template rather than importing into the Landscape being edited (Default: Disabled)
Import Terrain Settings	Import and apply the terrain settings from the Template replace existing settings for this landscape (Default: Enabled)
Import Topography	Import the Topography Layers from the Template.
Import Textures	Import the Textures settings from the Template. These come from the Texturing Tab.
Import Trees	Import the Trees settings from the Template.
Import Grass	Import the Grass settings from the Template.
Import Groups	Import the Groups settings from the Template.
Actual Heights	Attempt to keep actual Group heights rather than use relative heights. If the source and destination start positions of the landscapes (y-axis) are different, the minimum and maximum actual heights may be clamped to avoid the Group appearing outside the potential landscape height range.
Import Mesh/Prefabs	Import the Mesh/Prefab settings from the Template. This will overwrite current settings in the Mesh/Prefab tab.
Import LB Lighting	Import the LB Lighting settings from the Template. If LB Lighting doesn't exist in the scene it will be added when "Apply Template" is clicked
Import Water	Import and apply water. Replaces any existing water added from Scene Settings in the landscape.
Import Paths	Import Camera and MapPaths.
Remove other Paths	This will remove any existing Camera or MapPaths in the current landscape
Replace Cam Animators	This will remove the any Camera Animators from the current landscape and re-create default Camera Animators for each Camera Path
Ignore Start Position	If the Template was created from a landscape that wasn't located at a world space position of 0,0,0, this will place the new landscape at 0,0,0.
Update Terrain Height	If the Template was created from a landscape with a different Terrain Height than the current landscape, object placement will be incorrect.
Main Camera	The main camera in the scene
Apply Topography	Will generate the topography after the Template has been loaded
Apply Textures	Will apply the textures to the terrains after the Template has been loaded
Apply Trees	Will place the trees in the landscape after the Template has been loaded
Apply Grass	Will populate the landscape with grass after the Template has been loaded

Property:	Function:
Apply Groups	Will populate the landscape with groups after the Template has been loaded
Apply Mesh/Prefabs	Will populate the landscape with meshes or prefabs from the Mesh/Prefab tab after the Template has been loaded
Apply Path Meshes	Map Paths can create a mesh in the landscape. If one had been created in the source scene, and Paths were included in the Template, the mesh will can be rebuilt in the landscape.

Load Template Method 2

This method is typically faster than method 1 but gives you less control.

1. If you have a Template Package, import it into the project using the standard Unity tools (Asset\Import Package\Custom Package)
2. Create and save a new scene
3. In the Project panel in Unity, go to LandscapeBuilder\Templates
4. You may need to click "Open Prefab".
5. Select the template that you wish to restore
6. In the Inspector, update the "Landscape Name" if you like. E.g. [name] Test Restore
7. Tick "Populate Landscape"
8. Click "Create New Landscape from Template"
9. If (for some reason) textures do not show up on the landscape, check the "Texturing" tab. If the texture images are missing (denoted by the N/A after their name), then click the [R]elink button. Once they have been resolved, "Texture Landscape" and/or "Populate Landscape with Groups". The later may be required if any Groups affect texturing.

Importing Terrains into a Landscape

Sometimes you may have created terrains with the standard Unity tools or with another terrain generation program but now wish to use the features in Landscape Builder.

Method 1 – Single terrain only

If you have a **single terrain** that is a root or **top-level gameobject** in your scene you can follow this simplified import process. If it has a parent gameobject, use Method 2.

1. Make a FULL BACKUP of your Unity Project folder
2. Import the Landscape Builder package into your project.
3. Windows ->Landscape Builder->Landscape Builder Editor
4. Dock LB window (typically on the right in the Unity Editor)
5. In the Hierarchy, select the terrain.
6. In the Unity Inspector, Add Component, LB Landscape
7. Go to Landscape Editor window (or docked tab), and drag the gameobject with the LB Landscape and terrain onto the "Landscape to Edit" slot
8. In the Landscape Tab, click "Import Now
9. When prompted, click "Yes, Fix Now" to automatically parent the terrain to the landscape

Method 2

If your terrains don't already have a parent gameobject, create an empty gameobject in your Hierarchy and move the terrains into that gameobject.

1. Make a FULL BACKUP of your Unity Project folder
2. Import the Landscape Builder package into your project.
3. Windows ->Landscape Builder->Landscape Builder Editor
4. Dock LB window
5. Select Parent GameObject of Terrains (can have multiple landscapes in same scene if need be). You may need to create an empty gameobject, **set the position of the gameobject to 0,0,0** and then drag the terrains into that new game object. Each terrain under the same gameobject needs to be square. All terrains under the same gameobject need to be the same size (width, length, height). If not, you'll need to place them in different parent gameobjects, each with their own LB Landscape script.
6. Give the terrain parent gameobject a unique name in the project. This will be the name of the landscape (e.g. My Landscape 01). If integrating with other assets, we recommend not making the landscape name a subset of any terrain names.
7. With multiple terrains they must be in the correct order in the Hierarchy.

   MyLandscape01
     Terrain01
     Terrain02
     Terrain03
     Terrain04
     ...
     Terrian09

   Top-down view

3	6	9
2	5	8
1	4	7

8. In the Unity Inspector, select the new parent GameObject (e.g. My Landscape 01)
9. Add Component
10. LB Landscape
11. Go to Landscape Editor window (or docked tab)
12. Drag the terrains parent GameObject (e.g. My Landscape 01) onto the "Landscape to Edit" slot
13. In the Landscape Tab, update the landscape version by clicking "Fix Now"
14. In the Landscape Tab, click "Import Now"
15. Adjust the Texture, Tree and Grass configurations as required in the Texturing, Trees and Grass tabs

There are a few restrictions or limitations currently with using Imported terrain data. For example, imported detail (Grass) cannot take advantage of GPU Acceleration. You will notice these are turned off in the Advanced tab after importing an existing terrain.

As a workaround

1. disable the imported Grass items
2. enable GPU Acceleration - Grass
3. add some new Grass items
4. procedurally add grass to your scene
5. once you're happy with the results, you can delete the old Imported Grass items

Importing Terrain Data into a Landscape

Sometimes you may wish to selectively import data from Unity Terrains AND procedurally control Topography, Texturing, Trees, Grass, and meshes or prefabs. Most game developers will not need this level of control and can simply create great landscapes using only procedural generation.

This feature can also be useful if you make adjustments to the Unity terrain data (heightmap, textures, trees, and/or grass) but still be able to use the full power of LB.

On the respective LB Editor window tabs (Topography, Texturing, Trees, and Grass) there is an "Import" button. If you have added various items outside the LB tool, you can import this data into LB. You could then add other procedurally generated items to the same landscape.

Using RAW heightmap data

Landscape Builder can export and import terrain 16-bit RAW files. Internally, and when exporting, LB always uses what is called Little Endian format (which is the Microsoft Windows default and optimized for Intel processors). LB can also read Big Endian RAW files which are often used on Apple Mac computers (which were originally equipped with 68000 processors).

The "RAW" and "Export RAW" buttons can be found on the Topography tab. To import RAW files, perform the following tasks:

1. Create a new folder either inside your Project (e.g. under LandscapeBuilder\Heightmaps) or someone else on your computer.
2. Add the RAW file into the new folder. If you have multiple terrains and there are multiple RAW files (1 for each terrain), the file must be in the correct sort order. The easiest way to do this is to append a number to the name. e.g. MyRAWFile001.raw, MyRAWFile002.raw, MyRAWFile003.raw etc. When LB creates multi-terrain landscapes, it creates them in columns starting from the left closed to 0,0. So from front to back, and left to right.

2	4
1	3

3. Click "RAW" and select the folder that contains the RAW files
4. Choose between Windows and Mac format (go with Windows if in doubt)
5. Click "Generate Heightmap"

Topography Tab

The Topography tab is used for the generation of heightmap data for each of the terrains in the landscape. Heightmap data is what defines the topography. In version 1.3.0 we introduced a new system called Topography Layers, which provided a new workflow for generating topography. It replaced all the previous topography generation options (value-based noise, curve-based noise, and image heightmap generation). Layers includes all the functionality of the older options, and adds a lot more.

Heightmap Generation – Overview

The first and most common way to generate topography (heightmap data) for your landscape is to procedurally generate it. Landscape Builder offers an advanced and versatile perlin noise generator for this purpose. The perlin noise generator is basically a function that takes position data as input and gives back height data as output. You can use this to generate consistent and virtually infinite topographies with which to build your landscapes.

The other way you can generate your landscape is by importing heightmap data. There are a number of Layer Types to handle this scenario. In this release, heightmaps are imported as a RAW, Portal Network Graphics (PNG), or Tagged Image File Format (TIFF) files. In PNG heightmap data files, the data is stored as a greyscale image. White values will be the highest on the terrain and black will be the lowest. Data in this format is available from a number of different sources. 16bit RAW and 16/32 bit (Geo)TIFF files typically contain higher resolution data than PNG files.

Using layers, you can mix and match perlin noise and image-based heightmap generation. This is particularly useful when you want to add real world heightmap data to your landscape.

Heightmap Generation – Layer Based

The Layer Based system operates by allowing you to add a number of layers, each consisting of data to generate topography with. There are presets available for the perlin noise layers to assist you. For each layer, you can specify what type of layer it is. There are 10 types in total, divided into perlin layers, image layers, modifier layers, and Map Path layers. Perlin layers allow you to generate topography from the output of a perlin noise function. Image layers allow you to generate topography from RAW or PNG images. The types of layers are further divided into six categories summarized here and explained in more detail below.

Base Layer Usage
Every topography should (usually) have at least one base layer. Base layers are used for generating the basic topography of your landscape, like the valleys and peaks of a mountain range or the gentle undulation and ridges of a desert.

Additive Layer Usage
Additive layers are used when you want to add areas of topography to your landscape but don't want to affect other areas. For example, you might be using a desert floor base and wanting to add some mesas, like in a canyon. You don't want this layer to affect every area, and you might also want to specifically put a mesa in one corner of your landscape for gameplay reasons. For this, you'd use an additive layer.

Subtractive Layer Usage

Subtractive layers are just like additive layers but they subtract from the topography instead of adding to it. Amongst other things, they are useful for adding river basins, lakes, craters or depressions.

Detail Layer Usage

Detail layers are used to add finer detail to your landscape. These operate by creating small scale noise on your topography. The differences between detail layers and base layers are the inclusion of the downscaling option and the layer filters. Downscaling allows you to "skip" larger scale octaves of noise as to only include smaller details in the output of the layer.

Map Path Layer Usage

Map Path layers are used for items like river, paths or any feature that will follow a path through the landscape. Typically, they are much longer than they are wide.

If river bed is sandy or gravelly, it may be relatively flat. Similarly, a manmade path will be smooth; worn down after months or years of constant human or animal traffic. You may also wish to add a raised dirt pathway to a scene and you'd like it to be formed using the terrain mesh and be blended with the surrounding "natural" topography of the landscape.

NOTE: If you wish to add noise to your path then you should use a Perlin Additive, Subtractive or Detail Layer with a Map Path Layer Filter rather than a Map Path Layer.

Image Modifier Layer Usage

Image modifiers can be shown in the scene before they are applied to the landscape. A volume picker can be used in the scene view to visualise, resize, position, and rotate the topography modifier.

Perlin Base Layers

Perlin Base layers are used for generating the basic topography of your landscape, like the valleys and peaks of a mountain range or the gentle undulation and ridges of a desert. The following presets are available:

Preset:	Result:
Mountain Range Base	Generates a ridged topography with the impressions of erosion
Mountain Range Complex Base	Generates a complex ridged topography with defined warping, subtly defined peaks and the impressions of erosion
Mountain Peaks Base	Generates a topography with large, flat plains and tall, steep, ridged mountain peaks
Swiss Mountains Base	Generates a ridged, mountainous topography with rounded peaks
Rolling Hills Base	Generates a smooth, inverse-ridged topography with rolling hills
Gentle Valleys Base	Generates a ridged topography with smooth, sweeping valleys

Desert Base	Generates a ridged, smooth, desert-like topography with sweeping dunes
Desert Floor Base	Generates a ridged, smooth desert-like topography that is flat enough to be a desert floor
Canyon Base	Generates a steeply terraced topography with flat plains and steep cliffs with a gradual runoff
Smooth Islands Base	Generates an island topography with a smooth transition from land to water and a typical smooth tropical island landscape on the land. Works best with water placed at a height of half the terrain height (defaults at 1000 metres)
Rugged Islands Base	Generates an island topography with a smooth transition from land to water and a rugged hills landscape on the land. Works best with water placed at a height of half the terrain height (defaults at 1000 metres)
Plains Base	Generates a flat, gently undulating topography
Alien Desert Base	Generates a wild, alien-looking desert topography
Rugged Hills Base	Generates a topography with bumpy plains and rugged hills and mountains

You can also adjust the settings manually. What each of the settings does is detailed below:

Property:	Function:
Noise Tile Size	The scaling of the noise on the x-z plane. Increasing this value will spread out the features of the topography more.
Noise Offset X	The offset of the noise on the x-axis. Increasing this value will move all terrain features to the right, meaning some of the rightmost features will disappear and new features will appear on the leftmost side of the terrain. Decreasing this value will move all terrain features to the left.
Noise Offset Z	The offset of the noise on the z-axis. Increasing this value will move all terrain features forward, meaning some of the foremost features will disappear and new features will appear at the back of the terrain. Decreasing this value will move all terrain features backwards.
Noise Octaves	The number of detail layers of the noise. Increasing this value will add more detail to the topography, but only up to a point: If your heightmap resolution is not high enough you will not be about to see the added detail. Increasing this value will also increase topography calculation time.
Height Scale	The scaling of the noise on the y-axis.

These are the main settings that will be helpful in setting the look and feel of your landscape. However, if you want to fine-tune your landscape and have that extra amount of control over it, you can modify the advanced settings. By default, they are in a collapsed state – you can show/hide them by clicking the small triangle next to the "Advanced Settings" label. What each of the advanced settings does is detailed below:

Property:	Function:
Noise Lacunarity	The factor by which each successive octave (or detail layer) of the noise is scaled down by on the x-z plane. Increasing this value makes the topography more turbulent/bumpier. Decreasing this value makes the topography smoother. In general, the higher this value is, the less detail there will be, and the higher this value is, the more detail there will be. This setting is rather sensitive – small alterations can cause large changes.
Noise Gain	The factor by which each successive octave (or detail layer) of the noise is scaled down by on the y-axis. Increasing this value makes smaller topographic details

	larger in scale (more influential). Decreasing this value makes smaller topographic details smaller in scale (less influential). The gain should be decreased if you wish to emphasise larger features of the topography. The gain should be increased if you wish to emphasise smaller features of the topography. This setting is rather sensitive – small alterations can cause large changes.
Warp Amount	Amount the input position is warped by. More warping produces more curved features in the topography. If this set to 0 no warping occurs. If warping is on, the topography calculation time will be increased.
Warp Octaves	The number of detail layers of the warping. Increasing the value adds warping on smaller scales, creating more detailed warping. Increasing this value also increases topography calculation time. This property is only shown if warp amount is more than 0.
Curve Modifier	A curve used to modify the output of the noise function. See the "About Curve Modifiers" section for more information.

Image Base Layers

If you want to use external heightmap data like SRTM data or similar as the basis of your topography use an Image Base layer. It allows you to generate a topography layer of your landscape from the grey scale output of an image.

You can specify the image used to generate the topography by clicking the "Select" button in the Texture2D field. A popup menu will appear, and you can use it to select any image you have in your project.

Aside from the image, you have a number of options that control how the image is applied to your topography. They are detailed below:

Property:	Function:
Image Source	Default, MIT_LRO_LOLA, or Terrain Party. If you are unsure which one to select, go with the default. See below for more details.
Normalise Input	Some heightmap image files only cover a small range of the grey scale spectrum between black (lowest) and white (highest). Normalising the values (converting all values to between 0 and 1) can be useful in some scenarios.
Repair Holes	Some heightmaps are missing data. This can result in a 0-1 value of 0 when other values surrounding it are non-zero. To help in these situations, ticking this option will attempt to set those zero values to a value similar to a neighbouring pixel.
Repair Threshold	When data is missing in the heightmap, it sometimes gets set to a non-zero value. Examples include data from the LOLA moon data sets. Increasing the threshold can repair these non-zero values too. However, if the threshold is increase too much, some (or all!) correct values can be "repaired" too. The higher the threshold value, the more pixels with a grey scale value greater than zero will be replaced.
Interpolation Smoothing	If the heightmap image has a relatively low resolution or has blocky artefacts, this can help to smooth the landscape. If set too high, the landscape may lose detail (however, if that happens you could add a Detail Layer to add it back in). NOTE: This will affect the whole heightmap, not just the current layer.
Height Scale	The scaling of the topography on the y-axis.

Detail Smoothing	This uses a matrix averaging algorithm to smooth the topography after this image heightmap has been imported. Depending on the granularity of the image data, keeping this value as low as possible will typically produce the best results. Start with no Detail Smoothing and increase as required.
Curve Modifiers	A curve used to modify the grey scale output of the texture. See the "About Curve Modifiers" section for more information.

Once you are happy with the settings, you can click the "Generate Heightmap" button. This will begin the process of generating the topography of each terrain in your landscape, and will show a progress bar. You can click the cross at the right of the progress bar to cancel the process if you need to.

The topography can only be generated from the image if the heightmap image has read/write enabled. If the texture you selected doesn't have this option enabled, a warning and a button titled "Fix Now" will appear. You can click the "Fix Now" button to automatically enable read/write. Alternatively, you can manually enable it by selecting the texture in the project, switching the Texture Type to "Advanced" and checking the "Read/Write Enabled" option.

If the imported layer looks blocky:

1. Click on the centre of the Heightmap Image in the Layer to highlight the texture in the Project window. In the Unity Inspector make sure the texture "Max Size" is at least as large as the source image file[3] and ensure the "Format" is set to "Automatic Truecolor".
2. Increase the Interpolation Smoothing and/or Detail Smoothing just enough to remove the blocky look.

One of the big advantages of the layer-based system is that it makes it much easier to create decent topographies from satellite heightmap data, which is usually low-resolution. This data is typically not particularly useful for say a first-person game where you're walking around on the ground. For the best results:

1. Add an image base layer, and put your heightmap image in the texture slot. Set interpolation smoothing to 2, 4 or 8 and set detail smoothing to 1. If you now click generate, you will see your heightmap data has been smoothed.
2. The heightmap data has been smoothed, but to be smoothed it will have lost a fair bit of detail. If you think it is **too** smooth (for instance, if you had relatively high-quality data to start with) you may want to reduce detail smoothing or interpolation smoothing.
3. The last step is to add that detail back in again. To do this, we need to add a detail layer. Add a second layer and choose one of the detail layer presets. Then click generate (you may want to set the landscape heightmap resolution to 1025 or 2049 if you can afford the computational time).

Image Source – MIT_LRO_ LOLA

This is a great source for Moon heightmap data from the Massachusetts Institute of Technology. The data was gathered from the Lunar Obiter Laser Alignment (LOLA) program. We'd recommend using the JP2 files from the SLDEM2015_512 section. This heightmap data is stored in JPEG 2000 format which can be converted into PNG files that Unity can read using a conversion tool like IrfanView[4].

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[3] Unity 5.x converts all images greater than 8192x8192 to 8192.
[4] IrfanView is available from http://www.irfanview.com

http://imbrium.mit.edu/EXTRAS/SLDEM2015/TILES/

Image Source – Terrain.Party

If importing data from the Terrain Party[5] website, typically you'll want to use the "Merged" image. Unity cannot natively open this PNG[6] format but you can either open it and resave in your favourite Image Editor or resave it as a Photoshop PSD 16bit file. Ensure you are careful to select a size that will translate to your landscape. We suggest starting with a resolution of 8KM, then making your landscape 8000x8000 with a height of 2000m.

Terrain data is typically height adjusted to have a minimum height of 60 metres. The real heights are adjusted to suit. For example, if the minimum height of the selected region is for example 700 m, and the maximum height is 2400 m, the imported heights will become 60 – 1760 (2400 – 700 + 60).

Perlin Additive Layers

Additive layers are used when you want to add areas of topography to your landscape but don't want to affect other areas. For example, you might be using a desert floor base and wanting to add some mesas, like in a canyon. You don't want this layer to affect every area, and you might also want to specifically put a mesa in one corner of your landscape for gameplay reasons. For this, you'd use an additive layer. The following presets are available:

Preset:	Result:
Mountain Range Additive	Generates a ridged additive topography with subtle warping, defined peaks and the impressions of erosion
Mountain Peaks Additive	Generates an additive topography with large, flat plains and tall, steep, ridged mountain peaks
Swiss Mountains Additive	Generates a ridged, mountainous additive topography with rounded peaks
Gentle Valleys Additive	Generates a ridged additive topography with smooth, sweeping valleys
Desert Dunes Additive	Generates a ridged, smooth, desert-like additive topography with sweeping dunes
Canyon Additive	Generates a steeply terraced additive topography with flat plains and steep cliffs with a gradual runoff
Rugged Hills Additive	Generates an additive topography with bumpy plains and rugged hills and mountains

You can also adjust the settings manually. What each of the settings does is detailed below:

Property:	Function:
Noise Tile Size	The scaling of the noise on the x-z plane. Increasing this value will spread out the features of the topography more.
Noise Offset X	The offset of the noise on the x-axis. Increasing this value will move all terrain features to the right, meaning some of the rightmost features will disappear and

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[5] http://www.terrain.party is not associated with SCSM in any way.
[6] Unity 5.x cannot open 16-bit PNG files.

Property:	Function:
	new features will appear on the leftmost side of the terrain. Decreasing this value will move all terrain features to the left.
Noise Offset Z	The offset of the noise on the z-axis. Increasing this value will move all terrain features forward, meaning some of the foremost features will disappear and new features will appear at the back of the terrain. Decreasing this value will move all terrain features backwards.
Noise Octaves	The number of detail layers of the noise. Increasing this value will add more detail to the topography, but only up to a point: If your heightmap resolution is not high enough you will not be about to see the added detail. Increasing this value will also increase topography calculation time.
Height Scale	The scaling of the noise on the y-axis.
Additive Amount	The additive amount value controls (roughly) how much of this layer is added onto your landscape. For example, if you used 0.5, roughly 50% of your desert would be mesas. If the additive layer does not appear to affect your topography, increase this value.
Remove Base Noise	You can also use the "Remove Base Noise" checkbox to retain the layer's normal shape, so (for example) that you don't have aspects of your desert floor layer showing on the top of your mesas. This will however reduce the overall height of your additive layer – if the additive layer does not appear to affect your topography (and you have already set additive amount to 1), it may be advisable to disable this.
Add Min Height	For landscapes with single terrains, and with "Remove Base Noise" enabled, the lowest point in the terrain is added to this layer so the Additive Layer appears above the other layers higher in the editor list.
Add Height	With "Remove Base Noise" enabled, the amount, in metres, added to this layer so the Additive Layer is raised higher in the landscape.
Restrict Area	Turn this on if you want to highlight an area in which you want this layer applied.
Enable Area Picker Button	Toggle the area picker on/off in the scene. By default, the area will be in the bottom left corner of the landscape at 0,0.
Area Rectangle	The size and location of the area that will be affected by the change
Blend Rate	The amount the restricted are is blended with the surrounding topography

For more settings, clicking the small triangle next to the "Advanced Settings" label. What each of the advanced settings does is detailed below:

Property:	Function:
Noise Lacunarity	The factor by which each successive octave (or detail layer) of the noise is scaled down by on the x-z plane. Increasing this value makes the topography more turbulent/bumpier. Decreasing this value makes the topography smoother. In general, the higher this value is, the less detail there will be, and the higher this value is, the more detail there will be. This setting is rather sensitive – small alterations can cause large changes.
Noise Gain	The factor by which each successive octave (or detail layer) of the noise is scaled down by on the y-axis. Increasing this value makes smaller topographic details larger in scale (more influential). Decreasing this value makes smaller topographic details smaller in scale (less influential). The gain should be decreased if you wish to emphasise larger features of the topography. The gain should be increased if you wish to emphasise smaller features of the topography. This setting is rather sensitive – small alterations can cause large changes.

Warp Amount	Amount the input position is warped by. More warping produces more curved features in the topography. If this set to 0 no warping occurs. If warping is on, the topography calculation time will be increased.
Warp Octaves	The number of detail layers of the warping. Increasing the value adds warping on smaller scales, creating more detailed warping. Increasing this value also increases topography calculation time. This property is only shown if warp amount is more than 0.

Perlin Subtractive Layers

Subtractive layers are just like additive layers but they subtract from the topography instead of adding to it.

Perlin Detail Layers

Detail layers are used to add detail to your landscape. These operate by creating small scale noise on your topography. The differences between detail layers and base layers are the inclusion of the downscaling option and the layer filters. Downscaling allows you to "skip" larger scale octaves of noise as to only include smaller details in the output of the layer. Internally, downscaling is how much the "tile size" of the noise is scaled down by on the x-z plane and also scales down the y-axis proportionally.

Layer Filters can be used to only allow the detail layer to affect certain heights or inclinations of your topography. These are at a high enough detail that you can obtain more detail by increasing the heightmap resolution of the terrains in your landscape up to 1025 or 2049 (although you should be advised that this will increase the computational time of your topography).

Preset:	Result:
Default Detail	Generates simple bumpy details
Ridged Detail	Generates ridged details
Swiss Detail	Generates medium-scale rounded details
Desert Detail	Generates small ridged details similar to those appearing on desert dunes
Hills Detail	Generates small rounded details to break up large flat areas
Warped Detail	Generates complex warped details

Image Detail Layers

Image Detail layers are similar to Perlin Detail Layers, except they take an image or Unity texture as input to produce the heightmap.

Map Path Layers

Sometimes you want to modify parts of the topography but don't wish to add noise. Examples include rivers, pathways and roadways. A Map Path Layer requires a Map Path from the scene as input. Unlike Map Path Layer Filters, Map Path Layers do not require a Map Texture as they natively interpret the world space location data of the path. So, simply create a Map Path in your scene and

add it to the Layer. You can get help creating a Map Path using the instructions from the "Scene Paths – Add Map Path to Landscape" in the Landscape Tab section of this manual.

Don't worry about creating a perfect path the first time, as it can be edited later. You can regenerate the topography as many times as you like after you've adjusted points within your Map Path. For faster generation times on large landscapes, you can increase the Map Path Resolution distance initially and then reduce it to between 2 and 5 metres when you're closer to the look you're after.

The following properties apply to all Map Path Layers:

Property:	Function:
Type Mode	Set is used to set the bottom and top heights of the path in the landscape. Add is used when add (or removing) height from the current topography heights Flatten is used to flatten the height perpendicular to the direction of the path.
Map Path	This is the Map Path that you created in the scene to define this layer.
Blend Preset	The Blend Curve to use. "Ease In Out" is the default and will rarely need to be changed.
Blend Curve	This determines how the edges of the path blend in with the surrounding landscape topography. Although you can customise this curve the default should work in most circumstances.
Height Preset	Select one of the presets to alter the Height Curve.
Height Curve	This customisable curve determines the cross-section of the heights along the path. The curve is a visual representation of what that cross-section will look like.

The following properties apply to a Type Mode of Set.

Property:	Function:
Min Height	The minimum height, in metres, of the path on the y-axis. If creating a river, this would be the bottom of the river bed.
Max Height	The maximum height, in metres, of the path on the y-axis.
Edge Smoothing	Will attempt to smooth the edges of the path. Typically, best results are achieved by setting this to 0 and adjusting the Height Curve, Min/Max Heights along with the Edge Width of the MapPath. Shallower, wider rivers or valleys look the best on Unity terrains.

The following properties apply to a Type Mode of Add.

Property:	Function:
Height to Add/Subtract	The height, in metres, to add or subtract on the y-axis to/from the current terrain heights
Subtract	If selected, the height will be subtracted from the current terrain heights rather than added.
Edge Smoothing	Will attempt to smooth the edges of the path. Typically, best results are achieved by setting this to 0 and adjusting the Height Curve, Height to Add or Subtract, along with the Edge Width of the MapPath. Shallower, wider rivers or valleys look the best on Unity terrains.

The following properties apply to a Type Mode of Flatten.

Property:	Function:
Height to Add/Subtract	The height, in metres, to add or subtract on the y-axis to the current terrain heights
Subtract	If selected, the height will be subtracted from the current terrain heights rather than added.
Edge Smoothing	The amount of edge smoothing to apply after the topography has been altered. The edge width can be adjusted in the Map Path. As this feature is relatively slow, set it to 0 if you don't need it to improve heightmap generation time (especially when building the landscape at runtime). This feature ignores the outer edge but overlaps in the inner edge so that cliff edges can be smoothed. Generally, less smoothing with narrower edges is better as smoothing will ultimately undo the flattening effect of this layer. Start with an edge width of 20% of the path width and Edge Smoothing of 0.1.

The following Height presets are available:

Preset:	Result:
Flat	Flattens the terrain along the path, typically used with a Type Mode of Flatten
River 1	A river bed which gently dips from both banks towards the centre
River 2	A river with flat left and right banks that then dip towards the centre
River 3	A flat-bottomed river with moderately sloping banks
River 4	A flat-bottomed river with flat left and right banks
River 5	Similar to River 4 but with slightly dipping left and right banks
River 6	A river with a left channel and a wide right floodplain
Slope Left	Has a raised hump on the left of the path
Slope Right	Has a raised hump on the right of the path

Image Modifier Layers

LB comes with a number of sample RAW and PNG topography modifiers which are in five categories (hills, lakes, mesas, mountains and valleys).

Property:	Function:
Category	Hills, lakes, mesas, mountains and valleys.
File Type	RAW or PNG
Landform	The name of the sample
Modifier Mode	ADD will directly add (or remove) height to the landscape. SET will set landscape heights directly, removing base noise.
Height	Size of the modifier, in metres, on the y-axis
Invert	All the heights of the modifier will be inverted, so that the modifier cuts into the landscape, rather than rises above it.
Y offset	Offset, in metres, of the modifier on the y-axis. Can be positive or negative.
Area Rect	The size and location of the area this modifier will affect.
Area Rect Rotation	The rotation, in degrees, of the modifier.
Use Blending	Whether the edges of the modifier will be blended with the surrounding landscape.
Centre Size	The amount of the centre of the Image Modifier that is preserved during blending with the surrounds.

Property:	Function:
Fill Corners	The amount the corners are filled with the modifier when it is blended with the surrounds.
Add Water	This option is available for lakes and valleys
Water Level Offset	The distance, in metres, the water is offset below the top of the lake or valley modifier.
Water Landscape UVs	The UVs for the water mesh that will be created will be based on the dimensions of the landscape, rather than the actual mesh.
Water UV Tiling	UVs for the water mesh that will be created will be scaled or tiles in the x and z directions of the landscape.
Water Type	Custom, AQUAS, Calm Water, River Auto Material (R.A.M.) or Unity Standard Assets water. If in doubt, use Custom and adjust the UV Tiling.
Water Material	The material (and shader) the water asset uses on the mesh generated by LB.

Check the scsmmedia.com website for a video tutorial on using Image Modifier layers.

To create your own Image Modifier Layers, see "Creating Image Modifiers from (Geo)TIFF files" and "Creating Image Modifiers from a Terrain" at the end of this chapter.

Imported Layers and (Geo)TIFF

As described in the "Landscape Tab" section called "Importing Terrain Data into a Landscape", existing or external data can be added to a Topography Layer. When the data is imported into a Topography, a special "Unity Terrains" layer type is created. This layer holds the actual RAW heightmap data which will be used to populate the terrains within the landscape.

As well as being able to import existing "RAW" terrain files, LB also allows you to import GeoTIFF files which contain heightmap data.

The benefit of using GeoTIFF files is that they can be downloaded directly from websites like "Open Topography" (http://opentopo.sdsc.edu/lidar?format=sd) and imported directly into Landscape Builder.

Greyscale, normalised TIFF files can also be imported from 3rd party products like World Creator.

Property:	Function:
Repair Threshold	The higher the value, the more pixels below the highest values will be replaced. This is a 0 to 1 value. So, if it is set to 0.1, values in the top 10% of the height range, will be repaired by using surrounding values.
Is Source Normalised	If the source data is already normalised, check this box. Some external software may generate normalised TIFF files. These do not contain actual heights like GeoTIFF files do, rather the data spans the whole range of 16bit values. When using this data, be sure to set the terrain height in the Landscape tab to the actual maximum height of your data.
Normalise Input	The data values are adjusted to cover the whole range from the lowest point to the highest, and match those to your landscape height. For example, if the lowest point in the data is 100m, this will now be the set to a height of 0 in your terrain.
Includes Below Sea level	Global Multi-Resolution Topography (GMRT) GeoTIFF data includes above and below sea-level heights. After importing the GeoTIFF file, enable this and click "Fix Now" when prompted (in that order). This will set an artificial sea level of

	10,000 and place seabed data below that. If the data looks incorrect, try deleting the Layer, and importing the TIFF file again. Contact support if you have issues.
Height Scale	Scaling of the RAW heightmap data on the y-axis (default: 1.0)
Floor Offset	The height, in metres, that the floor of the data is raised to allow for you to add river bed, valleys, or swamps to the lowest point in the landscape (default: 0m).

NOTE: You can also import heightmap data from grayscale textures by using Topography Image Layers (see the relevant section about in this manual).

To repair spikes in source data, see the following Unity post:

https://forum.unity.com/threads/387912/page-19#post-7016854

Importing MOLA (Mars) Data

Phase 1 - Getting the data

1. Go to the University of Washington to get the NASA data: https://pds-geosciences.wustl.edu/missions/mgs/megdr.html
2. Scroll down the page to "MEGDR Tiled Image Files and Labels at 128 Pixels Per Degree"
3. Download one (or two) of the IMG files 64 to 128 MB each, along with the TBL files (small text meta-data files)
4. Download and install the (free) ImageJ app (from US Dept. Health) https://imagej.nih.gov/ij/

Phase 2 - Convert data to TIFF

In the TBL file locate something that looks like the following:

LINES = 5632
LINE_SAMPLES = 11520
SAMPLE_TYPE = MSB_INTEGER
SAMPLE_BITS = 16
UNIT = METER

1. Open ImageJ
2. File->Import-Raw
3. Set Width to LINE_SAMPLES
4. Set Height to LINES
5. This example is 16-bit Signed because SAMPLE_BITS is 16 (2 x 8bit per pixel), Signed (Most Significant Bit, "Integer"). The data contains +ve and -ve numbers with an artificial sea level
6. Optionally crop the image (the IMG files are 1/16th of the surface of Mars!)
7. File->Save As->TIFF

Phase 3 - Importing into LB

1. Create a new landscape
2. On the Topography tab, click TIFF
3. Locate the TIFF file from Phase 2 and click Open
4. Depending on how big your TIFF is, how many terrains and their height-map resolution is, this could take from a few seconds to a few minutes.
5. Optionally add some Topography Smoothing (less or none is generally better)

6. Now you're ready to texture the landscape, add space ships (using Sci-Fi Ship Controller of course), add a character controller (e.g., Sticky3D Controller), build a colony etc.

About Curve Modifiers

Curve modifiers are curves that can be used to define a modification to a certain noise function or texture grey scale output. What they do is they specify for any possible input value a given output value. The input values are the values along the X-axis (left-to-right values) and the output values are the values along the Y-axis (bottom-to-top values). When using a curve modifier, an x value is determined based on the input value. This x value can be anywhere from 0 to 1. The point on the curve that has this x value is then located. Along with having an x value (its left-to-right position) it also has a y value (its bottom-to-top position). The output is set to the y value of the point on the curve.

Don't panic, we have Curve Modifier presets – read on!

The advantage of using the Curve Modifiers is that you have almost total control of the noise function itself. Not only can you add as many curve modifiers as you like to modify the overall output of the noise, you can add as many curve modifiers as you like to modify the output of each individual octave (or detail layer) of the noise, allowing you to reproduce a wide and varied number of topographies in your landscape.

Output Curve Modifiers are available in all Layer Types while Per Octave Curve Modifiers are only available in Perlin layers.

Output Curve Modifiers are curve that are used to modify the overall output of the noise. For instance, if you are looking to add a single terrace at a specific height to the topography or make the entire landscape steeper, you would add an Output Curve Modifier. Per Octave Curve Modifiers modify the output of each individual octave (or detail layer) of the noise, allowing you to modify the entire character or feel of the topography. For instance, if you want to add ridges to the topography or create many terraces at many different heights, you would add a Per Octave Curve Modifier. You can add or remove curve modifiers by clicking the "+" and "-" buttons respectively.

There are a number of different presets you can choose from for each curve modifier, and each will have different results depending on whether they are used as Output Curve Modifier or as a Per Octave Curve Modifier. These are detailed below:

Preset:	Output Result:	Per Octave Result:
None	Nothing is changed	Nothing is changed
Invert	The topography is inverted	The output of each octave of the noise is inverted
Increase Height	The height of the topography is slightly increased	The output of each octave of noise is slightly increased
Decrease Height	The height of the topography is slightly decreased	The output of each octave of the noise is slightly decreased
Output Min Max	The range of the output is increased	The range of the output of each octave is increased
Input Min Max	The range of the input is increased	The range of the input of each octave is increased
Ridged	The entire topography is "ridged" – one large ridge	Each octave of the noise is "ridged" – ridges will appear at every scale in the topography

	will appear at the maximum height of the topography	
Smooth Ridged	The entire topography is smoothly "ridged" – one large ridge will appear at the maximum height of the topography	Each octave of the noise is smoothly "ridged" – ridges will appear at every scale in the topography
Double Ridged	The entire topography is "ridged" – two large ridges will appear at the maximum height of the topography	Each octave of the noise is "double ridged" – ridges will appear at every scale in the topography
Smooth Double Ridged	The entire topography is smoothly "ridged" – two large ridges will appear at the maximum height of the topography	Each octave of the noise is smoothly "double ridged" – ridges will appear at every scale in the topography
Power of One Point Five	The output of the noise is raised to the power of 1.5 – high areas will become steeper and low-lying areas will become flatter. This has less effect than squared	The output of each octave of the noise is raised to the power of 1.5 – features, large and small, will generally be steepened. This has less effect than squared
Squared	The output of the noise is squared – high areas will become steeper and low-lying areas will become flatter	The output of each octave of the noise is squared – features, large and small, will generally be steepened
Cubed	The output of the noise is cubed – high areas will become steeper and low-lying areas will become flatter. This has more effect than Squared	The output of each octave of the noise is cubed – features, large and small, will generally be steepened. This has more effect than Squared
Power Of Four	The output of the noise is raised to the power of four – high areas will become steeper and low-lying areas will become flatter. This has more effect than Cubed	The output of each octave of the noise is raised to the power of four – features, large and small, will generally be steepened. This has more effect than Cubed
Very Smooth Terraced	The topography is terraced, with one terrace high, one terrace low and a very smooth incline between them	Each octave of the noise is terraced with a very smooth incline between the two terraces, resulting in many terraces at different heights and scales throughout the topography
Smooth Terraced	The topography is terraced, with one terrace high, one terrace low and a very smooth incline between them	Each octave of the noise is terraced with a smooth incline between the two terraces, resulting in many terraces at different heights and scales throughout the topography
Steep Terraced	The topography is terraced, with one terrace high, one	Each octave of the noise is terraced with a steep incline between the two terraces, resulting in

	terrace low and a steep incline between them	many terraces at different heights and scales throughout the topography
Very Smooth Double Terraced	The topography is terraced, with one terrace high, one terrace low, another terrace in the middle and two very smooth inclines between them	Each octave of the noise is terraced with a very smooth incline between the three terraces, resulting in very many terraces at different heights and scales throughout the topography
Smooth Double Terraced	The topography is terraced, with one terrace high, one terrace low, another terrace in the middle and two smooth inclines between them	Each octave of the noise is terraced with a smooth incline between the three terraces, resulting in very many terraces at different heights and scales throughout the topography
Steep Double Terraced	The topography is terraced, with one terrace high, one terrace low, another terrace in the middle and two steep inclines between them	Each octave of the noise is terraced with a steep incline between the three terraces, resulting in very many terraces at different heights and scales throughout the topography
Sharp Double Terraced	The topography is terraced, with one terrace high, one terrace low, another terrace in the middle and two sharp inclines between them	Each octave of the noise is terraced with a sharp incline between the three terraces, resulting in very many terraces at different heights and scales throughout the topography
Five Tiered terraced	The topography is terraced with five tiers of terraces	Each octave of the noise of the noise is terraced with five tiers of terraces, resulting in an extremely large amount of terraces at different heights and scales throughout the topography, including small rivulets
Ten Tiered Terraced	The topography is terraced with ten tiers of terraces	Each octave of the noise of the noise is terraced with ten tiers of terraces, resulting in an extremely large amount of terraces at different heights and scales throughout the topography, including very small rivulets
Twenty Tiered Terraced	The topography is terraced with twenty tiers of terraces	Each octave of the noise of the noise is terraced with twenty tiers of terraces, resulting in an extremely large amount of terraces at different heights and scales throughout the topography, including extremely small rivulets
Canyon Terracing 1	The topography is terraced with five tiers of terraces. Each terrace smoothly declines into a plateau	Each octave of the noise of the noise is terraced with five tiers of terraces, resulting in an extremely large amount of terraces at different heights and scales throughout the topography, including extremely small rivulets
Canyon Terracing 2	The topography is terraced with ten tiers of terraces. Each terrace smoothly declines into a plateau	Each octave of the noise of the noise is terraced with ten tiers of terraces, resulting in an extremely large amount of terraces at different heights and scales throughout the topography, including extremely small rivulets
Canyon Terracing 3	The topography is terraced with one hundred tiers of	Each octave of the noise of the noise is terraced with one hundred tiers of terraces, resulting in

	terraces. Each terrace smoothly declines into a plateau	an extremely large amount of terraces at different heights and scales throughout the topography, including extremely small rivulets
Island Smoothing 1	The middling heights of the topography are smoothed out, allowing for a potential beach area	Some regions of the terrain will be smoothed out, with the rest being subtly steepened
Island Smoothing 2	The middling heights of the topography are smoothed out, allowing for a potential beach area. This has less effect than Island Smoothing 1 and so will create steeper beaches	Some regions of the terrain will be smoothed out, with the rest being subtly steepened. This has less effect than Island Smoothing 1.
Island Smoothing 3	The middling heights of the topography are smoothed out, allowing for a potential beach area. This affects a smaller region than Island Smoothing 2 and so will create narrower beaches	Some regions of the terrain will be smoothed out, with the rest being subtly steepened. This has less effect than Island Smoothing 2

Layer Filters

Layer Filters are used with Perlin Additive, Perlin Subtractive, Perlin Detail, or Image Detail Layers to restrict which parts of the landscape are affected by the Topography Layer.

To add or remove a Filter, click the add (+) or remove (-) buttons. There are three filter types available for Topography Layers.

Type:	Applies To:	Purpose:
Height	Perlin Detail, Image Detail	To filter the strength of the Topography Layer based on a height curve
Inclination	Perlin Detail, Image Detail	To filter the strength of the Topography Layer based on an inclination curve
Map	Perlin Subtractive, Perlin Additive, Perlin Detail, Image Detail	To restrict the points in the landscape based on a texture "Map" of the landscape. This could have been created from a Stencil layer.
Stencil	Perlin Additive, Perlin Subtractive	To restrict the points in the landscape based on a Stencil Layer in the landscape.

Map Layer Filters use a texture "Map" generated elsewhere in LB, or in a third-party art program. A workflow, might be:

1. Generating a Perlin Base Topography Layer
2. Creating a Stencil
3. Save one of the Stencil Layers as a texture Map
4. Add a Perlin Additive Layer
5. Add a Layer Filter to the new Perlin Additive Layer
6. Set the Filter Type to "Map"

7. Add the texture Map from the Stencil Layer to the Layer Filter
8. Generate the Topography

NOTE: For Perlin Additive and Subtractive Topography Layers, the best way to use a Stencil Layer is with a Filter Type of "Stencil Layer". This Filter Type doesn't require you to first save the Stencil Layer as a Map; instead it uses the native Stencil Layer format.

Property:	Function:
Map	The texture Map PNG file – typically created from a Stencil Layer
Colour	The primary colour in the texture Map
Inverse	Enable if you want to affect all the areas in the landscape NOT in the Map
Smooth Rate	The amount of smoothing that will be applied to the filtered area of the topography. The lower the amount of smoothing the better. Typically, 0.1 or less.

To use a Stencil Layer to filter Topography Layer placement, a typical workflow would be:

1. Generating a Perlin Base Topography Layer
2. Creating a Stencil (e.g. Stencil01), with a Stencil Layer (e.g. Mountains Stencil Layer1)
3. Add a Topography Perlin Additive Layer
4. Add a Layer Filter to the new Perlin Additive Layer
5. Set the Filter Type to "Stencil Layer"
6. Set the Stencil to the new stencil created above (e.g. Stencil01)
7. Set the "Stencil Layer" to the new one created about (e.g. Mountains Stencil Layer1)
8. Add the texture Map from the Stencil Layer to the Layer Filter
9. Generate the Topography

Property:	Function:
Stencil	Topography Layer Filter Stencil. NOTE: Make sure this Stencil is located as a child object of the current Landscape.
Stencil Layer	The Stencil Layer that will filter or restrict where the Topography Layer is applied within the landscape.

Topography Masking

Topography masking allows you to "mask out" the topography of your landscape from the output of a mathematical function (like perlin noise) or the greyscale ouput of an image. Masking works with both the perlin and image topography generation. It can be accessed via the "Masks" tab at the bottom of the topography window.

There are three options for the Mask Mode.

Mode:	Function:
None	No masking will be applied when this is selected
Distance To Centre	General height of each part of your landscape will be controlled by how far away it is from the middle. You could use this to create something like an island or a mountain, where the central region is much higher than the outer regions. Alternatively, you could go the other way and create a lake in the middle of your

	landscape. The general topography of your landscape is preserved; the mask value is just used to scale your topography. The mask is defined by a curve (the mask curve setting) where 0-1 on the x-axis corresponds to the distance to the centre of the landscape (larger values are further from the centre) and 0-1 on the y-axis corresponds to the strength of mask (smaller values will be masked out more and will be reduced in height).
Noise	The output of a perlin noise function is used to create the mask, which is helpful for creating randomly (and naturally) positioned islands. You can define the noise tile size to control the size of the islands and also add warping to the noise to make it look more natural. When in noise mode, the noise tile size, offset X and Z, curve modifier and warp amount settings are displayed, which behave just as they do in the standard perlin noise topography generation.

The "Script Curve" button will output the C# code to the console to assist with creating curves in a runtime script.

Topography Erosion

Landscape can pseudo-simulate the effects of thermal erosion in the final pass. To do this, enable thermal erosion in the erosion tab at the bottom of the topography window.

Property:	Function:
Preset	The prese to use for thermal erosion. Selecting a preset changes the talus angle and the strength, but not the number of iterations
Iterations	The number of iterations used during thermal erosion. More iterations will erode the topography more and will generally yield more accurate results, but will take more time to complete. If you are using a preset, you should generally increase the number of iterations if there is not enough erosion occurring, and decrease the iterations if there is too much erosion occurring
Talus Angle	The angle that the slope of the topography will approach. Only slopes steeper than this angle will be eroded. Lower values will result in more erosion, while higher values will result in less (but more dramatic) erosion.
Strength	How quickly the topography slope approaches the talus angle. Lower strengths will generally yield more accurate results but will require more iterations to reach the same level of erosion.
Stencil	Optionally, include a Stencil Layer as a filter for the final pass erosion. First select a Stencil that is a child of the current landscape, then decide if it will be an AND or NOT filter.
Stencil Layer	The Stencil Layer from the Stencil to be used as the AND or NOT filter

Topography Smoothing

When applying image-based Topography Layers like GeoTIFF, RAW or PNG data, it is sometimes necessary to smooth the data. This can be done in a final pass by enabling smoothing in the smoothing tab at the bottom of the topography window.

Property:	Function:
Iterations	The number of iterations the smoothing pass makes over the terrain data
Pixel Range	The strength of the smoothing that is applied in each iteration

Stencil	Optionally, include a Stencil Layer as a filter for the final pass smoothing. First select a Stencil that is a child of the current landscape, then decide if it will be an AND or NOT filter.
Stencil Layer	The Stencil Layer from the Stencil to be used as the AND or NOT filter

Heightmap Undo

If you need to undo a modification to the heightmap, you can do so by clicking the "Undo Heightmap Modification" button located at the bottom of the Topography tab. To preserve memory, it can only store one heightmap undo per landscape.

Note on Texturing, Trees, Grass and Mesh Population

If you generate a new topography after you've run any of the texturing, trees, grass or mesh population operations, the textures, trees, grass and/or meshes won't be regenerated in order to match the new topography. Because of this, if you generate a new topography, you should re-run all of the texturing, trees, grass and mesh population operations you had previously run. This just entails going into each of the tabs and clicking on the "Populate Landscape With…" buttons again.

Creating a simple island scene with Layers

1. In Unity, create a new Scene
2. Save the Scene
3. Click the Landscape Tab
4. Landscape Size 4000x4000
5. Terrain Width 2000
6. Generate Landscape
7. On Topography Tab, add a Layer
8. Select "Desert Floor Base" from Preset popup
9. Change "Height Scale" to 0.1
10. Expand "Curve Modifiers and Filters"
11. Add an "Output Curve Modifier"
12. Change the "Output Curve Modifier" Preset to "Squared"
13. Click "Masks"
14. Change "Mask Mode" to "Distance To Centre"
15. Click "Generate Heightmap"
16. On Landscape Tab, expand "Scene Settings"
17. In Unity "Project" window type "water4advanced"
18. Drag the water4advanced.prefab into the LB window "Water Prefab" slot
19. Change the "Water Resizing Mode" to "Standard Assets"
20. Change the "Water Level" to 46
21. Click "Add Water To Scene"
22. On the Texturing Tab, select "Islands" as the Texturing Preset
23. Click "Assign Textures from Preset" and click "Assign" when prompted
24. Change "Texture 1" (Sand) "Max Height" to 55
25. Change "Texture 2" (Grass Muddy) "Min Height" to 50
26. Hide and Disable Textures 3, 4, 5 and 6
27. Click "Texture Landscape"

28. On the Trees Tab, select the "Islands Forest" Preset
29. Click "Assign Trees from Preset" and "Assign" when prompted
30. Change the "Min Height" to 56 and click "Populate Landscape With Trees"
31. Our Island is pretty flat so you could add some more Topography Layers
32. On Topography Tab, add a Layer
33. Select "Mountain Range Complex Base" from Preset popup
34. Change "Layer Type" to "Perlin Additive"
35. Change "Additive Amount" to
36. Click "Restrict Area"
37. Set Area to X 650, Y 800, W 2000 H 2000, and "Blend Rate" to 1.0
38. Click "Generate Heightmap"
39. On Texturing Tab, enable "Texture 3", change "Min Height" to 100 and "Min Inclination" to 20
40. Click "Texture Landscape"
41. On Trees Tab, click "Populate Landscape With Trees"

That just to give you an overview of how you can modify layers etc. You can easily change the shape of this single island by changing:

1. Layer 1 Output Curve Modifiers (try some of the presets like Power Of One Point Five, Cubed or Power Of Four)
2. Changing the Noise Offset X and Y values
3. Changing the Noise Tile Size (try 3000 and raise the water level to 53 on the Landscape Tab)

Other enhancements:

1. Add some detail layers
2. Change the single tree for multiple trees and give it tropical island look and feel
3. Add some grass from something like the excellent HQ Photographic Textures Grass Pack
4. Switch the water out for something like AQUAS
5. Add some roads on your island using a product like EasyRoads3D Pro or create tracks and paths using Object Paths from the Groups system in LB.

Creating Image Modifiers from (Geo)TIFF files

1. Create new landscape 4000x4000, terrain width 4000 (single terrain)
2. Go to http://opentopo.sdsc.edu/lidar?format=sd
3. Global Data, Shuttle Radar Topography Mission (SRTM GL1) Global 30m
4. Select the square area (the area may need to be taller than the width as pixels may not be square)
5. Select GeoTIFF
6. Give it a job title and your email address. Submit
7. Download rasters_srtm.tar.gz
8. Open the .gz file and then the rasters_srtm.tar file inside the .gz file.
9. Inside the .tar file is the .tif file you want. Extract it to somewhere out the LB project.
10. Rename the output_srtm.tif file. E.g., yorkshiredales_Swaledale_30m_18km.tif
11. In LB, on Topography tab, click "TIFF" and select the TIF file just extracted and renamed
12. Click "Normalise Input"
13. Generate Heightmap
14. Add some Smoothing (start with 2 Iterations and a Pixel Range of 3)
15. Generate Heightmap
16. Adjust the Height Scale (say 0.25) and test "Generate Heightmap"

17. Export RAW
18. The RAW file is saved under Heightmaps\[landscape name] project folder
19. In LB, rename LandscapeTerrain0000 file to modifier name. E.g., YorkshireDalesSwaledale
20. In LB, drag the file into the correct Modifier folder. E.g., Modifiers\Hills
21. To test modifier.

Creating Image Modifiers from a Terrain

Sometimes you may wish to create an Image Modifier layer for LB from an existing Unity terrain.

1. Create a regular terrain using the Unity terrain tools.
2. Highlight the terrain in the Hierarchy and click the Terrain Settings icon on the Terrain script in the Unity Inspector.
3. Click "Export Raw…", select "Bit 16", and click "Export" when prompted
4. Give the file a meaningful name and click Save
5. In the Project pane, drill down to Assets/LandscapeBuilder/Modifiers/
6. Right click on Hills or Mountains (don't use the Custom folder) and click "Show in Explorer" (if on Windows)
7. Copy the saved RAW file from step 4 into the Hills or Mountains folder.
8. Test the Image Modifier in the LB Editor. Go to the Topography tab, add a new Layer, change the "Layer Type" to "Image Modifier", change the "Category" to Hills. If you don't see your new modifier in the "Landform" dropdown, click the "Refresh" button on the Layer.

Groups Tab

Groups are used for the procedural placement of prefabs throughout your landscape. Beginners, artists, level designers, and programmers alike can access their power through the Group Designer and comprehensive options in the Landscape Builder Editor window.

Group members can be placed as individual items or as a collection of interdependent items that make up a structured, procedurally generated, groups that can be dotted around your landscape.

Although easy to set up with the visual Group Designer, clearings provide great flexibility and control over how prefabs are procedurally placed in the scene. For example, assuming you had the appropriate prefabs, you could create:

- Villages
- Farm yards
- Rocks surrounded by trees and flowers
- Forest clearings
- Mountain-side huts
- Flattened areas for gameplay
- Zone-based instantiation for character spawning
- Combined groups with static and movable characters

Watch the video series on Groups in the Get Started section of this manual.

Groups – Overview

There are four different Group types:

Group Type:	Description:	Use Group Designer?	Use Object Path Designer?
Uniform	For procedurally placing group members (prefabs) throughout the landscape. Useful when you want to evenly place prefabs based on common or individual rules. Stencils can be used to further filter where prefabs are placed.	No	Yes
Procedural Clearing	Clearings are areas within your landscape that contain one or more group members (prefabs) which obey rules within each group. Multiple Clearings can be procedurally placed in a landscape according to rules you define. Clearing can contain ground textures and/or grass.	Yes	Yes
Manual Clearing	Clearing that can be manually placed in the landscape. Apart from where they are placed, all other features are the same as Procedural Clearings.	Yes	Yes
SubGroup	Similar to Procedural or Manual Clearings, except that they are only spawned from within other Group Types.	Yes	Yes

Group Designer

If you wish to create Procedural Clearings, Manual Clearings, or SubGroup, this is the best tool to start with. Use the 3D Group Designer to create a visual representation of what each instance of a Group will look like when it is applied to the landscape.

After adding an empty Group in the Groups tab, change the type to either Procedural Clearing, Manual Clearing, or SubGroup, and click the button "Open Designer".

Drag prefabs from the Unity Project pane onto the Designer surface. Right-click on a prefab within the Designer surface to see the context-sensitive menu.

Alternatively, highlight some prefabs in your scene, then click the Import button on the Groups tab. This will create a basic Manual Clearing Group which you can edit in the Group Designer. You can also change this to be either a Procedural Group or a SubGroup after it is imported. When prefabs (members) are imported, they ignore the proximity of other prefabs around them. This behaviour can be changed on the member Proximity tab.

Group-Level Settings

Groups have a common set of properties that can be adjusted. Most properties that apply to Procedural Clearing Groups, also apply to Manual Clearing and SubGroups.

The order groups and members appear in the list will indicate the placement priority in the scene. Groups higher in the list in the editor will be placed in the scene before groups lower in the list. The same applies to members within a group.

Option Tab	Setting	Description
General		This options tab contains general group settings
General	Max Groups Per Sqr Km	Maximum number of Procedural groups that can be placed per square kilometre
General	Proximity Extent	The minimum distance a Procedural group's centre can be from any other group's extent or edge
General	Minimum Radius	The minimum size a clearing can be when created in the scene
General	Maximum Radius	The maximum size a clearing can be when created in the scene
General	Start Rotation	The starting rotation (in degrees) that the Manual or Procedural Group will be randomly rotated on the y-axis.
General	End Rotation	The ending rotation (in degrees) that the Manual or Procedural Group will be randomly rotated on the y-axis.
General	Remove Existing Grass	You may wish to remove all existing grass from a group. This can also be useful when you wish to add grass to a group from the Group-level Grass option tab.
General	Remove Min. Blend Dist.	The minimum distance over which grass being removed will be blended
General	Remove Existing Trees	You may wish to remove all existing Unity terrain trees from a group.

Option Tab	Setting	Description
Default		This options tab contains default rules that will apply to all members in the group unless "Override Group Defaults" is selected for that member.
Default	Minimum Scale	Default Group minimum scaling on the xyz-axes for members
Default	Maximum Scale	Default Group maximum scaling on the xyz-axes for members
Default	Min [Relative or Actual] Height	Default Group minimum height in metres that the group or members can be placed. To switch between Relative (to landscape start position), and actual height, right-click on a Group and toggle the "Group Actual Heights" option.
Default	Max [Relative or Actual] Height	Default Group maximum height in metres that the group or members can be placed. To switch between Relative (to landscape start position), and actual height, right-click on a Group and toggle the "Group Actual Heights" option.
Default	Minimum Inclination	Default Group minimum inclination in degrees that the group or members can be placed
Default	Maximum Inclination	Default Group maximum inclination in degrees that the group or members can be placed
Default	Flatten Terrain	Whether the topography (terrain) under and whole group will be flattened. If you wish to flatten the terrain for individual group members, disable this and set the member flatten options.
Default	Flatten Blend Rate	The amount of the edges of the flattened area that will blend with the terrain. To apply the original terrain, on the Topography tab, click Generate Heightmap.
Default	Flatten Height Offset	Height in metres above the centre point to flatten (Default: 0). Used to raise or lower the flattened area.
Filters		This option tab contains any group-level filters. This is where you apply Stencils to limit where groups and members are placed in the scene. Currently members, including subgroups, on Object Paths ignore these filters. If you have Vegetation Studio Pro, you can also use it to add Biome filters (masks) to a Group.
Filters	Filter Type	Stencil or Biome. NOTE: Biome filters only apply if you have Vegetation Studio Pro installed in the project and applied to the landscape in the Terrain Settings on the Landscape tab.
Filters	Biome	When Vegetation Studio Pro is enabled on the landscape, the Biome to apply to the whole Group. A VSP biome mask will be added to the landscape.
Filters	Blend Distance	The distance over which the biome will be blended with the surrounds.
Filters	Stencil	This is a reference to a 2D Stencil you have already created in your landscape (see details in the Landscape Tab for more information on Stencils). You will need to ensure that the Stencil is in the current Landscape as we currently don't check this.
Filters	Stencil Layer	The Stencil Layer within the Stencil. You may have multiple Stencil Layers to define different areas of your landscape. E.g. Grassed Area 1, Homestead, River Banks, Mountains etc. When you add a Stencil reference, by default, the first Stencil Layer will be selected.

Option Tab	Setting	Description
Filters	New Button	A quick way to add a new Stencil to the landscape. Typically, you only need 1 Stencil with 1 or more Stencil Layers.
Filters	Edit Button	A quick way to edit the Stencil from the Groups tab.
Filters	Consider Radius	When procedurally placing Groups in the scene, by default, only the centre of the Group is considered when evaluating if it is within the painted area(s) of a Stencil Layer. When enabled, the radius of each Group is also considered. However, for performance reasons, not all points within the Group are tested, only the centre and a few points around the circumference.
Zones		This option tab contains any Group-level zones you may have defined to determine where items are placed (or not placed) within a Procedural or Manual Clearing group. These can also be visualised and moved using the Group Designer. Zones are created at the Group-level, then applied at the member-level. Zones can also be applied to Tex(tures) and Grass. See below.
Zones	Mode	OR/NOT
Zones	Type	A circular or rectangular area can be used to define a zone.
Zones	Zone Centre Point	X, Z values, of where the zone will be placed within the group Procedural or Manual Clearing
Zones	Zone Radius	The radius of the Circle
Zones	Zone Rectangle	Width and Length of the rectangle
Zones	Biome	When Vegetation Studio Pro is enabled on the landscape, the Biome to apply to the Zone within the Group
Zones	Blend Distance	The distance over which the edge of the biome will be blended with the surroundings.
Tex		This Group-level options tab allows you to add Textures to the Procedural or Manual Clearing. Textures must exist in the Texturing Tab, located at the top of the Landscape Builder Editor window. They must be first applied to the landscape on the Texturing tab, although they can have a Strength of 0 if you only want them to be modified by Groups.
Tex	Texture nn	The name of the Texture from a list of available textures in the Texturing Tab.
Tex	Strength	Strength of the texture in the splatmap.
Tex	Noise	Whether or not noise will be used to add variation to the ground texturing
Tex	Noise Tile Size	Scaling of the noise on the x-z plane. Small sizes will result in smaller regions of texture, while larger values will give larger areas.
Tex	Whole Group	Tick this, if you want the texture to cover the whole Clearing.
Tex	Status	Indicates if the Texture will be usable in its current state or if it may need you to change something in the Texturing Tab.
Tex	Min. Blend Distance	The minimum distance over which the texture is blended with A. the surroundings outside the extent of the clearing if >= 0 or B. the surroundings inside the extent of the clearing.
Tex	Apply to Whole Group	Applies to all the area of each group in the scene
Tex	Edge Blend Distance	The number of metres to over which to blend the zones with the surroundings.

Option Tab	Setting	Description
Grass		This Group-level option tab contains Grass that you wish to add to Clearings.
Grass	Min. Blend Distance	The minimum distance over which the grass is blended with A. the surroundings outside the extent of the clearing if >= 0 or B. the surroundings inside the extent of the clearing.
Grass	Min. Density	The minimum density this grass can be in a patch
Grass	Max. Density	How densely packed the grass is
Grass	Use Noise	Whether noise will be used to add variation to the grass placement
Grass	Noise Tile Size	Scaling of the noise on the x-z plane. The larger the tile size, the larger the grass patches become.
Grass	Noise Octaves	Detail layers of the noise. Higher values will give more detailed shapes with less grass. To maintain similar amounts of grass, increase the Placement Cutoff.
Grass	Grass Placement Cutoff	The noise cut-off value for grass placement. Increasing this value will mean more grass is placed
Grass	Apply to Whole Group	Applies to all the area of each group in the scene

Member-Level Settings - Prefab

The default member type is Prefabs. This will be what you use the most to place prefabs within a Group.

Option Tab	Setting	Description
General		This options tab contains general group member settings
General	Prefab	The minimum size a clearing can be when created in the scene
General	Maximum per Sqr Hectare	Maximum number of prefabs that can be placed per square hectare (100m x 100m) within the clearing for the current group member. This setting does not apply to Object Paths.
General	Maximum per Clearing	Maximum number of prefabs per Group clearing within the scene. This further restricts the number in a group AFTER Max per Sqr Hectare is calculated. This is useful for clearings with a variable radius where you want an absolute maximum in any one clearing.
General	Combine Meshes	Useful for simple prefabs where you want to reduce the number of static objects in the scene. Can be used for more complex prefabs but generation time is greatly extended. When used in members placed along an Object Path, we recommend keeping this disabled until you are happy with the path. Then turn it on and Populate the Landscape with Groups. NOTE: This is not supported when using the Object Path Designer.
General	Keep Prefab Connection	Keep the connection between the instantiated prefabs in the scene and the Prefab asset. Changing the Prefab will change all instances in the scene(s)
General	Add Mesh Collider	Whether a mesh collider is added for each prefab's mesh. This will remove existing colliders.

Option Tab	Setting	Description
General	Remove Animator	When combining prefab meshes, remove any Animator components.
General	Remove Empty	Whether to remove empty game objects when combining Meshes. This can reduce the number of game objects in the scene if the prefabs don't contain additional scripts or components.
General	Override Group Defaults	Override the Group default settings for this Group Member. Permits unique rules for this member.
General	Minimum Scale	Minimum scaling on the xyz-axes for this member within the group when "Override Group Defaults" is enabled
General	Maximum Scale	Maximum scaling on the xyz-axes for this member within the group when "Override Group Defaults" is enabled
General	Min (Relative or Actual) Height	Minimum Relative (to landscape start position) or Actual height in metres that this member can be placed within the group when "Override Group Defaults" is enabled. To switch between Relative (to landscape start position), and actual height, right-click on a Group and toggle the "Group Actual Heights" option.
General	Max (Relative or Actual) Height	Maximum Relative (to landscape start position) or Actual height in metres that this member can be placed within the group when "Override Group Defaults" is enabled. To switch between Relative (to landscape start position), and actual height, right-click on a Group and toggle the "Group Actual Heights" option.
General	Minimum Inclination	Minimum inclination in degrees that the member can be placed within the group when "Override Group Defaults" is enabled
General	Maximum Inclination	Maximum inclination in degrees that the member can be placed within the group when "Override Group Defaults" is enabled
General	Use Noise	Noise will be used to add variation to the prefab placement. For Path Objects, use the Placement Cutoff on the Layout tab.
General	Noise Tile Size	Scaling of the noise on the x-z plane
General	Placement Cutoff	The noise cutoff value for prefab placement. Increasing this value will mean more prefabs are placed
General	Align with Terrain	Whether the prefab will be aligned with the terrain normal or slope. Not compatible with "Use Path Slope" on Path tab. Currently not compatible with Group Flatten Terrain.
General	Flatten Terrain	Whether the topography (terrain) under and surrounding the prefab will be flattened. If you wish to flatten the terrain for all members of the group, consider using the Group Type of Clearing and Group Flatten Terrain. Currently not compatible with Group Flatten Terrain.
General	Flatten Distance	This is the distance the terrain is flattened from the centre of the prefab.
General	Flatten Blend Rate	The amount of the edges of the flattened area that will blend with the terrain. To apply the original terrain, on the Topography tab, click Generate Heightmap.
General	Flatten Height Offset	Height in metres above the centre point to flatten (Default: 0). Used to raise or lower the flattened area.

Option Tab	Setting	Description
XYZ		This options tab contains the XYZ component settings for a group member
XYZ	Placed in centre w/offset	Is this prefab placed in a fixed location with an offset from the centre of the group? Turn off if you want one or more randomly placed within the group or zone(s) in the group.
XYZ	Offset XZ	When "Place in centre w/offset" is enabled, the offset on the x and z-axis from the clearing centre for this prefab within the group
XYZ	Model Offset	Local offset this prefab model. Typically, this can be left at 0, 0, 0 if the prefab is correctly zeroed.
XYZ	Randomise Offset Y	Randomly select an offset for the prefab on the y-axis between the minimum and maximum offset Y values
XYZ	Offset Y	The offset on the y-axis for this member within the group when Randomise Offset Y is disabled
XYZ	Min Offset Y	Minimum offset on the y-axis for this member within the group when Randomise Offset Y is enabled.
XYZ	Max Offset Y	Maximum offset on the y-axis for this member within the group when Randomise Offset Y is enabled.
XYZ	Rotation Type	How the group member will be rotated in relation to other items in the group.
XYZ	Randomise Rotation Y	Whether the y-axis rotation should be randomised
XYZ	Rotation Y	The fixed Y rotation (in degrees) that the prefab will be rotated on the Y-Axis
XYZ	Start Rotation Y	The starting Y rotation (in degrees) that the prefab will be rotated on the Y-Axis when Randomise Rotation Y is enabled.
XYZ	End Rotation Y	The ending Y rotation (in degrees) that the prefab will be rotated on the Y-Axis when Randomise Rotation Y is enabled.
XYZ	Randomise Rotation XZ	Whether the additional x-axis and/or z-axis rotation should be randomised. This could be helpful to add some random wobble to a prefab.
XYZ	Rotation Override	Used to override the X and Z rotations of a model that has a non-0 rotation
XYZ	Start Rotation X	The starting X rotation (in degrees) that the prefab will be additionally rotated on the X-Axis
XYZ	End Rotation X	The ending X rotation (in degrees) that the prefab will be additionally rotated on the X-Axis
XYZ	Start Rotation Z	The starting Z rotation (in degrees) that the prefab will be additionally rotated on the Z-Axis
XYZ	End Rotation Z	The ending Z rotation (in degrees) that the prefab will be additionally rotated on the Z-Axis
Proximity		This options tab contains the proximity settings that apply to group members
Proximity	Proximity Extent	The minimum distance this member can be from any other member's extents in any group
Proximity	Ignore Prox of Others	When this prefab is placed, it will not take into consideration the Proximity Extent of other prefabs in this Group. It may be placed close to other objects within the same Group.
Proximity	Prox Ignored by Others	Other prefabs can be placed at the same position or near this prefab. For example, you could place a box under or on top of a table or pot plants under a patio.

Option Tab	Setting	Description
Proximity	Min Grass Proximity	Grass within this distance of the centre of the object (multiplied by its scale) will be removed
Proximity	Remove Min. Blend Dist	The minimum distance over which grass being remove should be blended
Proximity	Remove Trees	Whether terrain trees near the prefab will be removed if within the Min Tree Proximity. If not enabled, prefabs will not be placed within the minimum tree proximity of a terrain tree.
Proximity	Min Tree Proximity	Trees within this distance of the prefab will be removed (from the centre of the tree to the edge of the prefab proximity extent)
Zones		Zones may be used to restrict where members are placed within a clearing group. Zones are defined at the Group-level, then applied as filters here for clearing members. Zones do not apply to Uniform groups
Zones	Zone Edge Fill	Used when you wish to place prefabs around the edges of the zone filters. For rectangle zone filters, select Top, Bottom, Left and/or Right edges. If any of the zones are circles, selecting T, B, L, or R will fill the edge of the circle.
Zones	Zone Fill Distance	The distance (in metres) from the outer edge of the zone filters towards the centre that the prefabs will be placed when Zone Edge Fill is enabled.
Paths		This options tab contains additional settings relevant when a member (prefab) is placed on an Object Path.
Paths	Use in Paths Only	When enabled the member will only be placed along any Object Paths it has been added to (see Object Paths below). This means it will not be placed in the landscape UNLESS it is on an Object Path.
Paths	Use Path Height	Off by default, the prefab will use the Path Height rather than the terrain height. This can be useful when working with multiple Series and you wish to "stack" them on top of each other in the scene. Like for example, building a bridge with multiple components.
Path	Use Terrain Trend	When the member is in a clearing or subgroup and Use Path Height is enabled, this will allow the path to also follow the trend or contours of the terrain.
Paths	Use Path Slope	Off by default, this can be used to make the prefabs follow the slope of the Object Path. Not compatible with "Align with Terrain" on General tab.
Paths	Orientation	Default Space: Rotation and offset rules will apply like the would any other member within the Group. Path Space: Rotation and offset rules will use the forward direction of the Object Path.

Member-Level Settings - Object Path

Object Paths are used to populate a spline with other (prefab) members in the Group. They can also be used to spawn SubGroups. You can have a different starting or ending prefab (or SubGroup) on the path and/or have multiple different prefabs (or SubGroups) along the path. If you have different

prefabs in the path, you can choose how the procedural engine determines when to place each prefab in your list. When the path is given width, it can be used to make walkways, trails, rivers, or pathways.

There are different spacing methods. Currently the choices are Exact Quantity in path, Quantity per 100m, and Spacing distance.

Each different Group member placed along the Object Path may be rotated or offset based on its Orientation. This is set in the individual Group Member Paths tab (See Member-Level Settings – Prefab above for more information).

The Object Path can be configured to add rotation on the z-axis along the path. The z-axis rotation of each prefab placed between user-defined path points is smoothly blended between points. Other rotation rules like "Align with Terrain" can also be applied (separately or at the same time) to each prefab.

Object Paths can be created in Uniform Groups (landscape-wide), Procedural Clearing Groups, Manual Clearing Groups, and/or SubGroups. When Object Paths are placed in Clearing Groups, and the Groups are instantiated in the scene, the Object Path positions and their prefabs are correctly rotated to reflect the rotation of the whole Group, be it a village, farm yard, town, forest clearing, hamlet, game point of interest etc. We've done the maths heavy lifting so that it "just works" for your game design.

Typical Object Path Workflow (Uniform Group)

1. In an existing or new Uniform Group
2. Add members for prefabs you'd like on to place on the Object Path (optionally set them to "Use in Paths Only" on the Paths tab)
3. Add a new member and switch it to an Object Path type using the (O)bject Path button.
4. Open the Object Path Designer and create a spline in the scene
5. On the Objects tab, decide which members you'd like to place along the path and how you'd like to space the prefabs
6. Click the Refresh button to see what they would look like in the scene
7. Adjust the path points in the scene, change the Objects, and/or change the Object Layout options
8. Click the Refresh button and repeat the above step as required
9. Close the Object Path Designer
10. Click Populate the Landscape with Groups button

Typical Object Path Workflow (Manual/Procedural Group or SubGroup)

1. In an existing or new Manual/Procedural Group or SubGroup
2. Open Group Designer
3. Add members for prefabs you'd like on to place on the Object Path (optionally set them to "Use in Paths Only" on the Paths tab)
4. In the Landscape Builder Editor, add a new member and switch it to an Object Path type using the (O)bject Path button.
5. Open the Object Path Designer and create a spline in the Group Designer
6. On the Objects tab, decide which members you'd like to place along the path and how you'd like to space the prefabs
7. Click the Refresh button to see what they would look like in the Group Designer

8. Adjust the path points in the Group Designer, change the Objects, and/or the Object Layout options
9. Click the Refresh button and repeat the above step as required
10. Close the Group Designer
11. Populate the Landscape with Groups button

Option Tab	Setting	Description
General		This options tab contains general Object Path settings
General	Path Name	A unique name for the Object Path in the project. LB doesn't check if the name is unique – you need to manage this yourself.
General	Path Has Width	When enabled the object path can also be used to flatten topography, apply textures (future), and create meshes. It can also create objects with different layouts and offsets.
General	Show Path in Scene	When enabled the path will be displayed in the scene view
General	Show Distances	When enabled the distances from the start will be displayed in the scene view
General	Show Point Labels	When enabled the point labels will be displayed in the scene view
General	Show Surrounding	When enabled the extent to which the path is blended with the surrounding topography is displayed in the scene view
General	Path Resolution	This is the size of the segments that make up the path. A lower number will be a result in a higher quality path but will be slower to render. (Default: 5)
General	Snap to Terrain	Should the path points follow the height of the terrain? When enabled, the Height Offset will be added to the terrain height. (Used with Path Has Width only as path points always snap to the terrain when Use with Path is not enabled).
General	Height Offset	The points will maintain the height above the ground specified as they are drawn in the scene view. This will not affect how the prefabs are placed unless 'Snap to Terrain' is enabled, and 'Use Path Height' is enabled on the member Path tab.
General	Point Display Size	The relative size of the object path gizmo points within the scene view
General	Zoom on Find	Display the path point in the scene view, and zoom to the indicated distance (Uniform Groups only)
General	Find Zoom	The distance to zoom out when (F)inding a path point in the scene view (Uniform Groups only)
General	Remove Existing Grass	When used with the 3rd party Vegetation Studio Pro and the path has width, enabling this will remove Grass from the Object Path.
General	Remove Existing Trees	When the path has width, and GPU Acceleration (Path) is enabled, this will remove Unity terrain tools from the path.
General	Trees Dist. from Edge	The distance from the edge of the path that Unity terrain trees will be removed. The maximum distance is the surround distance (see Surface tab).
General	Biome	When Vegetation Studio Pro is enabled on the landscape, the biome that will be applied to the Object Path.

Option Tab	Setting	Description
General	Blend Distance	The distance over which the edge of the biome will be blended with the surroundings.
Objects		This options tab contains links to the members (prefabs) you'd like to place along the Object Path.
Objects	Default Series	The Default Series is always placed along the centre line of the path. This highly optimised Series is ideal when you wish to place prefabs along a single spline. The path does not require width to use the Default Series.
Objects	Width-based Series	One or more Series can be used to place prefabs (or subgroups) along the centre, left or right path edges with or without a sideways offset. Slightly slower than a Default Series, it provides more options. To use Width-based Series, "Path has Width" needs to be enabled on the Object Path General Tab.
Objects	Series Override	Use a set of Series from another Group Member Object Path within the same Group. This allows you to use a common set of Series across multiple Object Paths.
Objects	Series Name	The name of the Width-based Series
Objects	Use Subgroups	Place whole groups of prefabs rather than individual prefabs along the Object Path
Objects	Include Fixed Positions	Optionally include one or more positions along the Object Path in a Width-based Series, where a main member prefab will be placed. If you do not need this, leave it turned off as it increases the population time.
Objects	Start Member	[Optional] Start prefab (or subgroup) to place as the first object in the path
Objects	Start Member Offset	The offset to positions after the start member. This is useful when the Start Member prefab is not the same size as the Main Members in the Object Path [Width-base Series ONLY]
Objects	End Member	[Optional] End prefab (or subgroup) to place as the last object in the path
Objects	End Member Offset	The offset to End Member prefab if Snap last object to End is not enabled. This is useful when the End Member prefab is not the same size as the Main Members in the Object Path [Width-base Series ONLY]
Objects	Main Members or SubGroups	A list of members (prefabs or subgroups) to place along the Object Path. Use the Selection Method to determine which items are placed along the path.
Objects	Num fixed Pos	When "Include Fixed Positions" is enabled on a Width-based Series, this is the number of fixed positions the prefab will be placed at along the Object Path.
Objects	Position Index	Used with "Include Fixed Position", this is the zero-based position along the path that a prefab will be placed within the Main Members. This could be useful for placing one or more gate prefabs in a fence or wall.
Objects	Layout Method	How the main prefabs (or subgroups) will be procedurally placed along the path. *Spacing*: Fixed distance between prefabs (centre to centre) *Exact Qty*: The number of prefabs to place on this Object Path (Default Series only)

Option Tab	Setting	Description
		Qty per 100m: The number of prefabs to place every 100m along the path's spline.
Objects	Selection Method	How the main prefabs (or subgroups) will be selected from the list when being placed along the path. *Alternating:* Place each prefab, in turn, along the Object Path based on their order in the "Main Members" list on the Objects tab. *Random:* Randomly select the next prefab from the list of "Main Members" on the Objects tab. *RandomLessRepeats:* Same as "Random" but can help to avoid having multiple of the same prefabs next to each other. *RandomUnique:* Randomly select a single prefab from the list of "Main Members" on the Object tab. This can be useful when there are multiple instances of the same Group / Clearing in the scene but you want the same path in each instance to have a different prefab all the way along the path.
Objects	Spacing Distance	Distance apart each main prefab (or subgroup) should be placed (centre to centre). [LayoutMethod = Spacing Only] You may also need to adjust the proximity settings for each member object on the path to be slightly less than the spacing distance.
Objects	Objects on Path	Exact number of prefabs on the path [LayoutMethod = Exact Qty Only]
Objects	Objects per 100m	Maximum number of prefabs per 100m on the path [LayoutMethod = Perfabs Per 100m Only]
Objects	Snap last obj to end	If the objects do not fit evenly along the path, place the last object at the end of the path (rather than before the end)
Objects	Randomise Per Group	Each Group region or instance placed will use its own random seed. Has no effect for Uniform Groups. This affects how Series objects are selected, and sparse placement when Placement Cutoff is less than 1. NOTE: When Selection Method is set to *Random*, enabling this may affect the placement of other members and Groups in your landscape.
Objects	Placement Cutoff	The likelihood that the objects will be placed at each position. Set below 1 for sparse placement.
Objects	Placement Spline	Use the Centre, Left Edge, or Right Edge to determine where the prefabs (or subgroups) are placed along the Object Path. [Width-base Series ONLY]
Objects	Use 3D Distance	The spacing between objects will be calculated in 3D space rather than the more optimised 2D space. This could be useful when traversing undulating topography. [Width-base Series ONLY]
Objects	Use Non-Offset Distance	The distance along the path is calculated on the Placement Spline rather than the spline created with the z-offset. This could be useful when aligning multiple Series of objects with a different Offset Z distance. [Width-base Series ONLY]
Objects	Object Offset Z	The distance that the prefab (or subgroup) is offset on the z-axis in path-space (sideways). +ve values to the right in the direction of the path, and -ve values to the left. [Width-base Series ONLY]

Option Tab	Setting	Description
Objects	Object Start Offset	The distance from the start of the path to place the first prefab (or subgroup). [Width-base Series ONLY]
Objects	Object End Offset	The distance from the end of the path to finish prefab (or subgroup) placement (actual last position will depend on spacing distance and if Snap last obj to End is enabled). [Width-base Series ONLY]
Points		The user-defined points that determine where the path will be positioned in the Group.
Points	Path Points	A list of positions that designate the spline of the Object Path.
Points	Rotation Z	Click the Expand arrow next to a Path Point. The rotation on the z-axis (in degrees) of this path point. Prefab rotation will be blended between this point and the next. Prefabs will also have their own (Member) rotation applied.
Points	W Button	Change the width at all points along the path [When Path Has Width is set on General tab]
Points	Cp Button	Copy all the path points in the LB Copy Buffer where they can be pasted into other Object Paths from similar types of Groups. For example, Points in Uniform Groups can be pasted into other Uniform Groups. Clear and SubGroups can copy Points between each other.
Points	Get Button	Get path points from an existing Map Path, RAM spline, JSON files, or the LB Copy Buffer. Can also be used to save path points as JSON files.
Points	Dist Button	Evenly distribute points along the Object Path based on the distance specified after clicking the Dist and Change buttons.
Points	<-> Button	Will reverse the direction of the path.
Points	Reset Rot. Button	Set all z-axis rotations of all points to 0 degrees
Surface		When Path Has Width on the General tab is enabled, Surface determines how the landscape surface or ground is affected along the length of the Object Path
Surface	Flatten Terrain	Flatten the terrain along the length of the object path
Surface	Profile Preset	Select one of the presets to modify the Profile Height curve (no undo).
Surface	Profile Height	The profile or cross-section of the surface height left to right on the path. To have an effect, "Add Terrain Height" must be greater than zero.
Surface	Add Terrain Height	The height to add (or remove) to raise or lower path. Has no effect when the Profile Height curve is flat. To add height to the path, raise the height of the path points.
Surface	Surround Distance	The distance over which the surroundings will be blended with the flattened object path
Surface	Blend Start	Blend the starting edge with the surrounds using the Surround Distance
Surface	Blend End	Blend the ending edge with the surrounds using the Surround Distance
Surface	Surround Smoothing	Apply some smoothing to the blended surroundings
Surface	Blend Curve	Determines how the path is blended with the surrounding topography
Surface	Surface Mesh	Create a mesh for the surface of the Object Path

Option Tab	Setting	Description
Surface	Mesh Landscape UVs	UVs for mesh that is created will be based on the dimensions of the landscape, rather than the actual mesh. Can be useful when creating the water surface of a river.
Surface	Mesh Switch UVs	Switch the UVs so that they are tiled in path-space x (left-right) across the path and z (start-end) direction of the path.
Surface	Mesh UV Tiling	UVs for mesh that is created will be scaled or tiled in path-space z (start-end) direction of path and x (left-right) across the path.
Surface	Mesh Y Offset	The offset on the Y-axis between the Object Path spline and the mesh
Surface	Mesh Indent	The distance the mesh is indented from the edge of the Object Path
Surface	Mesh Edge Snap	For Uniform Groups, if the edges of the mesh will be snapped to the terrain height
Surface	Edge Snap Type	How to snap the edges of the path to the terrain height
Surface	Mesh Collider	Create a mesh collider for the surface mesh
Surface	Is Double-sided	Make the mesh double-sided. It will have twice the number of triangles as single-sided. If the Mesh Base has thickness (see below), it will also have a double-side material.
Surface	Mesh Material	The material used to render onto the path mesh
Surface	Mesh Base Thickness	The thickness of a base mesh created under the surface mesh (Default 0 - no base will be created)
Surface	Mesh Base UV Tiling	UVs for base mesh that is created will be scaled or tiled in path-space z (start-end) direction of path and x (left-right) across the path.
Surface	Mesh Base Use Indent	Use the (surface) Mesh Indent distance. This will make the base the same width as the surface mesh.
Surface	Mesh Base Collider	Create a mesh collider for the Mesh Base
Surface	Mesh Base Material	The material used to render onto the path base mesh
Surface	Core Texture	The Texture from the Texturing Tab that will be used to texture the core of the Object Path on the terrain. NOTE: Textures first need to be applied to the landscape from the Texturing tab. Texture rules like Height and Inclination from the Texturing tab will be ignored. If only used in the Groups tab, you can set the Strength of the Texture in the Texturing tab to 0.
Surface	(Core) Noise Tile Size	Scaling of the noise on the x-z plane. A value of 0 means no noise is applied. Small sizes will result in smaller regions of texture, while larger values will give larger textured areas.
Surface	Core Strength	The strength of the texture on the core path being applied over any existing textures on the terrains.
Surface	Surround Texture	The Texture from the Texturing Tab that will be used to texture the surround of the Object Path on the terrain. NOTE: Textures first need to be applied to the landscape from the Texturing tab.
Surface	(Surround) Noise Tile Size	Scaling of the noise on the x-z plane. A value of 0 means no noise is applied. Small sizes will result in smaller regions of texture, while larger values will give larger textured areas.
Surface	Surround Strength	The strength of the texture on the path surroundings being applied over any existing textures on the terrains.

Texturing Tab

The Topography tab is used for the procedural texturing of all the terrains in your landscape. Usually in Unity when you want to texture a terrain, you have to do it by hand. This has a few drawbacks: Firstly, it's time consuming. Texturing a two-kilometre by two-kilometre terrain can take hours, if not days or weeks to achieve acceptable visual quality. Many game designers who aren't artists may also find that they are unable to achieve acceptable visual quality no matter how long they spend on it. And that leads us to the second drawback; namely that techniques such as proper blending of terrain textures can be difficult to achieve with the default Unity terrain painting tools (again, especially for non-artists).

Landscape Builder solves most of these problems by using procedural texturing techniques. In other words, you as the user define the textures you want on the terrain and rules about where they appear, and Landscape Builder does the rest. It calculates the texturing for the entire landscape in seconds, and the algorithms it uses makes it simple to get whatever texturing blending you like.

Texturing your Landscape

You can add textures by clicking the "Add Texture" button, and remove them by clicking the "Remove Texture" button. Although Unity 5.x supports up to 12 textures, keeping it to 8 or less will perform better. Both buttons are located near the top of the Texturing tab.

For fast scene prototyping, the landscape can be textured by selecting one of the Texturing Presets, clicking "Assign Textures from Preset", clicking "Assign", then clicking the "Texture Landscape" button. Available presets include: Islands, Canyon, Forest, Mountain Range, Desert, Hills, and Rocky Hills.

If you wish to temporarily remove all Textures from the scene, without losing the texture configurations, click "Disable All Textures", and click the "Texture Landscape" button. Individual Textures can be enabled or disabled by using the tick box at the top of each Texture box.

For each Texture you add, there are a number of settings you can use to control where that texture appears on the landscape and how it looks when it does. These settings are detailed below:

Property:	Function:
Texture	The texture that will be shown.
Normal Map	The normal map that will be applied where the texture is.
Tiling	The area (in metres) over which this texture tiles. Increase this value to increase the texture "size" in the landscape. Decrease this value to decrease the texture "size".
Metallic	The PBR metallic value of the texture.
Smoothness	The PBR smoothness value of the texture.
Is Tinted	Is this Texture being tinted by another colour?
Tint Colour	The Tint to apply to the texture. The original texture colours are not modified so that you can re-tint the same original texture in multiple landscapes or scenes.
Tint Strength	The amount of tint to apply to the texture
Texturing Mode	The way that this texture's influence is calculated across the landscape. Available options are:

Property:	Function:
- *Height*	Where the texture appears is determined by terrain height. The texture appears at heights between Min Height and Max Height (both in metres) on the terrain. The strength of the texture is faded out towards the outside of the Min-Max Height range.
- *Inclination*	Where the texture appears is determined by terrain inclination or slope. The texture appears at inclinations between Min Inclination and Max Inclination (both in degrees) on the terrain. The strength of the texture is faded out towards the outside of the Min-Max Inclination range.
- *Height And Inclination*	Where the texture appears is determined by both terrain height and terrain inclination. The texture appears at points where the height is between Min Height and Max Height (both in metres) and the inclination is between Min Inclination and Max Inclination (both in degrees). The strength of the texture is faded out towards the outside of the Min-Max height range and the Min-Max Inclination range simultaneously.
- *Constant Influence*	The texture appears everywhere on the terrain.
- *Map*	This is designed to help you fast-track applying textures to a 3D terrain in the locations you want them. Rather than attempting to paint a texture onto a 3D terrain, you create a "map" of the texture using the built-in Map Path tool, or in your favourite image editing software with the heightmap of the current terrain as a guide. Of course, you can still apply other textures to the Landscape at the same time using any combination of Texturing Modes. For a detailed workflow of how to use this feature see below. See also Scene Paths – Add Map Path to Landscape
-*Height Inclination Map*	Where the Texture appears is determine by Height, and Inclination, and the Map area.
- *Height Inclination Curvature*	Where the texture appears is determined by the height, inclination, and if the curvature of the landscape is a convex or concave shape at each point. The rule is applied if the change in height over a given distance (Curvature Distance) is greater than the Min Height Difference specified.
Imported	This is a special Mode that gets automatically set when Textures are imported from terrains created outside Landscape Builder
Blending Mode	This affects how the texture is blended or faded out as points on the terrain approach the minimum and maximum values that match height and inclination rules. For example, if the slope on the terrain is near 20 degrees, and the inclination rule is from say 20 to 45 degrees, values close to 20 will be blended out. This is the default behaviour and generally what you want. However, where an area is almost flat, you may not want to blend the minimum values. Most of the time "Auto" will select the correct blending option for you.
Is Map from Path?	If the Map was created with a Map Path that you created in the scene view, then tick this to get the best blending results in the landscape.
Inverse	For selecting the inverse area of a Map
Use Noise	Whether noise will be used to add variation to the texturing
Minimal Blending	The strongest texture will be rendered but edge blending will still take place. Only available when "Use Noise" option is enabled.
Noise Tile Size	The scale of the noise applied to the x-z plane. Small sizes will result in smaller regions of texture, while larger values will larger areas. 100 is a good starting point. Only available when "Use Noise" option is enabled.
Strength	How much influence the texture has compared to other textures. If you set all the texture strengths to 0.5, they won't all appear faded out; it will have the same

Property:	Function:
	outcome as it would if the texture strengths were set to 1. But if you set one texture strength value to 1 and another to 0.5, the second texture will have half the influence of the first.

Once you are happy with your texture selection and their corresponding settings, you can click the "Texture Landscape" button located at the bottom of the Texturing tab. This will begin the process of texturing each terrain in your landscape, and will show a progress bar. You can click the cross at the right of the progress bar to cancel the process if you need to.

To improve visual quality, it is often a good idea to "overlap" the height ranges of your textures, as this will allow them to smoothly blend/transition from one to another. For example, if you had two textures in your landscape, a grass texture and a cliff texture, instead of having the min and max inclination of your grass texture set to 0 and 30 respectively and the min and max inclination of your cliff texture set to 30 and 90, it would usually be better to set the min and max inclination of your grass texture to 0 and 35 and the min and max inclination of your cliff texture set to 25 and 90. This way, between the inclinations of 25 and 35 the two textures would be blended together and ensure a smooth transition between them.

The **easiest way to create a Map** in v1.3.2 or newer, is to use the **Map Path tool**. For full details see the information in this document under the section titled "Scene Paths – Add Map Path to Landscape" in the Landscape Tab chapter.

The following workflow can also be used for **Map Texturing Mode**:

1. On the Landscape Tab, select the "Landscape To Edit" (if it isn't already selected)
2. On the Export tab, enter a "Heightmap Filename" (the .png file extension is automatically added for you)
3. Click "Export to PNG"
4. The image will be highlighted in the Project window
5. Either double-click on it to open your default image editor (associated with the PNG file type), or right-click on the image and select "Show in Explorer" (on Microsoft Windows) or "Reveal in Finder" (on Mac OSX)
6. Paint the areas in the heightmap image you wish to texture in a single colour. Take note of the RGB values of the colour you use.
7. Save the modified image over the original (or to a new texture if required).
8. In Landscape Builder, on the Texturing Tab, click "Add Texture"
9. Change the Texture Mode to Map
10. Add the modified heightmap image (containing your texture "map") to the Map texture
11. Change the Colour to match the one used to draw the map
12. Adjust the Strength of this texture to determine the weight when blending with any other textures that may occupy the same space on the landscape. To make this texture stand out on the landscape, make the Strength higher than other textures that will occupy the same area.
13. Apply a Texture and optional Normal map which will get drawn onto the landscape where your map indicates. For example, you may apply the Pebbles or Path (Rocky) texture if you're building a path for characters to walk along.
14. Adjust the Texture Tiling, Metallic and Smoothness as required
15. If required, click "Inverse" to exclude this area of the map for texturing (rather than include it)
16. Click the Texture Landscape button

When mapping textures onto a landscape, the terrain resolution should be taken into consideration. Thin lines in a map may not get applied to the landscape. Some experimentation should be performed using your landscape before building a full map in your image editing software.

To fade parts of the map into the other surrounding textures, slightly alter the colour of the textured area in the map PNG image file. For example, if you have a path that is going to be applied to the landscape, and you are using say Red (RGB 255, 0, 0, 0 or #FF0000) you could reduce the edge of the path in "steps" from say 254,0,0 to 245,0,0. Then in Landscape Builder, set the Tolerance to 10 and click "Texture Landscape". The edges of the path will now fade into the other textures occupying the same space on the landscape.

For advanced blending tick the "Advanced" option. This will give you more control over how pixels in the Map texture are interpreted, and then how the Texture is applied in the scene. Colours consist of four channels; namely Red, Green, Blue and Alpha.

Property:	Function:
Tolerance Red	The tolerance or variation between the Map pixel Red channel value, which corresponds to the position in the landscape, and the Colour selected by you to match the Map. When the Red channel of the Map pixel doesn't exactly match the Red channel value in your selected Colour, this value determines how different they are allowed to be and still produce a match. The further away from an exact match, the less blending in the scene takes place.
Tolerance Green	The tolerance or variation on the Green channel
Tolerance Blue	The tolerance or variation on the Blue channel
Tolerance Alpha	The tolerance or variation on the Alpha channel.
Weight Red	The weighted average is calculated from the relative weights of each channel's tolerance values. 0 means don't consider the Red channel, whereas 1 means give it full consideration. When in doubt, set all the weights to 1 and then adjust them and retest Texturing the landscape.
Weight Green	The relative weight or strength of the Green channel.
Weight Blue	The relative weight or strength of the Blue channel.
Weight Alpha	The relative weight or strength of the Alpha channel.
Preset	When the Texture is blended with other Textures in the landscape, there is likely to be overlap. Near the edges of the textures or where the overlap occurs, to obtain a smooth blend or fade, a curve-based algorithm is applied. The Presets help you produce a natural-looking result. Each Preset is designed to give a different fade or fall-off effect.
Blend Modifier	This is the curve modifier used to control the blending or fade-out between multiple Textures in the landscape. Start with a Preset then adjust as required. Most of the time, one of the Presets will achieve good results.

Texturing – Applying Filters

Filters allow you to further define the where a texture appears in your landscape. To add a Filter, click "Add Filter". Textures can be limited to where they appear with one or more Area Filters. The Area Filters allow you define a rectangle within the landscape. If you want finer control over where the Texture should be applied, we recommend using a Stencil Layer filter.

Stencil Layer Filters restrict where the Texture is applied in the landscape. To see more information, see the "Stencil" section in the "Landscape Tab" chapter.

One or more Area Filters can be applied to each Texture. Filter can OR'd together or AND'd together. We think you will use OR more than you use AND when combining the same type of filter. Combining two or more Area Filters may be useful it you want a Texture to appear in this area, OR this area, OR this area etc. The AND operator is used to only texture the intersection or common parts of areas.

To define an area, enter the values directly into the Area Rectangle or click on the "Enable Area Picker" to move the area around in the Scene view. To resize the area, update the W/H Area Rectangle values in the LB Editor Window, or select the Unity Resize tool (press R key or click icon on toolbar) to resize in the Scene view.

Texturing Undo

If you need to undo a modification to the texturing, you can do so by clicking the "Undo Texture Modification" button located at the bottom of the Texturing tab. To preserve memory, it can only store one texturing undo per landscape.

Texturing – Relinking Missing

Sometimes Textures lose their link with their asset in the asset database. This can occur for the following reasons:

- You delete the original texture from the Project then reimport it
- You import a LB Template into a new project and the Textures are in a different folder within the new project
- You import a LB Template into a new project that uses Unity Terrain Layers

Each "Texture" on the "Texturing" tab can contain a (albedo) texture and a Normal Map texture. When a link is broken, the name of the texture still appears but the image is missing. The name will also have "N/A" appended to it, which stands for "not available".

To relink the (albedo) texture and normal maps, click the [R]elink button at the top of each "Texture" that has missing images.

Relief Terrain Pack Integration

RTP is an advanced 3rd party terrain shader solution that is widely used to give landscapes a AAA look and feel.

To enable RTP perform the following tasks after importing the RTP 3.3r into your project:

1. Create and save a new scene.
2. Ensure Landscape Builder and RTP (v3.3r or newer) has been imported into their default locations in the project.
3. Create a new Landscape
4. Add one or more Topography layers (e.g., Rolling Hills Base and Hills Detail)
5. On the Advanced tab, enable "Show Texture Heightmap"

6. Texture the landscape using the built-in LB tools (e.g., use Rocky Hills preset)
7. Replace the Texture 4 "Texture" and "Normal Map" (bot_CliffBlue) with "Rocks_diffuse", "Rocks_normal", and "Rocks_height" from the RTP pack.
8. Add the heightmap textures for the first 3 textures (e.g., GrassHillAlbedo_parallax, RockLayered_parallax, and rock1_parallax).
9. IMPORTANT: Ensure the textures are all the same size (this is a requirement of RTP). Note: the heighmaps can be a lower resolution.
10. On the Landscape tab, expand "Terrain Settings"
11. Change the "Material Type" to "Relief Terrain Pack"
12. Enable "Tessellation"
13. Click "Apply Terrain Settings"
14. If you are using Unity 2019.2 or newer, in "Terrain Settings", now click "Store TData in Project" and set the "Terrain Data Folder" to something like "Landscape/TerrainData/yourscenename" and once again click "Apply Terrain Settings".
15. On the Texturing tab, click "Texture Landscape"
16. Then use the RTP documentation to tune your RTP shader settings.

Extra steps required when the landscape has multiple terrains and RTP is enabled.
1. In the Unity Editor Project pane, expand "LandscapeBuilder" then "Materials"
2. Locate the folder called "_[scene name]" and expand it.
3. Duplicate the [Landscape Name]TerrainMaterial so that you have the number of materials that match the number of terrains (if you have 4 terrains, you'll need 3 duplicate materials plus the original one)
4. In the Unity Editor Hierarchy pane, expand the Landscape parent gameobject
5. Select the second terrain (e.g., LandscapeTerrain0001)
6. In the Unity Inspector under "Terrain" click the "Terrain Settings" gear icon
7. Replace the "Material" (e.g., [LandscapeName]TerrainMaterial) with the first duplicate material (e.g., [LandscapeName]TerrainMaterial 1)
8. Repeat steps 5-7 with the other terrains and materials

To disable RTP on the landscape, in the LB Landscape tab, change the Terrain Settings "Material Type" back to "Built In Standard" and click "Apply Terrain Settings".

MegaSplat Integration Preview

MegaSplat is an advanced 3rd party Splat Mapping system for Unity which allows up to 256 textures to be painted on Meshes or Terrains, using a single material and rendered in a single pass with height map-based blending.

WARNING: This is still in preview, so BACKUP YOUR PROJECT FIRST.

Landscape Builder includes MegaSplat integration which is currently in preview[7]. To test the current workflow, perform the following tasks:

1. Create and save a new scene.
2. Ensure Landscape Builder and MegaSplat (v1.73 or newer) has been imported into their default locations in the project.

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[7] The full integration is still under development. The purpose of this preview is to help us discover and develop a workflow that will enhance your game development with the two products. We welcome feedback in our Unity Beta Program forum.

3. Create a new Landscape, ensuring the Material Type under Terrain Settings is "Build In Standard".
4. Add one or more Topography layers (e.g., Rolling Hills Base and Gentle Valley Additive)
5. Texture the landscape using the built-in LB tools (e.g., use Hills preset)
6. IMPORTANT: Ensure the textures are all the same size (this is a requirement of MegaSplat). For testing you can use the textures that come with MegaSplat and are located in the Project folder under MegaSplat/Examples/Textures.
7. On the Landscape Tab, expand Terrain Settings.
8. Change the "Material Type" to "MegaSplat"
9. Click "Initialise" (this will create a new custom terrain material, MegaSplat shader, and support terrain splat textures)
10. Click "Apply Terrain Settings"
11. On the LB Texturing Tab, click "Hide" next to each of the Textures
12. At the bottom of the Texturing Tab you will find a "MegaSplat Texturing" section. You can either click "Create / Select" button to create a new MegaSplat "Texture Array Config" file[8] OR choose to "Copy from Existing" MegaSplat Texture Array Config file. For now, click the selector to the right of "Copy from Existing" to choose from and existing Texture Array that comes with MegaSplat. When the selector window opens, double-click on "Megasplat_Example_diffuse_tarray".
13. After a few seconds, the selection window will close. Then click "Copy Textures"
14. The MegaSplat Terrain Painter window should appear on the Utilities Tab. If the Terrain Converter is not expanded, click on it to expand.
15. Map the LB Textures (on the left) to the appropriate MegaSplat cluster texture on the right (see the MegaSplat documentation for more details).
16. Click "Convert"

Known issues:

1. Does not work with 2019.2 or newer (consider using MicroSplat instead)
2. If all the textures are not the correct type and size, you may experience MegaSplat shader errors like: Material doesn't have a texture property '_SplatControl' when you click "Copy Textures" in the LB Texturing Tab.

To use the MegaSplat with mesh terrains, perform the following tasks:

1. Setup a landscape by following the steps above (the landscape has to be already configured to use the MegaSplat Terrain shader).
2. On the Landscape Builder Export Tab, for now, uncheck all the options under "Create Landscape as Mesh", except "Use MegaSplat".
3. Click "Export to Mesh"
4. Click "Disable Terrains" (this will temporarily disable the Unity Terrains in the Landscape).
5. To make any changes using LB to mesh terrains, click "Enable Terrains", perform the actions, then repeat steps 2-4 (this will overwrite any changes made with MegaSplat).

To get MegaSplat support or watch help videos, click one of the buttons provided under "MegaSplat Integration" on the LB Advanced Tab.

If you see any issues in the MegaSplat integration technical preview, please contact us and we will investigate it with the MegaSplat developer.

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[8] To learn more about Texture Array Config files, see the MegaSplat documentation.

MicroSplat Integration Preview

MicroSplat is modular 3rd party Splat Mapping system for Unity which allows up to 32 textures to be painted on Meshes or Terrains, using a single material.

WARNING: This is still in preview, so BACKUP YOUR PROJECT FIRST.

When using MicoSplat with LB, landscape names must be unique in the project AND the landscape name cannot form part of any terrain names. For example, if using imported terrains, don't name you landscape "Test" and your terrains "Test1", "Test2", "Test3" etc.

Landscape Builder includes MicroSplat integration which is currently in preview[9]. To test the current workflow, perform the following tasks:

1. Create and save a new scene.
2. Ensure Landscape Builder (v2.3.8 or newer) and MicroSplat (v3.5 or newer) has been imported into their default locations in the project.
3. Create a new Landscape
4. Add one or more Topography layers (e.g., Rolling Hills Base and Gentle Valley Additive)
5. Texture the landscape using the built-in LB tools (e.g., use Hills preset)
6. On the Landscape Tab, expand Terrain Settings.
7. Change the "Material Type" to "MicroSplat"
8. Click "Apply Terrain Settings"
9. Click the "Initialise" button
10. A dialog box will prompt you to click "Convert to MicroSplat" button (click OK on the dialog box, then click "Convert to MicroSplat")
11. When the conversion has completed, return to Landscape Builder Editor and click Landscape tab
12. If you see a warning that the shader name needs to be updated, click "Fix Now".
13. If the Material Type is not MicroSplat, change it to MicroSplat and click "Fix Now" on the Shader name warning, followed by "Apply Terrain Settings".

NOTE: In some versions of Unity, the Material Type may switch back to "Built-in Standard". If this happens, switch it back to "MicroSplat". Once it has been "Initialised", you can then simply click "Apply Terrain Settings" again. If the problem persists, contact LB support with the Unity version, LB version, and MicroSplat version numbers.

When using Heightmap textures with MicroSplat, in the Landscape Builder editor, go to the Advanced tab and enable "Show Texture Heightmap". This will allow you to add Heightmap textures in the LB Texturing tab. To update diffuse, normalmap, and heightmap textures for MicroSplat, apply Texturing to the landscape in the LB editor like usual. LB will update MicroSplat automatically.

If you see any issues in the MicroSplat integration technical preview, please contact us and we will investigate it with the MicroSplat developer.

Beta Program forum https://discussions.unity.com/t/625694

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[9] The full integration is still under development. The purpose of this preview is to help us discover and develop a workflow that will enhance your game development with the two products. We welcome feedback in our Unity Beta Program forum.

Trees Tab

The Trees tab is used for the procedural placement of trees throughout your landscape. Like texturing, populating your terrains with trees can be a pain to do by hand, and often doesn't give you the results you want. Landscape Builder gives you a solution to this that is similar to the solution it provides for texturing. You define the trees you want to appear in your landscape, define rules about where they should appear, and Landscape Builder places them, orients them and even randomises their colour and size.

Populating your Landscape with Trees

At the top of the Trees tab, there are two settings. These settings are detailed below:

Property:	Function:
Trees Have Colliders	Check this if the tree prefabs you will be using have colliders. This will ensure that your tree count will not be so high that the maximum number of colliders in a Unity scene is exceeded.

You can also choose from the "Best Placement" and "Fastest Placement" options. When using "Best Placement" the number of trees placed in the landscape will more accurately reflect the "Max Trees Per Sqr Km" settings you are using, at the expense of computational time. The "Fastest Placement" setting will be better suited to low-end development computers.

You can have as few or as many trees in your landscape as you like. You can add trees by clicking the "Add Tree" button, and remove them by clicking the "Remove Tree" button. Both buttons are located near the top of the Trees tab.

For fast scene prototyping, you can add trees by selecting one of the Tree Presets, clicking "Assign Trees from Preset", clicking "Assign", then clicking the "Populate Landscape with Trees" button. Available presets include: Pine Forest, Mixed Forest, Bushland, Fast Forest, Mountain Pines, and Islands Forest.

Individual Trees can be enabled or disabled by using the tick box at the top of each Tree box.

For each tree added, there are a number of settings you can use to control where that tree appears on the landscape and how it looks when it does. These settings are detailed below:

Property:	Function:
Prefab	The tree prefab to use. Although some sample trees are included in the pack we expect most people to purchase Speed Trees or custom 3rd party trees from the Asset Store (there are plenty to choice from).
Max Trees Per Sqr Km	The amount of this type of tree the algorithm will attempt to place in every square kilometre of the terrain. Increase this value to increase the number of trees placed.
Bend Factor	How much the trees bend when affected by a wind zone. If set to 0 the trees will not be affected by the wind zone.
Tree Scaling Mode	The way that this tree shall be scaled throughout the landscape. Available options are:

Property:	Function:
- Random Scaling	The tree is randomly scaled.
- Scale By Terrain Height	The tree is scaled according to the height of its position in the landscape. At its maximum possible height, it has a scale equal to Max Scale (see below) and at its minimum possible height it has a scale equal to Min Scale (also see below).
Lock Width To Height	If checked, the height and width scaling of the tree will be locked to a fixed ratio. This option is only available when the Tree Scaling Mode is set to Random Scaling (when it is set to Scale By Terrain Height this option is always on).
Min Scale	The minimum possible scale (relative to the prefab) of the tree when placed into the landscape.
Max Scale	The maximum possible scale (relative to the prefab) of the tree when placed into the landscape.
Min Proximity	The minimum distance (in metres) this tree can be placed from any other tree.
Offset Y	The distance (in metres) the tree is offset from the ground. Value must be between -2 and 0. The default is 0, is ground level at the centre of the tree.
Tree Placing Mode	The way that this tree is populated in the landscape. Available options are:
- Height	Where the tree appears is determined by terrain height. The tree appears at heights between Min Height and Max Height (both in metres) on the terrain.
- Inclination	Where the tree appears is determined by terrain inclination. The tree appears at inclinations between Min Inclination and Max Inclination (both in degrees) on the terrain.
- Height and Inclination	Where the tree appears is determined by both terrain height and terrain inclination. The tree appears at points where the height is between Min Height and Max Height (both in metres) and the inclination is between Min Inclination and Max Inclination (both in degrees).
- Constant Influence	The tree appears everywhere on the terrain.
- Map	This is designed to help you fast-track applying trees to a 3D terrain in the locations you want them. Rather than placing trees onto each terrain with the Unity Place Trees painter, you create a "map" of the trees using the built-in Map Path tool or in your favourite image editing software with the heightmap of the current terrain as a guide. Of course, you can still place other trees in the Landscape at the same time using any combination of Landscape Builder Tree Placement Modes. See Map Texturing Mode for an example workflow of using a map. See also: Scene Paths – Add Map Path to Landscape
- Height Inclination Map	Where the trees appear is determine by Height, and Inclination, and the Map area.
- Height Inclination Curvature	Where the trees appear is determined by the height, inclination, and if the curvature of the landscape is a convex or concave shape at each point. The rule is applied if the change in height over a given distance (Curvature Distance) is greater than the Min Height Difference specified.
Imported	This is a special Mode that gets automatically set when Trees are imported from terrains created outside Landscape Builder
Inverse	For selecting the inverse area of a Map
Use Noise	Whether noise will be used to add variation to tree placement
Noise Tile Size	The scale of the noise applied to the x-z plane. Small sizes will result in smaller clumps of trees, while larger values will larger groves.

Property:	Function:
Tree Placement Cutoff	The noise cutoff value for tree placement. Increasing this value will mean more trees are placed.
Is Tinted	Whether the trees will be randomly colour tinted to provide colour variation in a forest. Enabling and disabling Tinting will change tree placement as they both use the same randomising algorithm. If you wish to keep the same tree placement when disabling tinting, keep it Is Tinted on, and reduce Max Tint Strength to the minimum value. NOTE: Requires a shader that honours Unity Terrain TreeInstance color. E.g. Nature/Tree Soft Occlusion Bark or Leaves
Max Tint Strength	The maximum strength of the tint or colour variation that will be applied to trees.
Tint Colour	The colour used to tint the trees.

Once you are happy with your tree selection and their corresponding settings, you can click the "Populate Landscape with Trees" button located at the bottom of the Trees tab. This will begin the process of populating every terrain in your landscape with trees, and will show a progress bar. You can click the cross at the right of the progress bar to cancel the process if you need to.

Important: Landscape Builder comes with some basic trees created with the Unity tree creator. Unity terrains will ignore the randomised rotation LB applies to the trees. Instead, we recommend using SpeedTrees which will be randomly rotated. Another option is place trees with the Group System although this will create a GameObject for each tree.

Tree Placement – Applying Filters

Filters allow you to further define the placement of trees. To add a Filter, click "Add Filter".

Texture Filters

Select the Texture you only want the Tree Type placed on. If you only want the Tree Type to be placed where two Textures are blended together, click "Add Filter" and select the second Texture.

The list of available Textures is taken from the Textures currently applied to the landscape. Note, there may be two or more Textures in the Landscape, with the same Unity Texture but with different placement properties.

The cut-off value determines the weight of the texture at that point in the terrain. For AND filters, the relative weight of the texture at which trees will be added. For NOT filters the relative weight that trees will not be added.

Area Filters

One or more Area Filters can be applied to each Tree Type. Filter can OR'd together or AND'd together. We think you will use OR more than you use AND when combining the same type of filter. Combining two or more Area Filters may be useful it you want a Tree Type to appear in this area, OR this area, OR this area etc. The AND operator is used to only place trees in the intersection or common parts of areas.

To define an area, enter the values directly into the Area Rectangle or click on the "Enable Area Picker" to move the area around in the Scene view. To resize the area, update the W/H Area Rectangle values in the LB Editor Window, or select the Unity Resize tool (press R key or click icon on toolbar) to resize in the Scene view.

Stencil Filters

Stencil Layer Filters restrict where the Trees are applied in the landscape. One or more Stencil Layer can be painted in the editor to determine where trees will be procedurally placed. A Stencil Layer can be assigned to each Tree Type. The same Stencil Layer can be used for different Tree Types if you'd like multiple Tree Types in the same forested areas within the landscape.

 To see more information, see the "Stencil" section in the "Landscape Tab" chapter.

Tree Placement Undo

If you need to undo a modification to the trees in your landscape, you can do so by clicking the "Undo Trees Modification" button located at the bottom of the Trees tab. To preserve memory, it can only store one tree modification undo per landscape.

Grass Tab

The Grass tab is used for the procedural population of your landscape with grass. Like texturing and tree placement, populating your terrains with grass can be a pain to do by hand, and often doesn't give you the results you want. So, just like in the Texturing and Trees tabs, you can define the grasses you want to appear in your landscape, define rules about where they should appear, and Landscape Builder creates them throughout your landscape accordingly.

Populating your Landscape with Grass

You can have as few or as many grasses in your landscape as you like. You can add grass by clicking the "Add Grass Type" button and remove them by clicking the "Remove Grass Type" button. Both buttons are located near the top of the Grass tab.

For fast scene prototyping, you can add grass by selecting one of the Grass Presets, clicking "Assign Grass from Preset", clicking "Assign", then clicking the "Populate Landscape with Grass" button. Available presets include: Hills, Islands, Forest, Meadows, and Savannah.

Individual Grass Types can be enabled or disabled by using the tick box at the top of each Grass Type box.

For each grass type you add, there are a number of settings you can use to control where that grass type appears on the landscape and how it looks when it does. These settings are detailed below:

Property:	Function:
Use Mesh Prefab	This determines whether you wish to use mesh grass prefabs or texture-based prefabs.
Texture	The texture to use for this grass type.
Mesh Prefab	The Unity terrain detail mesh prefab. This could either be something like a rock, a flower, a grass mesh, or a small bush. If using a mesh prefab, start by setting the max density to 1 or 2, then gradually increase if required.
Use Instancing	Whether this prefab uses GPU Instancing for rendering (U2021.2+ URP or HDRP only. Render Mode must be VertexLit).
Grass Rendering Mode	The way that the grass is rendered. Available options are:
- *Grass Billboard*	The grass is rendered as 2D billboards that are always facing the camera. This is usually preferable for fields of grass (not supported for Mesh Prefabs)
- *Vertex Lit*	Used when placing static Mesh Prefabs like flower or bushes in the scene
- *Grass*	The grass is rendered as static 2D quads that are assigned random rotations. This is usually preferable for sparsely placed grasses such as flowers.
Grass Patch Fading Mode	The way that the density of grass patches should be faded out. Available options are:
- *Don't Fade*	Grass density is either full density or zero density. This creates very distinct "patches" of grass
- *Fade*	Grass density can be an interpolation between full density and zero density. The interpolation is based upon the Grass Populating rules. This creates only subtly distinct patches of grass but smoothly fades out grass density

Healthy Colour	Tint of the grass when the grass is defined as "healthy" by the grass-placing algorithm.
Dry Colour	Tint of the grass when the grass is defined as "dry" by the grass-placing algorithm.
Min Grass Height	The minimum height (in metres) of each instance of this grass type.
Max Grass Height	The maximum height (in metres) of each instance of this grass type.
Min Grass Width	The minimum width (in metres) of each instance of this grass type. Increasing this value can help make fields of grass look denser.
Max Grass Width	The maximum width (in metres) of each instance of this grass type. Increasing this value can help make fields of grass look denser.
Min Density	The minimum density of this grass type in the landscape. By default, this is 0, so that a range of dense and less dense grass patches will be created, making a more natural look.
Max Density	The maximum density of this grass type in the landscape. Start with low values of 1 or 2 if using a mesh prefab for grass, flowers or detail objects. Higher density values can be helpful in giving the effect of fields of grass, but the higher the density the value the higher the performance cost. Often the effect can be faked (at no or very little performance cost) by increasing the grass Min and Max Width values.
Grass Populating Mode	The way this grass type is populated in the landscape. Available options are:
- Height	Where the grass type appears is determined by terrain height. The grass type appears at heights between Min Height and Max Height (both in metres) on the terrain.
- Inclination	Where the grass type appears is determined by terrain inclination. The grass type appears at inclinations between Min Inclination and Max Inclination (both in degrees) on the terrain.
- Height And Inclination	Where the grass type appears is determined by both terrain height and terrain inclination. The grass type appears at points where the height is between Min Height and Max Height (both in metres) and the inclination is between Min Inclination and Max Inclination (both in degrees).
- Constant Influence	The grass type appears everywhere on the terrain.
- Map	This is designed to help you fast-track applying grass to a 3D terrain in the areas you want them. Rather than placing grass onto each terrain with the Unity Place Grass painter, you create a "map" of the grass using the built-in Map Path tool, or in your favourite image editing software with the heightmap of the current terrain as a guide. Of course, you can still place more grass in the Landscape at the same time using any combination of Landscape Builder Grass Populating Modes. See Map Texturing Mode for an example workflow of using a map. See also: Scene Paths – Add Map Path to Landscape
- Height Inclination Map	Where the grass appears is determine by Height, and Inclination, and the Map area.
- Height Inclination Curvature	Where the grass appears is determined by the height, inclination, and if the curvature of the landscape is a convex or concave shape at each point. The rule is applied if the change in height over a given distance (Curvature Distance) is greater than the Min Height Difference specified.

Imported	This is a special Mode that gets automatically set when grass is imported from terrains created outside Landscape Builder
Is Map from Path?	If the Map was created with a Map Path that you created in the scene view, then tick this to get the best blending results in the landscape.
Inverse	For selecting the inverse area of a Map
Use Noise	Whether noise will be used to add variation to grass placement
Noise Tile Size	The scale of the noise applied to the x-z plane. Small sizes will result in smaller clumps of trees, while larger values will larger groves.
Noise Octaves	Detail layers of the noise. Higher values will give more detailed shapes with less grass. To maintain similar amounts of grass, increase the Placement Cutoff.
Grass Placement Cutoff	The noise cutoff value for grass placement. Increasing this value will mean more grass is placed.

Once you are happy with your grass selection and their corresponding settings, you can click the "Populate Landscape With Grass" button located at the bottom of the Grass tab. This will begin the process of populating every terrain in your landscape with grass, and it will show a progress bar. You can click the cross at the right of the progress bar to cancel the process if you need to.

Grass Placement – Applying Filters

Filters allow you to further define the placement of grass. To add a Filter, click "Add Filter".

Texture Filters

Select the Texture you only want the Grass placed on. If you only want the grass to be placed where two Textures are blended together, click "Add Filter" and select the second Texture.

The list of available Textures is taken from the Textures currently applied to the landscape. Note, there may be two or more Textures in the Landscape, with the same Unity Texture but with different placement properties.

The cut-off value determines the weight of the texture at that point in the terrain. For AND filters, the relative weight of the texture at which grass will be added. For NOT filters the relative weight that grass will not be added.

Area Filters

One or more Area Filters can be applied to each Grass Type. Filter can OR'd together or AND'd together. We think you will use OR more than you use AND when combining the same type of filter. Combining two or more Area Filters may be useful it you want a Grass Type to appear in this area, OR this area, OR this area etc. The AND operator is used to only apply a Grass Type in the intersection or common parts of areas.

To define an area, enter the values directly into the Area Rectangle or click on the "Enable Area Picker" to move the area around in the Scene view. To resize the area, update the W/H Area Rectangle values in the LB Editor Window, or select the Unity Resize tool (press R key or click icon on toolbar) to resize in the Scene view.

Stencil Filters

Stencil Layer Filters restrict where the Grass Type is applied in the landscape. One or more Stencil Layer can be painted in the editor to determine where Grass Types will be procedurally placed. A Stencil Layer can be assigned to each Grass Type. The same Stencil Layer can be used for different Grass Types if you'd like multiple Grass Types in the same grassed areas within the landscape.

 To see more information, see the "Stencil" section in the "Landscape Tab" chapter.

HQ Photographic Textures Grass Pack & Rustic Grass Integration

For support with these packs (or to obtain them) use one of the buttons provided in the Advanced Tab. If you have installed one or more of the packs and then moved it to another project folder, go to the Advanced Tab and change the folder path.

If you have one or more of the packs installed, a small "L" button will appear next to each Grass Type that you have in your landscape. Click the "L" to view a list of pre-configured grasses from the packs.

In the Grass Selector window, click on the image of the grass to load the pre-configured values into the Grass Type. If you bring up the list but change your mind, just click the Grass Selector close window button.

Grass Population Undo

If you need to undo a modification to the grass in your landscape, you can do so by clicking the "Undo Grass Modification" button located at the bottom of the Grass tab. To preserve memory, it can only store one grass modification undo per landscape.

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Mesh Tab

The Mesh tab is used for the procedural placement of static meshes or more complex prefabs throughout your landscape. You can define the meshes you want to appear in your landscape, define rules about where they should appear and assign materials to each mesh. Landscape Builder places them, orients them, randomises their size and then combines them together into larger meshes to optimise performance.

Prefabs can be useful when you wish to procedurally place objects with attached scripts. Prefabs are not combined into larger objects and remain as separate objects in the landscape. They are however, grouped together according to the terrain they are placed on.

Populating your Landscape with Meshes or Prefabs

You can have as few or as many meshes or prefabs in your landscape as you like. You can add meshes by clicking the "Add Mesh" button, and remove them by clicking the "Remove Mesh" button. Both buttons are located near the top of the Mesh tab.

For each Mesh you add, there are a number of settings you can use to control where that mesh appears on the landscape and how it looks when it does. These settings are detailed below:

Property:	Function:
Use Prefab	Clicking this will allow you to place prefabs in your landscape rather than meshes for this item.
Mesh	The Mesh to use.
Materials	The materials to apply to each placed instance of this mesh.
Keep Prefab Connection	Keep the connection between the instantiated prefabs in the scene, and the Prefab asset. Changing the Prefab settings in the Project pane, will change all the prefabs in the scene(s). This could be useful for adjusting the LOD values of all prefabs procedurally placed in a scene.
Combine Meshes	Each mesh within a Prefab will be combined in the scene. This should only be enabled for static prefabs, that is, for those that won't move. Combining static objects into fewer meshes can improve performance. This is always enabled when a Mesh is used, but is optional with Prefabs because they may be movable objects.
Add Mesh Collider	Add a mesh collider to the objects that are created in the scene. When using Prefabs, the existing colliders are removed.
Offset	The offset value is a 3D offset that is applied to each Mesh or Prefab. The offset is scaled by the scaling applied to the Mesh. By default, each mesh will be placed with the origin point of the Mesh placed at the exact height of the landscape at that point. By setting the offset to a non-zero value, you can change this behaviour. For instance, you might have a house mesh that has an origin point at roof height. You could set the offset y value to allow the mesh to be raised so that the floor is at the terrain height instead of the roof.
Max Meshes Per Sqr Km	The amount of this Mesh the algorithm will attempt to place in every square kilometre of the terrain. Increase this value to increase the number of meshes placed.
Min Scale	The minimum possible scale of the mesh when placed into the landscape.
Max Scale	The maximum possible scale of the mesh when placed into the landscape.

Min Proximity	The minimum proximity (in metres) to any other mesh or tree. Trees within this distance of the mesh will be removed. If Deploy as Clusters is enabled, it is the minimum distance between the centres of each cluster of objects.
Randomise Y-Axis Rotation	If checked, the rotation of each placed instance of this mesh on the y-axis will be randomised.
Y Rotation	When Randomise Y-Axis Rotation is not enabled, this is the fixed rotation (in degrees) on the Y-Axis for the Mesh or Prefab.
Rotation Override	Some models may have a non-0 rotation when imported into Unity. This will override those (incorrect) X and/or Z rotations. A common scenario is when the model make has used a product like Blender and forgotten to correct the rotation for use with Unity. To get the correct value, in Unity, select the model in the Project pane, on the Model tab in the Inspector, examine the Rotation values under "Imported Object". Subtract 360 from the X,Z values to put in as X,Z Rotation Overrides in LB. For Example, if the model is imported with a X Rotation of 270, the Rotation Override for X would be -90.
Align with Terrain	Whether the Mesh or Prefab will be aligned with the terrain normal or slope.
Mesh Populating Mode	The way that this Mesh is populated in the landscape. Available options are:
- Height	Where the Mesh appears is determined by terrain height. The mesh appears at heights between Min Height and Max Height (both in metres) on the terrain.
- Inclination	Where the Mesh or Prefab appears is determined by terrain inclination. The mesh appears at inclinations between Min Inclination and Max Inclination (both in degrees) on the terrain.
- Height And Inclination	Where the Mesh or Prefab appears is determined by both terrain height and terrain inclination. The Mesh appears at points where the height is between Min Height and Max Height (both in metres) and the inclination is between Min Inclination and Max Inclination (both in degrees).
- Constant Influence	The mesh appears everywhere on the terrain.
- Map	This is designed to help you fast-track applying meshes to a 3D terrain in the areas you want them. You create a "map" of the mesh using either the built-in Map Path tool or your favourite image editing software with the heightmap of the current terrain as a guide. Of course, you can still place more meshes in the Landscape at the same time using any combination of Landscape Builder Mesh Populating Modes. See Map Texturing Mode for an example workflow of using a map. See also: Scene Paths – Add Map Path to Landscape
- Height Inclination Map	Where the Mesh or Prefab appears is determine by Height, and Inclination, and the Map area.
Is Map from Path?	If the Map was created with a Map Path that you created in the scene view, then tick this to get the best placement results in the landscape.
Inverse	For selecting the inverse area of a Map
Use Noise	Whether noise will be used to add variation to Mesh or Prefab placement
Noise Tile Size	The scale of the noise applied to the x-z plane. Small sizes will result in smaller groups of objects, while larger values will larger groups.
Placement Cutoff	The noise cutoff value for mesh or prefab placement. Increasing this value will mean more meshes or prefabs are placed.
Deploy as Clusters	Whether multiple meshes or prefabs will be deployed around the same location. The central deployment position of the cluster is determined first according to

	the general Mesh or Prefab placement rules like Height, Inclination, Noise, Proximity Filters etc.
Cluster Distance	The x and z distance from the central placement position to the edge of the placement boundary.
Cluster Density	The density influences the number of objects that are deployed in each cluster
Cluster Resolution	The distance apart the objects can be potentially placed within the cluster (from centre to centre). If the resolution distance is too low, some objects may overlap with each other because the Min Proximity is not taken into account within a cluster. However, with some objects, like rocks, this could be used to your advantage to produce more variation from the same mesh or prefab.
Remove Grass	If checked, remove grass that is under and near a Mesh or Prefab. This also applies to objects within a Cluster if "Deploy as Cluster" is enabled.
Min Grass Proximity	Remove grass within a circle of the given radius (in metres) from the centre of the Mesh or Prefab. The radius is scaled up or down based on the Scale of the Mesh, so this radius should be based upon the radius you'd use if the mesh had a scale of 1
Min Tree Proximity	Trees within this distance of Mesh or Prefab will be removed (from the centre of the tree to the centre of the Mesh or Prefab). This also applies to objects within a Cluster if "Deploy as Cluster" is enabled.
Flatten Terrain	This enables you to flatten an area under and surrounding an object. This can be useful on undulating terrain where a larger object may expect the ground to be flat. For example, when placing buildings or farm equipment in a scene.
Flatten Distance	The distance from the centre of the Mesh or Prefab to the edge of the flattened area.
Flatten Blend Rate	The amount of the edge of the flattened area will be blended with the height of the surrounding landscape. Increasing the blend rate will provide a gentler transition but will reduce the central flattened area. To compensate for this, increase the Flatten Distance.
Flatten Height Offset	Use this to raise or lower the flattened area (in metres). The Mesh or Prefab will be raised or lowered by the same amount.

Once you are happy with your mesh selection and their corresponding settings, you can click the "Populate Landscape with Meshes" button located at the bottom of the Mesh tab. This will begin the process of populating your landscape with meshes, and will show a progress bar. You can click the cross at the right of the progress bar to cancel the process if you need to.

You will notice that while the populating of the landscape with trees operation doesn't remove placed meshes, the populating of the landscape with meshes operation removes placed trees. For this reason, the trees operation should be run before the mesh operation, as the meshes won't be placed inside of meshes but there is a chance when running the trees operation that a tree will be placed inside of a mesh.

Mesh Placement – Applying Filters

Filters allow you to further define the placement of meshes. To add a Filter, click "Add Filter".

Texture Filters

Select the Texture you only want the mesh placed on. If you only want the mesh to be placed where two Textures are blended together, click "Add Filter" and select the second Texture.

The list of available Textures is taken from the Textures currently applied to the landscape. Note, there may be two or more Textures in the Landscape, with the same Unity Texture but with different placement properties.

Area Filters

One or more Area Filters can be applied to each Mesh or Prefab. Filter can OR'd together or AND'd together. We think you will use OR more than you use AND when combining the same type of filter. Combining two or more Area Filters may be useful it you want a Mesh or Prefab to appear in this area, OR this area, OR this area etc. The AND operator is used to only place objects at the intersection or common parts of areas.

To define an area, enter the values directly into the Area Rectangle or click on the "Enable Area Picker" to move the area around in the Scene view. To resize the area, update the W/H Area Rectangle values in the LB Editor Window, or select the Unity Resize tool (press R key or click icon on toolbar) to resize in the Scene view.

Stencil Filters

Stencil Layer Filters restrict where the Meshes/Prefabs are applied in the landscape. One or more Stencil Layer can be painted in the editor to determine where Meshes/Prefabs will be procedurally placed. A Stencil Layer can be assigned to each group of Meshes/Prefabs. The same Stencil Layer can be used for different Meshes/Prefabs if you'd like multiple types of Meshes/Prefabs in the same areas within the landscape.

 To see more information, see the "Stencil" section in the "Landscape Tab" chapter.

Proximity Filters

Sometimes you may wish to prevent a prefab from being placed too close to another object in your scene. Proximity Filters can help by checking the proximity to objects placed in specific Unity Layers[10] and/or having a certain Unity Tag.

You can check for objects in multiple layers at one time by using the multiple-select dropdown box in the editor.

Property:	Function:
Unity Layers	Select none, one or multiple Unity Layers to check for object proximity to meshes or prefabs being placed in the landscape.
Match Tag	Select a single Unity Tag or All Tags which will be compared when checking proximity to meshes or prefabs being placed in the landscape.
Min Proximity	The minimum number of metres away from the matching objects the meshes or prefabs must be before they are placed in the landscape.

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[10] Not to be confused with Topography Layers

Export Tab

The Export tab is used for the saving of terrain and prefab files in the project. By default, Landscape Builder saves TerrainData files into the scene you create them in. This prevents you from easily recreating them in other scenes or other projects. The Export tab allows you to name and save the TerrainData files into your project, and optionally create and save a landscape prefab as well. You are also given the option to create and export a package of the landscape.

Saving TerrainData and Prefab Files

Before you save your files into your project, there are a number of settings to consider. These settings are detailed below:

Property:	Function:
Save Terrain Data Assets	If checked, the TerrainData files will be saved in your project.
Terrain Data Asset Name	The name of the saved TerrainData asset(s). Each TerrainData file will also have a number appended to the end of the name. This option will only be shown if the Save Terrain Data Assets option is checked.
Create Landscape Prefab	If checked, a landscape prefab file will be created.
Landscape Prefab Asset Name	The name of the saved landscape prefab asset. This option will only be shown if the Create Landscape Prefab option is checked.
Export Package	If checked, a package of the landscape will be created and exported.
Package Name	The name of the created package. This option will only be shown if the Export Package option is checked.
Include Dependencies	If checked, the created package will include "dependencies" – other assets that are used in your landscape (that it depends on). This option will only be shown if the Export Package option is checked.

Once you are happy with your settings, you can click the "Create And Save Assets" button to create the TerrainData files (and the prefab file if you checked the Create Landscape Prefab option) in your project. The created assets will be saved in the LandscapeBuilder/TerrainData folder. Any created packages will be exported to the LandscapeBuilder folder (outside of the Assets folder in your project).

If you give any of the TerrainData or prefab files you attempt to save a name that already exists in the LandscapeBuilder/TerrainData folder of your project, the files won't save. You will get an error in the console warning you about this. If you want to save the files, you need to provide a unique (unused) name.

Export to PNG

The primary purpose of this feature is for use with the Texturing, Trees, Grass and Mesh Map features. To generate a heightmap image for the current landscape, enter a Heightmap Filename (the .png file extension is automatically added for you), and click the "Export to PNG" button. When it has successfully exported the file, it will be highlighted in the Project window. The heightmap is a Portal Network Graphics (PNG) file as a greyscale image. White is high and black is low on the terrain. The image will be a consistent representation of the whole landscape in a single file.

Create Landscape as Mesh

Sometime you may wish to use a mesh rather than a Unity Terrain. This feature allows you to create a series of meshes in the scene from an existing Landscape Builder-generated landscape. Rather than create single meshes per Unity Terrain object, meshes are created in equal-sized chunks containing 4225 vertices and 8192 triangles. At the lowest Heightmap Resolution of 65, one mesh will be created for each Unity Terrain within a landscape. Meshes will be parented to a gameobject named [landscapename]_Meshes under the main landscape gameobject.

Property:	Function:
Add Colliders	Used with the "Export to Mesh" button, this will add a collider to each mesh. This is equivalent of a Unity Terrain collider.
Make Static	Used with the "Export to Mesh" button, this is equivalent of setting a mesh "Static" in the Unity Inspector. If the "Auto" is enabled in the Unity Lighting Scene window, when Meshes are created or changed Unity will start to building lightmaps. This may take several hours and consume all available CPU. During testing, it is recommended to either not enable "Make Static" or to turn off Auto in the Unity Lighting window.
Add Occlusion Areas	Used with the "Export to Mesh" button, this will automatically calculate the boundaries for each mesh and add an Occlusion Area. Occlusion Culling can improve performance by avoiding the need to render the terrain mesh that is within the camera frustum but is hidden by either other parts of the landscape or other objects in the scene.
Bake Occlusion	If Add Occlusion Areas is enabled, this will automatically build ("Bake") the occlusion culling data. Unless you have a large landscape, typically this will only take a few minutes. It is also possible to manually bake the occlusion data using the standard Unity tools.
Use MegaSplat	If the 3rd party asset "MegaSplat" is installed, and this is enabled, the meshes will be configured for use with the MegaSplat shader and painting system. NOTE: MegaSplat integration is currently in Preview.
Include Splatmaps	Used with the "Export to Mesh" button, this option is currently considered experimental. Although LB can extract up to 3 splatmaps (12 textures), the bundled shader (LBMeshTerrain.shader) can only render the first 5. We plan to support at least 8 textures in a feature release.
Export to Project Folder	Sometimes you may wish to save the terrain meshes to the Project Folder. Typically, you'd do this if you want to move them to another project or computer, or modify them using a 3rd party tool. When using this, ensure that the landscape name is unique in the Project or else you could overwrite the meshes save to the Project Folder by another landscape.

Button:	Function:
Export to Mesh	Create the meshes in the scene using the options provided in the table above. NOTE: "Export to Splatmaps" is a separate function to the "Include Splatmaps" option and is not required when you wish to use the LBMeshTerrain shader with the new landscape mesh.
Export to Splatmaps	This will export the Unity Terrain splatmaps as packed textures to the Project. LB supports up to 3 splatmaps per Unity Terrain. Each splatmap can contain the data for up to four textures. The first texture will go into the Red channel, the second texture into the Green channel, the third texture into the Blue channel, and the fourth into the Alpha channel. The packed splatmap textures will be saved into the Project folder under LandscapeBuilder/Splatmaps/[landscape name]. These splatmaps could be used with your own custom shader and the landscape meshes created with the "Export to Mesh" button.
Disable Terrain	Useful for seeing what your new Landscape meshes look like without the Unity Terrains being visible
Enable Terrains	When you wish to update the landscape Topography, placement of objects/prefabs with the LB Mesh Tab, or change the landscape in any way, click this button. Once you're done, click "Export to Mesh" again.

ERROR: LBLandscapeOperations.CreateLandscapeMesh - could not find LBMeshTerrain shader. It seems to be missing from Assets/LandscapeBuilder/Shaders/Resources folder

NOTE: By default, the LBMeshTerrain.shader is in the root of the LandscapeBuilder/Shaders folder so that it is not automatically included in every Unity Build. If you see the above error in the Unity console, move the LBMeshTerrain shader into the LandscapeBuilder/Shaders/Resources folder in your project and click "Export to Mesh" again.

Export EasyRoads to MAPs

EasyRoads3D Pro (ER) is an excellent road modelling tool for Unity which provides a is great way of adding roads to your landscape. LB supports integration with ER version 3[11].

ER3 is available from the Unity Asset Store or directly from the author. At the time of writing, version 3 was still in Beta so make sure you ask for access to the Beta. You will need Beta 7.7 or newer.

https://www.assetstore.unity3d.com/en/#!/content/469

http://www.unityterraintools.com/

MAPs can be used in LB to provide finer control over Texture, Tree, Grass and Mesh placement. When building roads in a landscape, it is useful to know where the roads are and how wide they are. This can be very useful when constructing road "corridors". You may wish to place different trees, grass or textures at different distances away from the left or right of a road. You may also wish to create a blended texture effect on either side of the road.

To create a MAP:

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[11] Currently we don't support integration with the free version of EasyRoads and there are no plans to support the older ER version 2.x as version 3 provides many new and improved features.

1. Create a Road Network in the scene with EasyRoads3D Pro version 3
2. Add one or more roads to the Road Network (do not Finalize the roads)
3. In Landscape Builder, select the Export Tab.
4. Drag the Road Network game object from the scene Hierarchy onto the LB EasyRoads Network property, or use the Game object selector
5. Enter the name of the folder where the MAPs will be stored. This will be a folder under Assets/LandscapeBuilder/Images within your current project.
6. Select a Map Resolution
7. Set the Left and Right Edge Widths
8. Choose a colour and click Create Road Maps
9. Click "Create Road Maps"
10. Now you can use the MAPs to define Texture, Tree, Grass and Mesh placement using the appropriate LB Tab.

Property:	Function:
EasyRoads Network	This is the Game Object in the scene that contains the EasyRoads road objects
EasyRoads Map Folder	This is the location where you want to save the MAP files when you click the Create Road Maps button. Once the Maps have been created, you may wish to move them to a more convenient location within your project.
Map Resolution	This is the image resolution of the output PNG file. The greater the resolution the smoother the edges will be but the more disk space and memory will be consumed.
Include Road	Should the area under the road be part of the output Map? If you wish to include or exclude textures, trees or grass on the road verge you may wish to turn this off.
Left Edge Min Width	This is the minimum distance from the left edge of the road that the map will be created. It only applies when the road is not included.
Left Edge Max Width	This is the maximum distance from the left edge of the road to the outer left edge of the map in metres
Left Right Min Width	This is the minimum distance from the right edge of the road that the map will be created. It only applies when the road is not included.
Right Edge Max Width	This is the distance from the right edge of the road to the outer edge right edge of the map in metres
Map Colour	This is the output colour of the area being mapped. You will use this same colour when applying the Map to a Texture, Tree Type, Grass Type or Mesh placement method.
Combine Roads	Rather than creating individual map files for each road, combine all roads into one image map file. If this is enabled the map image file created will have the same name as the Road Network gameobject.

Maps are exported with the same names as the roads unless "Combine Roads" is enabled. If you have more than one road and they are all the same name, then the second map will overwrite the first map and so forth. Ensure that all your roads have unique names.

When working on a road corridor, you may wish to produce multiple maps for the same road. For example, you may wish to have a gravel and sand texture near the edge of the road, have some pine trees 15 metres from the left of the road, and put some grass 5 metres from the right of the road. If you attempt to create a second map for the pine trees you will be prompted to overwrite the first

map. To avoid this, after creating the first map, move the road(s) maps out of the folder to another folder in your project and/or rename the map files. For example: "road001 Sand Gravel" or "road001 left pine trees".

Advanced Tab

Landscape Builder comes with some extra functionality that doesn't readily fit into any of the first eight tabs. That functionality can be found in the Advanced tab. They are broken down into three categories: Options, Tools, and Integration.

Advanced Options

Disabling Trees And Grass

Often when your landscape is populated with large numbers of trees and grasses, the Unity editor can slow down significantly, making it difficult to continue working. If you have a landscape selected, the "Disable Trees And Grass" option becomes available. When ticked, rendering of trees and grass, both in the editor and at runtime will be turned off. Your trees and grasses will still be there; they just won't be rendered. Clicking it again re-enables the rendering of trees and grasses. You may have to click once in the scene view to force the rendering to update.

Show Timing

When building runtime version of a landscape in script, it can be useful to test various options in the Editor first. Enabling "Show Timing" can help to determine which options are going to suit your performance requirements or to determine where any build-time bottlenecks are.

Show Texture Heightmap

Some products like RTP and MicroSplat use texture heightmaps. This allows heightmaps to be stored with Textures in the Texturing Tab. These heightmap textures will then be updated in the 3rd party products correctly.

AutoSave

AutoSave is a feature that automatically saves the scene after Landscape Builder successfully completes an operation – for instance, texturing the landscape or populating the landscape with trees. By default, it is enabled. You can disable it by clicking the check box in the Advanced tab, and enable it by clicking it again so that the tick is displayed next to "AutoSave".

GPU Acceleration

On by default, these options allow you to speed up Topography, Texturing, Grass, and Object Path operations by using compute shaders. These shaders operate on the GPU rather than the CPU of your computer. Not all GPUs support these shader operations. Where possible, we recommend you keep these turned on.

Copy and Paste

These options are used with the Group Copy and Paste context menus. Groups can be copied from one landscape, and pasted into another landscape in the same scene. See the Group Copy Tutorial for more information at https://youtu.be/SveSGfys0Ac

If a Group is copied into landscape that already has the same Group, it is not updated unless "Groups – Update Existing" is enabled. If you change the name or the source Group, and then paste it into another landscape with the same Group, the name of that Group will not be updated unless "Groups - Update Name" is enabled.

Group Options

Property:	Function:
Scale Prefab by Original	When scaling a prefab, use the original prefab scale rather than assume local scale is 1x1x1. Off by default, for backward compatibility, this can be set for each landscape.
Max No Prefab Time	The maximum number of seconds to attempt to place a prefab group member in the landscape. After this time, it gives up and goes to the next group member or group. This is mostly used when you have Uniform groups and therefore there could be millions of cells for the Group System to test for potential placement options. If you have very strict placement rules, like say a height of between 20 and 20.5 metres it might take a relatively long time to place each prefab. This can be set for each landscape.
Random Seed	Settable both in the editor and at runtime, this can help make your landscape less deterministic (if that's desirable). See also the "Randomise Per Group" option in Object Path Series when the Selection Method is one of the "Randomise" methods.

Override Undo – Topography, Texturing, Trees and Grass

Backup operations in Unity are slow. Sometimes, particularly on large landscapes, these can contribute a significant amount of time to the overall terrain generation. If you are very confident in using LB you may wish to save some populating time by turning off our Undo feature which skips the (slow) backup step. NOTE: this is an ADVANCED option, and you could lose data if you are not careful. MOST PEOPLE SHOULD LEAVE THIS TURNED OFF.

Non Square Terrains

As the name suggests, this EXPERIMENTAL feature allows you to have terrains with a different width and length. Some features like Stencils will not be available, other features may not work well, or at all. Hey, if you need it, use it but MOST PEOPLE SHOULD LEAVE THIS TURNED OFF.

Legacy Noise Offset

This is only for backward compatibility with landscapes created BEFORE version 1.4.2. This version of the noise has some issues, so don't enable this unless you really need it.

Topography Image Modifier Layer Options

Generally, when editing Image Modifier layers in a scene, they are shown as a wireframe mesh. The option allows you to show it as a semi-solid or transparent mesh. You can set the colour here and the transparency level. There is also a handy [R]set button for when you really mess up the colour settings.

No Celestials

Probably not named the best, but this option prevents LB from setting the Unity Layer for LB Celestials which are used with LB Lighting (see Lighting System below for details). If you never use LB Lighting and you already use the same Layer 25 for your project you can enable this option. If you still need to use LB Lighting AND it clashes with your Unity Layer setup, you can leave this option turned OFF and instead change the LB Celestials layer settings. See the Lighting System section for details.

Advanced Tools

Texture Generator

The Texture Generator replaces the old Normal Map Generator. See the section of the same title later in this manual.

Undo Cleanup

Landscape Builder creates some undo files outside of the Assets folder, which don't get deleted when Unity is closed (or when you switch scenes) and take up disk space. You can use the "Clean Up Undo Files" button to delete these undo files. You might want to do this if you want to back-up your project and you need to keep the file size of your project to a minimum. Care should be taken with this option as directly afterwards some undo functionality will not be available. In some cases, you won't be able to revert to a state from before you pressed the "Clean Up Undo Files" button.

Position MainCamera to Scene View

Often it may be convenient to have the Game View match the Scene View that is visible in the Editor. This button will search for the camera with the "MainCamera" tag, and orient it to match the Editor Scene View.

Stitching Tool

This tool allows you to stitch landscapes topographies together so that their heights join seamlessly. Landscapes must have at least one common border and cannot overlap each other. Each landscape can contain one or more terrains.

If you wish to stitch terrains together that are not part of an existing landscape, first import those terrains into at least two different landscapes. See "Importing Terrains into a Landscape" in the "Landscape Tab" section for more information.

The following current restrictions apply:

1. All terrains and the parent GameObject must have a scale of 1,1,1
2. All terrains in the same Landscape must have the same width, length, height and heightmap resolution

For best results:

1. Landscapes were built with Landscape Builder (although imported terrains are supported)
2. There are no gaps between terrains on the x-axis and z-axis (only y-axis heights don't match)
3. Both Landscapes have the same Transform Position Y value
4. Terrains in both Landscapes have the same Transform Position Y value
5. All terrains from both landscapes have the same dimensions (if not you may have to set the Landscape Weight to either 0 or 1 to blend the edges).
6. It the height of one landscape is more than 50 metres above or below the adjoining the landscape, it may be beneficial to lower or raise the parent landscape gameobject in the scene by adjusting the Transform Position Y value.
7. If you are not happy with the results of a stitching operation, immediately press "Undo Landscape Stitching" to roll back the change.

Property:	Function:

Landscape 1	The first landscape to be stitched. Drag the Landscape object from the Hierarchy into this field
Landscape 2	The second landscape to be stitched. Drag the Landscape object from the Hierarchy into this field
Edge Distance	The distance from the edge of the landscapes, in metres, that stitching will begin. The exact distance from each edge will depend on the heightmap resolution of the terrains being stitched. The distance can be between 10 and 1000 metres. The default is 500 metres.
Landscape Weight	The relative weight each landscape has on the stitching process. Values to the left (< 0.5) favour Landscape 1, while values to the right (> 0.5) favour Landscape 2. The default is 0.5, giving each landscape equal weight.
Set Neighbours	Set the connections between neighbouring terrains to ensure LOD matches
Reset Neighbours	These two buttons (Landscape 1 and Landscape 2) will reset terrain neighbours to only be neighbours in the same landscape. This is the default when a new landscape is created with Landscape Builder. This only affects terrain LOD

When the "Stitch Landscapes Together" button is clicked, a backup of both landscape heightmaps is taken to preserve the original landscapes should you change your mind or wish to change some properties and try again. If the stitching fails, for whatever reason, the original landscapes should be automatically restored.

WARNING: The "Undo Landscape Stitching" will not work after:

- Landscape Topography Tab has been used to alter a landscape
- the Modifier Tab has been used to alter a landscape
- the landscape Scene Settings or Terrain Settings have changed
- the scene has been reloaded
- another scene has been loaded
- Unity has been restarted

Refresh Scene

This will rarely be required, but sometimes items in a scene can be left behind after errors occur. Clicking "Refresh Scene" may fix this. If it doesn't, contact support.

"Refresh Scene" may also help if you have recently uninstalled CTS 2019 and are seeing warnings under Terrain Settings on the Landscape tab.

"Sort Terrains" will attempt to arrange the terrains under a landscape gameobject in alphanumeric order. This might be required if you have moved them around or you are importing existing terrains into Landscape Builder.

Advanced Integration

Landscape Builder can integrate with 3rd party products. Some of the settings for these are found here.

AQUAS Integration

AQUAS is a 3rd party water product. In version 1.x, it has the option to create flowing rivers with a Flow Map Painter (which needs to be installed separately). For more info see the following sections in the Landscape Tab chapter of this manual.

- Scene Settings – Water
- Scene Settings – Adding Lakes and Ponds
- Scene Settings – Adding Flowing Rivers

HQ Photographic Texture Grass & Rustic Grass Integration

If you have the 3rd party Grass packs installed in your project under a folder that is not the default install path, then you can reset the path in this section by clicking on the "..." button.

You can obtain vendor support or information about these great packs by clicking the "Get Support" button. If you don't already have one of the packs, click "Get HQ Vol. 1", "Get HQ Vol. 2", or "Get Rustic". This will take you directly to the Asset within the Unity Assets Store.

If you have either pack installed, the grasses are accessible via the "L" button in the Grass Texture tab.

If the grass packs are installed but nothing appears in the Grass tab when you click "L" or look in the Grass Editor, you may need to go to the Advanced tab in the Landscape Builder Editor, update the path(s) under "HQ Photographic Textures Integration" and then restart Unity.

Newer versions of the packs are located in Turboscalpeur/[grass pack name] while older versions are located by default in the root folder under Assets.

MegaSplat Integration
See also the same named section in the Texturing Tab chapter above in this manual.

Vegetation Studio Integration
See also the Vegetation Studio (and Pro) chapters later in the manual.

Lighting System

Landscape Builder comes with a lighting system that allows you to add customisable dynamic or static lighting to your scene. In dynamic mode, you get a full day/night cycle and in both modes, you can preview your scene lighting in the editor.

NOTE: The Lighting System is not supported with HDRP, LWP, or URP.

Adding Lighting to Your Scene

You can add lighting to scene by clicking the "Set Up Scene Lighting" button in the Landscape tab of the Landscape Builder window. If the "Remove Directional Lights" option is checked, all existing directional lights (and the GameObjects they're attached to) will be removed from the scene. When you click the "Set Up Scene Lighting" button, Landscape Builder adds a new GameObject to the scene called "LB Lighting". This has two components attached – a reflection probe and the LB Lighting script. There are also two lights called "Sun Light" and "Moon Light" attached as a child GameObjects. The script controls the lighting, giving you customisable static or dynamic lighting.

Customising Your Lighting Setup

After you have added lighting to your scene, you can use the lighting script to customise it. Lighting has two Setup Modes; Simple and Advanced. Use Advanced mode if you need more control over the sun intensity, moon intensity, ambient light or fog colour at different parts of the day. Advanced mode comes with a number of curve and gradient settings which mimic the default behaviour used in Simple mode.

Reset buttons in each of the Settings sections allows you to restore the default settings.

Lighting - Skybox Settings

You can use either a procedural skybox or a six-sided skybox. Landscape Builder has a built-in procedural skybox material called "LBSkybox" which uses a modified skybox shader called "Procedural Modified". If required, you can use your own procedural skybox and/or shader.

To use a six-sided skybox, change the "Skybox Type" and click "Add Skybox". Drag the skybox six-sided material into the place supplied. Set the Transition Start and End Times for this Skybox. Add other Skyboxes as required so that your 24-hour day is covered.

Lighting – General Lighting Settings (Simple Setup Mode)

The first property of the script is the "Lighting Mode" property, which allows you choose whether the lighting is static or dynamic. In static mode, the lighting doesn't change at runtime. In dynamic mode, a customisable day/night cycle is implemented.

When in Static Lighting Mode, the following properties are displayed on the lighting script:

Property:	Function:
Sun	The light object to be used for the sun.

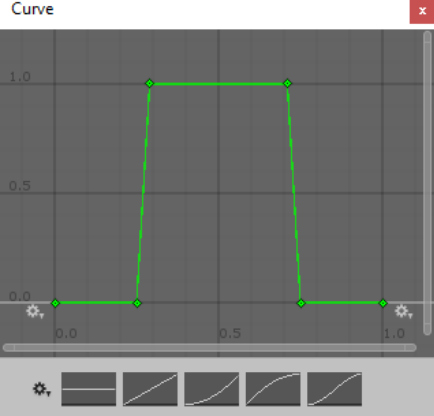|	
Sun Intensity	The intensity (and bounce intensity) of the sun light at its maximum brightness
Sun Orbit Rotation	The rotation of the sun's orbit on the y-axis. Modify this to change where the sun rises and sets.
Time of Day	The simulated time, expressed as a float in 24-hour time. For example, 10 means 10:00 A.M., while 16.5 means 4:30 P.M.
Sunrise Time	Sunrise time expressed as a float in 24-hour time. For example, 5 means 5:00 A.M., while 5.75 means 5:45 A.M. Sunrise can be between 2AM and 10AM
Sunset Time	Sunset time expressed as a float in 24-hour time. For example, 17 means 5:00 P.M., while 19.25 means 7:15 P.M. Sunrise can be between 2PM and 10PM
Use HDR	Allows High Dynamic Range colours to be selected. HDR can be useful when also using the Unity Post Processing stack. Applies to Cloud Colours and Ambient light.
Refl. Probes Update Mode	The reflection probes that will be updated when the game starts. Available options are:
- Don't Update	No reflection probes will be updated.
- Update This Probe	Only the default reflection probe attached to the Dynamic Lighting GameObject will be updated. This is the default option.
- Update All Probes	All non-baked reflection probes will be updated.

When in dynamic mode, the following properties are displayed on the lighting script:

Property:	Function:
Sun	The light object to be used for the sun.
Sun Intensity	The light intensity (and bounce intensity) of the sun at its maximum brightness
Sun Orbit Rotation	The rotation of the sun's orbit on the y-axis. Modify this to change where the sun rises and sets.
Day Length	The length of a day/night cycle (in seconds). The default is 1440, which means that one in-game minute passes in one real world second.
Start Time of Day	The simulated time at which the game starts, expressed as a float in 24-hour time. For example, 10 means 10:00 A.M., while 16.5 means 4:30 P.M.
Sunrise Time	Sunrise time expressed as a float in 24-hour time. For example, 5 means 5:00 A.M., while 5.75 means 5:45 A.M. Sunrise can be between 2AM and 10AM
Sunset Time	Sunset time expressed as a float in 24-hour time. For example, 17 means 5:00 P.M., while 19.25 means 7:15 P.M. Sunrise can be between 2PM and 10PM
Use HDR	Allows High Dynamic Range colours to be selected. HDR can be useful when also using the Unity Post Processing stack. Applies to Cloud Colours and Ambient light.
Realtime Terrain Lighting	If checked, the tree and terrain lightmap colours will be updated at every lighting update interval (specified below). This feature has a large performance cost. This option shouldn't be used when only using SpeedTree trees, as they update their lighting automatically.
Lighting Update Interval	The period of time (in seconds) between each complex lighting update. Decreasing this value will increase the frequency of lighting updates and make lighting transitions smoother, at the cost of performance.
Refl. Probes Update Mode	The reflection probes that will be updated at every lighting update interval. Available options are:
- Don't Update	No reflection probes will be updated.
- Update This Probe	Only the default reflection probe attached to the Dynamic Lighting GameObject will be updated. This is the default option.

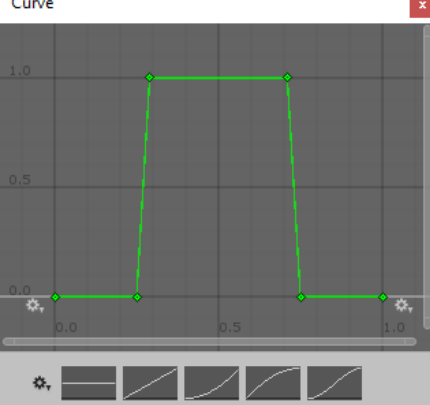|	
- Update All Probes	All non-baked reflection probes will be updated.

Lighting – General Lighting Settings (Advanced Setup Mode)

When in Static Lighting Mode, the following properties are displayed on the lighting script:

Property:	Function:
Sun	The light object to be used for the sun.
Max Sun Intensity	The maximum intensity of the sun.
Sun Intensity Curve	Curve defining the sun intensity at each time in the day (time of day is expressed as a 0-1 float) – with 0 being 0 intensity and 1 maximum intensity. For example, on this curve, the point (0.5, 1) on this curve means that at midday the sun light will be at maximum intensity. The point (0.75, 0) on this curve means that at 6:00 P.M. the sun light will be at 0 intensity.
Sun Orbit Rotation	The rotation of the sun's orbit on the y-axis. Modify this to change where the sun rises and sets.
Time Of Day	The simulated time, expressed as a float in 24-hour time. For example, 10 means 10:00 A.M., while 16.5 means 4:30 P.M.
Refl. Probes Update Mode	The reflection probes that will be updated when the game starts. Available options are:
- Don't Update	No reflection probes will be updated.
- Update This Probe	Only the default reflection probe attached to the Dynamic Lighting GameObject will be updated. This is the default option.
- Update All Probes	All non-baked reflection probes will be updated.

When in dynamic mode, the following properties are displayed on the lighting script:

Property:	Function:
Sun	The light object to be used for the sun.
Max Sun Intensity	The maximum intensity of the sun.

Sun Intensity Curve		Curve defining the sun intensity at each time in the day (time of day is expressed as a 0-1 float) – with 0 being 0 intensity and 1 maximum intensity. For example, on this curve, the point (0.5, 1) on this curve means that at midday the sun light will be at maximum intensity. The point (0.75, 0) on this curve means that at 6:00 P.M. the sun light will be at 0 intensity.
Sun Orbit Rotation		The rotation of the sun's orbit on the y-axis. Modify this to change where the sun rises and sets.
Day Length		The length of a day/night cycle (in seconds). The default is 1440, which means that one in-game minute passes in one real world second.
Start Time Of Day		The simulated time at which the game starts, expressed as a float in 24-hour time. For example, 10 means 10:00 A.M., while 16.5 means 4:30 P.M.
Sunrise Time		Sunrise time expressed as a float in 24-hour time. For example, 5 means 5:00 A.M., while 5.75 means 5:45 A.M. Sunrise can be between 2 A.M. and 10 A.M.
Sunset Time		Sunset time expressed as a float in 24-hour time. For example, 17 means 5:00 P.M., while 19.25 means 7:15 P.M. Sunset can be between 2 P.M. and 10 P.M.
Realtime Terrain Lighting		If checked, the tree and terrain lightmap colours will be updated at every lighting update interval (specified below). This feature has a large performance cost. This option shouldn't be used when only using SpeedTree trees, as they update their lighting automatically.
Lighting Update Interval		The period of time (in seconds) between each complex lighting update. Decreasing this value will increase the frequency of lighting updates and make lighting transitions smoother, at the cost of performance.
Refl. Probes Update Mode		The reflection probes that will be updated at every lighting update interval. Available options are:
- *Don't Update*		No reflection probes will be updated.
- *Update This Probe*		Only the default reflection probe attached to the Dynamic Lighting GameObject will be updated. This is the default option.
- *Update All Probes*		All non-baked reflection probes will be updated.

Lighting – Ambient Light and Fog Settings (Simple Setup Mode)

The environment can receive ambient light from a single blended colour between day and night, or it can consist of separate blended colours for ground, horizon and sky.

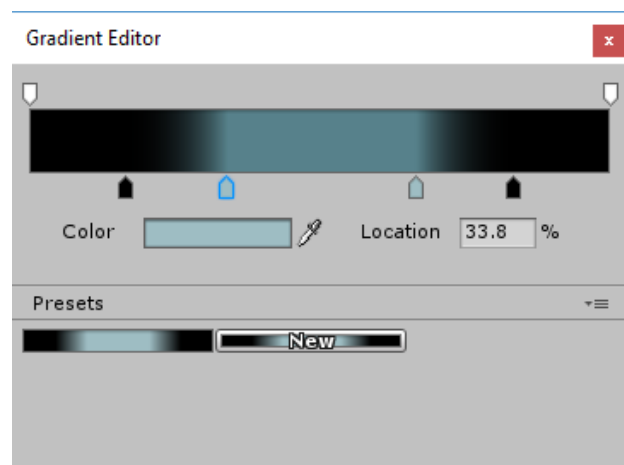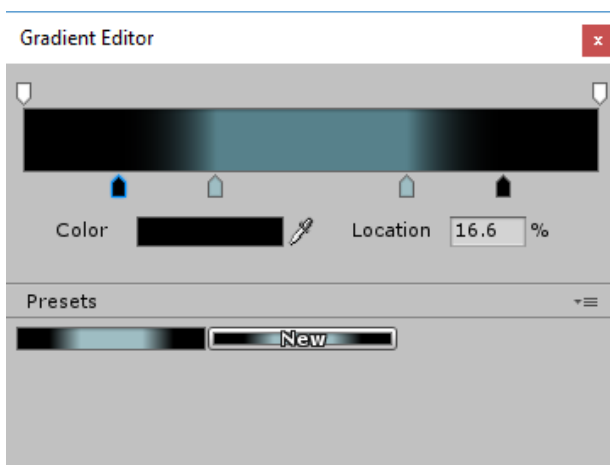When in Simple Setup Mode, the following properties are displayed:

Property:	Function:
Day Ambient Light	The colour of ambient light from two hours after sunrise to two hours before sunset. Making this colour "lighter" will increase ambient light in the day; making it darker will decrease the ambient light in the day. When Ambient Source is Gradient, separate colours can be set for sky, horizon, and ground.

Night Ambient Light	The colour of ambient light from two hours after sunset to two hours before sunrise. Making this colour "lighter" will increase ambient light at night; making it darker will decrease the ambient light at night. When Ambient Source is Gradient, separate colours can be set for sky, horizon, and ground.
Day Fog Colour	The colour of fog from two hours after sunrise to two hours before sunset
Night Fog Colour	The colour of fog from two hours after sunset to two hours before sunrise
Day Fog Density	The fog density from two hours after sunrise to two hours before sunset. Increasing this value will make it foggier in the day; decreasing it will make it less foggy in the day.
Night Fog Density	The fog density from two hours after sunset to two hours before sunrise. Increasing this value will make it foggier at night; decreasing it will make it less foggy at night.
Use External Fog	Use a third party or external product to control fog in the scene. LBLighting will not update fog settings at runtime.

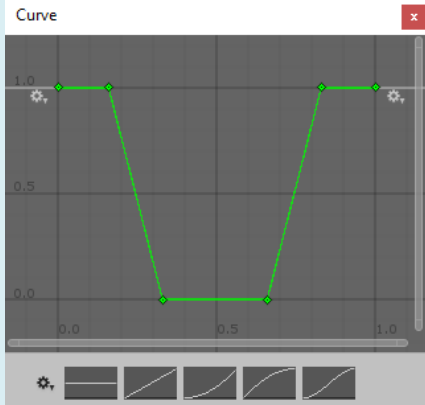## Lighting – Ambient Light and Fog Settings (Advanced Setup Mode)

When in Advanced Setup Mode, some explanation of the gradient editor is necessary.

The gradient editor is used in Landscape Builder to give you greater control over the transition between colours of lighting aspect e.g., ambient light and fog colour. The gradient editor in Unity consists of a number of keys each with their own colour corresponding to a percentage value. In Landscape Builder, the percentage value is used to indicate the time of day. 0% is the start of the day (midnight), 50% is the middle of the day (midday) and so on. To convert a 24-hour time to a percentage, simply divide by 24 and multiply by 100. In this way, 7:30 (which is 7.5) becomes: $\frac{7.5}{24} \times 100 = 31.25\%$.

In the above screenshots, you can see an example of the gradient editor being used (in this case for fog). Before and after the last two keys the fog colour is simply black, and between the 2nd and 3rd keys the fog colour is a light blue. Between the 1st and 2nd keys and between the 3rd and 4th keys however a colour transition has been automatically generated. If the user wanted to add an orange tinge to the fog during this transition, they could simply add two new keys between the 1st and 2nd and 3rd and 4th keys and set the colour to orange. The new colour transitions are generated automatically.

When in Advanced Setup Mode, the following properties are displayed:

Property:	Function:
Ambient Light Gradient	Gradient defining the ambient light colour at each time in the day (time of day expressed as a 0-1 float). When Ambient Source is Gradient, separate colour time gradients can be set for sky, horizon, and ground.
Fog Colour Gradient	Gradient defining the fog colour at each time in the day (time of day expressed as a 0-1 float)
Min Fog Density	The minimum fog density, corresponding to 0 on the fog density curve
Max Fog Density	The maximum fog density, corresponding to 1 on the fog density curve
Fog Density Curve	Curve defining the fog density at each time in the day (time of day is expressed as a 0-1 float). For example, on this curve, the point (0.5, 0) on this curve means that at midday the fog density will be at the min fog density. The point (0.75, 0.53) on this curve means that at 6:00 P.M. the fog density will be roughly halfway between min and max fog density.
Use External Fog	Use a third party or external product to control fog in the scene. LBLighting will not update fog settings at runtime.

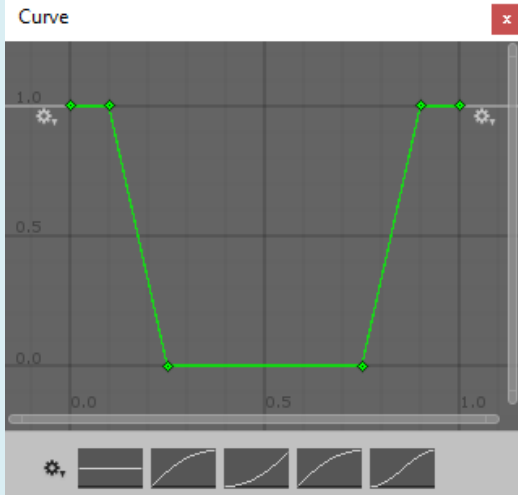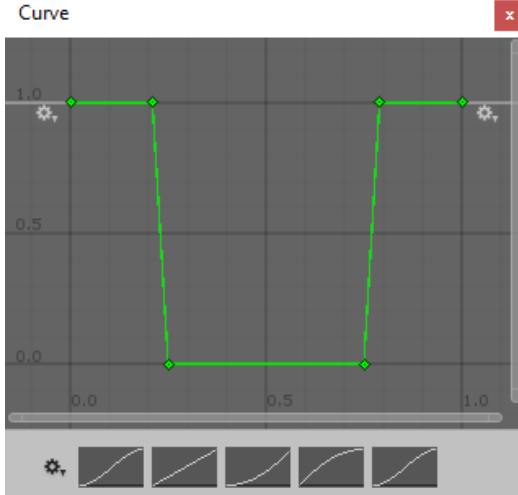## Lighting – Celestial Settings (Simple Setup Mode)

This enables you to add the moon and stars to your landscape night skies. There is a bug in Unity which can lead to having a blue or bright night sky. To correct this, open the Unity Lighting window, click the "Scene" tab, and add the "Sun Light" to the "Sun" slot.

Property:	Function:
Use Celestials	Allows you to add stars and the moon to the night sky.
Main Camera	Drag the main camera from the scene into this slot. This will allow Landscape Builder to set the main camera Clear Flags to "Depth only" and to remove the "LB Celestials" layer from the "Culling Mask".
Number of Stars	How many stars to create in the night sky.
Star Size	The relative size of each star.
Use Moon	Whether a light will be used for the moon. If "Use Celestials" is enabled the moon will also be created in the night sky.
Moon Intensity	The intensity of the moon light.
Moon Orbit Rotation	The rotation of the moon's orbit on the y-axis. Modify this to change where the moon rises and sets.
Moon Size	The relative size of the moon in the night sky.

Click "Build Celestials" to add the heavenly bodies to the scene and update the cameras to ensure the night sky rotates in step with the main camera.

Lighting – Celestial Settings (Advanced Setup Mode)

This gives you more control over the moon and stars in your landscape night skies.

Property:	Function:
Use Celestials	Allows you to add stars and the moon to the night sky.
Main Camera	Drag the main camera from the scene into this slot. This will allow Landscape Builder to set the main camera Clear Flags to "Depth only" and to remove the "LB Celestials" layer from the "Culling Mask".
Number of Stars	How many stars to create in the night sky.
Star Size	The relative size of each star.
Star Visibility Curve	Curve defining the star visibility at each time in the day (time of day is expressed as a 0-1 float) – with 0 being no stars visible and 1 being all of the stars visible. For example, on this curve, the point (0.5, 0) on this curve means that at midday there will be no stars visible in the sky. The point (0.75, 0) on this curve means that at 6:00 P.M. there will still be no stars visible.
Use Moon	Whether a light will be used for the moon. If "Use Celestials" is enabled the moon will also be created in the night sky.
Moon Intensity	The intensity of the moon light.
Moon Intensity Curve	Curve defining the moon intensity at each time in the day (time of day is expressed as a 0-1 float) – with 0 being 0 intensity and 1 maximum intensity. For example, on this curve, the point (0.5, 0) on this curve means that at midday the moon light will be at 0 intensity. The point (0.85, 1) on this curve means that at about 8:30 P.M. the moon light will be at maximum intensity.
Moon Orbit Rotation	The rotation of the moon's orbit on the y-axis. Modify this to change where the moon rises and sets.
Moon Size	The relative size of the moon in the night sky.

Click "Build Celestials" to add the heavenly bodies to the scene and update the cameras to ensure the night sky rotates in step with the main camera.

Lighting – Celestial (Changing Unity Layer)

By default, the Celestials use the Unity Layer #25. On rare occasions, this may conflict with another asset that is difficult to change. To change the layer, open Scripts\Behaviours\LBCelestials.cs and following the instructions at the top of the file.

Lighting – Weather Settings

Lighting can be used to control some aspects of the Weather FX system. The key integration aspects include:

- Material wetness
- The list of cameras will render Weather FX in the scene
- Cloud settings dry/wet and day/night conditions

Property:	Function:
Use Weather	This will enable Lighting – ImageFX integration. When it is first enabled, it will automatically scan the current scene for cameras and add them as ImageFX cameras. When it is disabled, any cameras in the ImageFX cameras list will have their ImageFX component removed.
Use Unity Fog	This option appears after the list of ImageFX Cameras. In some scenarios, typically with semi-transparent objects are present in your scene and "Use Weather" is enabled, enabling Unity Fog may improve the look of your scene.

Button:	Function:
Get Camera	Get all the Camera from the scene. This will add the ImageFX script to each of the cameras
+	Add an empty slot to into which a scene camera can be added
-	Remove the last camera from the ImageFX camera list. If this camera isn't still in the list, the ImageFX script will be removed from this camera
X	Remove this camera from the list and remove the ImageFX component from that camera.

Basic cloud settings can be controlled thought Lighting by setting the following properties. All cameras in the Weather FX camera list will be updated.

Property:	Function:
Render Clouds	Determines if clouds will be rendered or not by the ImageFX cameras
Use 3D Noise	Whether the clouds are rendered using 3D as opposed to 2D noise - this is particularly performance heavy.
Cloud Style	The style of the clouds rendered.
Clouds Quality Level	The quality of the ray-marching used to determine cloud density - higher settings increase quality at the cost of performance. Default: Low. Typically, "Low" is recommended. "High" can be used to improve the look when using "3D Noise".
Cloud Detail Amount	The amount of extra detail added to them - increasing this will decrease performance slightly.
Upper Colour (Day)	The upper or top colour of clouds at midday

Upper Colour (Night)	The upper or top colour of clouds at midnight
Lower Colour (Day)	The lower or bottom (underside) colour of clouds at midday
Lower Colour (Night)	The lower or bottom (underside) colour of clouds at midnight

Weather State settings can also be controlled by LB Lighting. All cameras in the Weather FX camera list will be updated.

Property:	Function:
Start Weather State	Set this to "Random" or to one of your Weather States you have configured below. "Random" will select from your list of states automatically.
Automatic Transitions	If enabled, the weather will transition between states automatically. Whether this is enabled or not it is always possible to trigger state transitions from script. Weather will only (automatically) transition between neighbouring States. For example, if the States are "Clear", "Cloudy", "Light Rain" and "Stormy"; "Cloudy" can transition to "Clear" or "Light Rain" but not "Stormy". States don't "wrap", so "Stormy" will never transition to "Clear" nor will "Clear" transition to "Stormy". Therefore, the order States are added is important.
Min/Max Transition Duration	When Automatic Transitions is enabled, the minimum and maximum times, in seconds, that it will take to transition from one weather state to another. If both are the same, transition will always take the same period of time and may look a little unrealistic.
Randomise Wind Direction	Whether wind direction can change when the weather state changes
Use Wind Zone	Whether a specified wind zone is controlled by the weather state
Wind Zone	The wind zone from the scene that will be controlled by the weather state

You may wish to have multiple weather states so that you can transition between them. For example, you may have states like "Clear", "Cloudy", "Light Rain", and "Stormy". Each state can have its own set of properties which are set out below.

Property:	Function:
Name	Your custom name of this state. E.g. "Fine", "Cloudy", "Stormy"
Probability	The (proportional) probability of the weather state occurring
Wetness	The wetness value used while in this weather state. 0 = dry, 1 = fully wet
Cloud Density	The cloud density used in this weather state. Range 3.0 to 5.0
Cloud Coverage	The cloud coverage used in this weather state. Range 0.0 to 1.0. 0 is no coverage and 1 is full cloud coverage
Rain Strength	How heavy the rain is while in this weather state? Range 0.0 to 1.0. 0 is no rain.
Hail Strength	How heavy the hail is while in this weather state? Range 0.0 to 1.0. 0 is no hail.
Clouds Morphing Speed	How fast cloud formations will change over time. Range 1 to 1000. Only available when "Use 3D Noise" is enabled.
Wind Strength	How strong the wind is while in this weather state (in metres per second)?
Wind Zone Main	If "Use Wind Zone" is enabled, the value of the 'main' property for wind zones used in this weather state.
Wind Zone Turbulence	If "Use Wind Zone" is enabled, the value of the 'turbulence' property for wind zones used in this weather state

Property:	Function:
Min/Max State Duration	If "Automatic Transitions" is enabled, the minimum and maximum durations of this state (in seconds)

Lighting – On Screen Clock Settings

This feature allows you to add a simple 24-hour digital clock to the scene. It will appear at the lower right corner of the Game View. It can be useful in testing your lighting settings either at runtime or in the editor. The clock will display the simulated time of day which is governed by "Day Length" and "Start Time of Day" in "General Lighting Settings".

Property:	Function:
Display Screen Clock	Displays the screen clock in the Game window as a 24-hour digital clock.
Clock Text Colour	The colour of the clock digits
Show Seconds	Display the screen clock in HH:MM:SS format

Lighting – Screen Fade Settings

If you wish to fade your scene in or out, click the "Show" button to expand the options.

Property:	Function:
Fade In On Wake	Fade the scene in when it first starts. This option will not be available if "Fade Out On Wake" is enabled
Fade In Duration	The length of time, in seconds, it takes for the scene to fully fade in.
Fade In On Wake	Fade the scene out when it first starts. This option will not be available if "Fade In On Wake" is enabled.
Fade In Duration	The length of time, in seconds, it takes for the scene to fully fade out.

You can also fade the scene in or out at runtime from your own scripts by using the following methods and fields. To use these items at runtime, you will first need a reference to the LBLighting script in the scene.

```
LBLighting lightingScript = GameObject.FindObjectOfType<LBLighting>();
if (lightingScript != null)
{
  lightingScript.fadeInDuration = 20f;
  lightingScript.StartScreenFade(true);
}
```

Field:	Details:
fadeInDuration	The time, in seconds, it takes to fade in the scene
fadeOutDuration	The time, in seconds, it takes to fade out the scene

Function:	Details:

StartScreenFade(bool isFadeIn)	Fade the screen in or out. The lighting will continue to be updated as normal.

Lighting – Previewing Your Lighting Setup In The Editor

You can preview your lighting setup at any time by clicking the "Update Lighting Preview" button at the bottom of the LB Lighting inspector.

ImageFX

In this release the ImageFX system provides the following high-level features:

- Distance-based Fog
- Height-based Fog
- Volumetric animated clouds
- Runtime control of fog, clouds, and lighting
- Integration with LB Lighting and Camera Animator

Our roadmap includes:

- Rain and lightning
- Runtime control of dynamic weather cycles

NOTE: ImageFX and the weather system is not supported with HDRP, LWP, or URP.

ImageFX – Quick Setup

Although the ImageFX script can be manually added to a camera, the fastest way to get started is to first add LB Lighting to your scene from the Landscape tab, expand "Weather Settings" in LB Lighting, and click "Use Weather". For more details, see "Lighting System" elsewhere in this manual.

ImageFX – Fog Settings

Once the LBImageFX script is attached to a camera the following properties can be set to control the weather in your scene.

Property:	Function:
Use Unity Fog Colour	Use the fog colour from the Unity Lighting Editor
Fog Colour	The custom colour of the fog if "Unity Fog Colour" is not enabled
Distance Based Fog	Enable Distance-based fog
Water Level	This height, is used to calculate how Distance-Based fog is rendered. The height, in metres, is the world space y-axis value which may be different from the landscape water level if the landscape position doesn't have a 0 y-axis value.
Distance Fog Density	The density of the distance-based fog
Height Based Fog	Enable Height-based fog
Height Based Density	The density of the height-based fog
Fog Height	The maximum height, in metres of the height-based fog
Fog Skybox	Apply fog to the skybox
Max Fog Intensity	The maximum fog intensity

Property:	Function:
Fog Colour Variance	The amount of variance the fog colour will have. Lower values tend to work the best. If using fog at night, keep the variance very low (like 0.005) or else the fog may appear very dark or even black. This value can also be modified at runtime.

ImageFX – Cloud Settings

That if you have enabled "Use Weather" in the Lighting script, some items will be controlled from LB Lighting rather than directly in the LB ImageFX script attached to a camera.

Property:	Function:
Render Clouds	The camera that this script is attached to will render Clouds in the Game view or at runtime
Detailed Clouds	Detailed Clouds provide higher definition clouds with some performance overhead
Use 3D noise	When enabled, this make the clouds look more volumetric and realistic. However, it does incur a performance overhead
Use HDR	Allows HDR colours to be selected. This can be useful when also using the Unity Post Processing stack. This is controlled by LBLighting if you have specified this camera as a ImageFX camera.
Cloud Style	Select from different cloud styles.
Clouds Start Height	The height at which the clouds will begin to be rendered. Typically, should be set around 10000 metres.
Clouds End Height	The highest that the clouds will be rendered. Typically set to 12000 metres. The thickness of the clouds needs be less than or equal to 2000 metres.
Clouds Tile Size	The tile size in 3D space over which cloud noise 'tiles' - increase this value to get wider/longer clouds
Clouds Upper Colour	The upper or top colour of clouds (controlled by LBLighting if you have specified this camera as a ImageFX camera)
Clouds Lower Colour	The lower or bottom (underside) colour of clouds (controlled by LBLighting if you have specified this camera as a ImageFX camera)
Clouds Quality Level	The quality of the ray-marching used to determine cloud density - higher settings increase quality at the cost of performance. Default: Low. Typically, "Low" is recommended. "High" can be used to improve the look when using "3D Noise".
Clouds Density	The density of clouds - increase this to make clouds darker (controlled by LBLighting if you have specified this camera as a ImageFX camera)
Clouds Coverage	The coverage of clouds - increase this to make clouds cover more of the sky (controlled by LBLighting if you have specified this camera as a ImageFX camera)
Clouds Detail Amount	The amount of extra detail added to them - increasing this will decrease performance slightly.
Clouds Animation Speed	The velocity of cloud movement in the scene. Cloud animation speed can be controlled on the X and Z axis. In the editor, the Z value appears as "Y". Negative values denote the reverse direction (controlled by LBLighting if you have specified this camera as a ImageFX camera).
Clouds Morphing Speed	How fast cloud formations will change over time. Range 1 to 1000. Only available when "Use 3D Noise" is enabled.

Cast Shadows	This will render shadows on your landscape as clouds pass overhead.
Shadows Ray Marches	The number of ray marches used to determine cloud density for shadows - increasing this value increases quality at the cost of performance
Max Shadow Strength	The strength or intensity of the shadows that are cast from the clouds
Sun	The light used to determine the direction in which shadows are cast (controlled by LBLighting if you have specified this camera as a ImageFX camera)

ImageFX – SSRR Settings

Screen Space Ray-traced Reflection is our implementation of a post processing camera effect to reflect objects, in real-time, onto shiny surfaces within the scene.

It has a number of custom properties to help you get the effect you're after.

Property:	Function:
PBR Reflection	Whether the reflections use PBR calculations. This option is only available for the Deferred rendering path. This option is available on your Camera script or in globally within the Unity Project Settings under Player, Other Settings.
Reflect Near Pixels	Enable this to allow near pixels to be reflected - this should always be enabled unless you only want to reflect far pixels. This has a higher performance overhead than only having Far Pixels enabled.
Reflect Far Pixels	Enable this to allow far pixels to be reflected - helpful if the skybox (or other far pixels) are written to after reflection probes are calculated
Down Sampling	How much the reflection textures are down sampled - increasing this will increase performance but will reduce quality.
Pixel Stride	The length in pixels of each ray stride - increase this value to improve performance at the cost of visual fidelity.
Max Ray Marches	The maximum number of (near pixel) ray marches to be performed per pixel - increasing this value allows for reflections of objects further away but will increase performance cost.
Max Ray Dist.	The maximum ray distance in metres - increasing this value allows for reflections of objects further away but will increase performance hit.
Screen Fade Dist.	The distance over which reflections of pixels leaving the screen are faded out.
Fresnel Fade	The factor by which reflections are faded out due to the fresnel effect - increase this to increase fading of reflections further 'into' objects.
Fresnel Power	The speed at which reflections are faded out due to the fresnel effect - increase this to fade reflections faster as they go further 'into' objects.
Jitter	The amount of jitter added to reflection rays - increasing this value can help to remove jagged artefacts.
Blur Strength	The strength of blurring for reflections on rough surfaces. This option is only available for the Deferred rendering path.

SSSR can be used with default shaders like the Unity Standard shader or custom shaders like "Standard-LB Weather" or "Standard-LB WeatherER" (see below).

We recommend SSRR be used with a camera Rendering Path of Deferred as it will give better results than Forward.

Varying wetness on flat surfaces

Sometimes you may wish to show the effect of water on flat surfaces in your scene without actually having a water shader "covering" an object. An example of this may be a road that is wet when it rains but then slowly dries as the clouds break up and the sun comes out. On wet surfaces, you may also wish to display reflections of both stationary and moving objects – like a car driving along a wet (shiny) road past some trees or houses.

The "Standard-LB Weather" and "Standard-LB WeatherER" shaders are designed to show the effects of water on a flat surface. These shaders use Physically Based Rendering (PBR) and allow shadows on all lighting types in your scene.

NOTE: This feature works with the built-in Standard Render Pipeline. It does not support HDRP, LWRP, or URP.

Property:	Function:
Color	The colour tint to apply to the Albedo texture
Max Water Level	The maximum water level can be between 0.0 and 2.0 with a default value of 1.0. It is multiplied by the wetness of the scene which is set in LBLighting (which must also be in the scene).
Metallic	The metallic look of the texture which will also be influenced by the amount of water on the surface.
Smoothness	How glossy or smooth the texture should appear. It will be influenced by the amount of water on the surface.
Height	The parallax map height
Normal	The strength of the normal map
Albedo (RGB)	This is the main Albedo texture
Normalmap	The normal map texture
Heightmap (R)	The height map texture
Tiling	The Albedo, Normalmap and Heightmap textures can be tiled on both x and y directions
Offset	The Albedo, Normalmap and Heightmap textures can be offset in both x and y directions

The Standard-LB WeatherER shader is identical to the Standard-LB Weather shader apart from an offset to prevent z-fighting with the terrain when used with EasyRoads3D Pro.

Shaders

Landscape Builder includes some custom shaders. These are located in the Assets/LandscapeBuilder/Shaders folder.

NOTE: These shaders only work with the built-in Standard Render Pipeline. They do not support HDRP, LWRP, or URP.

Shader:	Purpose:
LBTerrain	This shader has three components: LBTerrain-Base, LBTerrain-FirstPass, and LBTerrain-AddPass. It is used when rendering the terrains in the landscape. The

Shader:	Purpose:
	LB Standard Material Type can be used when rendering steep cliffs or canyons. It prevents Texture tiling from looking stretched. To use this shader, on the Landscape Tab, expand "Terrain Settings", and set the Material Type to "LB Standard".
LBImageFX	This powerful shader renders the weather FX and/or Screen Space Ray-traced Reflection on one or more cameras in the scene. It is automatically selected when the LB Image FX script is added to a camera or it is enabled in the Camera Animator. Screen Space Ray-traced Reflection is a camera effect that renders reflections in real-time onto typically flat objects in the scene. For more information, see the section in this manual called "ImageFX".
LBWeatherFX	The WeatherFX shader has been replaced by the new integrated LBImageFX shader. See also Introduction – Breaking Changes.
LBSimpleSSRR	The Simple Screen Space Ray-traced Reflection shader has been replaced by the new integrated LBImageFX shader. See also Introduction – Breaking Changes.
Skybox-LB Blended	Used by Six-sided skyboxes in LB Lighting.
Skybox-Procedural Modified	Used by the Procedural skybox in LB Lighting.
Standard-LB Weather	This shader uses Physically Based Rendering (PBR). It can be used to show the appearance of water on flat surfaces like roads or paths. It automatically picks up wetness from the weather system to display different amounts of "water" at runtime. For more information, see the section called "Varying wetness on flat surfaces".
Standard-LB WeatherER	The same as Standard-LB Weather except with an offset to match the EasyRoads3D v3 default road shader. On bumpy or hilly terrains, this can help roads to avoid z-fighting with the terrain.

LB Floating Point

Floating Point Overview

This feature is currently in **Technical Preview** and its behaviour may change without notice with each release to correct issues or to address various scenarios. If you see a problem, please contact us on our Unity Discussion forum or on our Discord channel.

When an object is a certain distance from the origin, float point number precision starts to be an issue. This is due to rounding errors that can make transforms have an imprecise position in world space – causing jitter. This component can help to minimise this issue by moving the whole "world" within your scene back to the origin when the player gets too far from the origin.

The component is designed to be extendable and there are events that can call your own code. This enables you to call third-party or your own APIs to deal with physics-related movement. For example, you might have an object that has its own teleporting code (like Sci-Fi Ship Controller), or you might need to write your own custom code to move a particular object and update movement-related variables for that component.

Floating Point Properties

Property:	Function:
Init on Awake	Should the component initialise when on Awake() or will you be calling Initialise() from your own game code?
Init Delay	Instead of the component being initialised when Initialise() is first called, it is delayed by the given number of seconds.
Enable on Init	Attempt to enable world movement when the component is initialised.
Timing Type	If set to manual, you need to call ManualMovementUpdate() and ManualStaticUpdate() from your own code. Typically called in FixedUpdate and LateUpdate respectively. Default is Auto.
Player Start as Origin	Use the player start position as the origin to calculate distance from origin.
Player Object	The player object that determines offset from the start position. If the player cannot auto-detect the world moving (like Sticky3D Controller), add it to the MoveableObjects list or move it via an Event.
Max Distance	The maximum distance the player can move from the current origin until the world is moved back to the origin.
Lock Axis	Prevent one or more axes being adjusted when moving the world
Landscapes	The list of landscapes to manage
Moveable Objects	The list of moveable or moving objects in the scene that don't require special attention via APIs to update their position
Static Objects	The list of environment objects in the scene that don't normally move (e.g. buildings, props etc.) or anything that should be moved in LateUpdate (e.g. cameras).

Floating Point Events

Event:	Purpose:
On Initialised	These are triggered immediately after the component is initialised.
On Pre Moveable Changed	These are triggered by the component immediately before the Moveable objects are updated.
On Post Moveable Changed	These are triggered by the component immediately after the Moveable objects are updated.
On Pre Static Changed	These are triggered by the component immediately before the static objects are updated.
On Post Static Changed	These are triggered by the component immediately after the static objects are updated.

LB Manager

> This feature is currently in **Technical Preview** and its behaviour may change without notice with each release to correct issues or to address various scenarios. If you see a problem, please contact us on our Unity Discussions forum or on our Discord channel.

This editor component can help to prepare your game or project for release. Its main purpose is to remove unnecessary Landscape Builder items from your scenes. There are several different options

so take your time and understand what each option will do before clicking the various action buttons.

Typically, you will only use this Manager when your landscapes and objects on those landscapes are complete and will not change before the final release. You could also use it with a backup copy of your entire project as a "dummy" or test run without affecting your production project. If you have time, and disk space to do this, we highly recommend this approach.

We HIGHLY recommend that you take a FULL BACKUP of your entire Project folder using Windows Explorer or OSX Finder BEFORE proceeding with LB Manager.

There are three phases to this process. The first 2 need to be performed on EACH landscape in EACH SCENE.

LB Manager – Phase 1 (Backup)

The landscape meta-data needs to be backed up to a file outside the main Assets folder. This will help you recover most of your landscape settings should you ever decide to tweak your game after it is "finished". This phase is non-destructive and you can do it as many times as you like.

1. Open each scene, then drag the landscape parent gameobject into the "Landscape" slot supplied. This is the same object that is added to the "Landscape to Edit" slot in the Landscape Builder Editor on the Landscape tab.
2. The template name is automatically populated. It assumes that each landscape has a unique name in your project (which it should if you've been careful to name them correctly). If not, you can modify the "Template Name" so that you at least you can identify them later and they don't overwrite your export files.
3. Click the "Backup Template" button. If LB Lighting hasn't been used in the scene, you'll see a warning in the Unity console. In this scenario, it can be safely ignored. A folder will open that contains your exported Template package. You should copy that to somewhere for safe keeping. These files are stored outside your Assets folder but inside the overall project, this so that they don't get automatically deleted when you remove other components of LB later.
4. Don't forget to repeat the above 3 steps for each landscape within each scene (typically you'll only have one landscape per scene).

IMPORTANT: We currently don't store any Unity Terrain data in templates. That means that Topography Layers which are "Unity Terrain" layers (or Imported layers), are NOT included in template backups.

If you created any of the Topography Layers with imported TIFF or GeoTIFF files, we highly recommend keeping backups of those TIFF files. The same applies for any custom RAW files you may have used. You don't need to keep copies of the standard Image Modifier files that come with LB as these will get reimported once you add LB to your project again (if need be).

To help you identify what assets you need to backup and/or more outside the Landscape Builder asset folder, you can generate a file with the "Get Inventory" button. This creates a text file outside the assets folder of your project. The folder should be displayed in Windows Explorer or Mac OSX Finder once the file is generated. This should only take a few seconds and can be run multiple times if required.

LB Manager – Phase 2 (Optimise)

Before starting this phase, you should verify that you have all the correct backup template packages from Phase 1. We recommend that you create a new empty project and attempt to re-create your landscapes from these packages. This can be done by:

1. Create a new Project using the same version of Unity or newer
2. Import Landscape Builder into the project
3. Import any other asset dependencies like textures, materials, prefabs etc.
4. Import the first backup package
5. Open the Landscape Builder Editor
6. Create and save a new scene
7. In the Project panel in Unity, go to LandscapeBuilder\Templates
8. Select the template that you wish to restore
9. In the Inspector, update the "Landscape Name" if you like. E.g. [name] Test Restore
10. Tick "Populate Landscape"
11. Click "Create New Landscape from Template"
12. If (for some reason) textures do not show up on the landscape, check the "Texturing" tab. If the texture images are missing (denoted by the N/A after their name), then click the [R]elink button. Once they have been resolved, "Texture Landscape" and/or "Populate Landscape with Groups". The later may be required if any Groups affect texturing.

If you haven't already done so, you can get a summary of the assets used in each landscape by using the "Get Inventory" button under "Phase 1".

Once you've tested the templates and can restore them to a new project then you're ready for the "Optimise" phase. Like Phase 1, this needs to be performed on each Landscape in each scene.

Removable Items	Description
De-parent Groups	Attempt to move the groups of prefabs to the root of the scene hierarchy. This may provide some performance benefit by reducing the depth of gameobject nesting.
Group IDs	The Groups system creates small scripts components that it attaches to gameobjects in the scene when it populates the landscape. This helps LB to edit and recreate prefabs quickly and efficiently. It includes the type of prefab and a reference to the Group Member. If you are unlikely to need to edit your project with LB later, you can safely remove these. Alternatively, you can remove them now and when it comes to reinstalling Landscape Builder, and importing the saved Template, you can DELETE all the child prefab gameobject under the parent Landscape gameobject before "Populating Landscape With Groups" again. If that all sounds too scary, untick this box and leave them in the project.
Map Paths	Although mostly superseded by Group Object Paths, Stencil Layers, and other such features, Map Paths can be used for making river beds and paths, EasyRoads3D integration, or for baking NavMeshes. They can also be used to control where ground textures, grass, trees and even topography appears. They can be use with and without surface meshes. When meshes are created
Stencils	Stencil layers are used to create and populate landscapes. They are used as filters to include or exclude areas. They can be backed up and restored with Templates. They would rarely be used for gameplay. You probably

	should know if you've written any gameplay code that accesses this data. Most people can safely remove them.
Meta-data	Most data to create and edit your landscape is stored in a meta-data object called LB Landscape. If you access any of this data from your gameplay runtime scripts, don't remove it. This data is backed up in Templates.

NOTE: Phase 2 optimisations can be used at runtime by calling:

LBLandscape.DeparentGroups(landscape…)
LBLandscape.RemovePrefabItems(landscape…)
LBLandscape.RemoveMapPaths(landscape…)
LBLandscape.RemoveStencils(landscape…)
LBLandscape.RemoveLBLandscape(landscape…)

LB Manager – Phase 3 (Uninstall)

Ok, now that you have the more time-consuming phases out of the way, the last step is pretty quick. As long as you've not edited any of the scripts and components that come with LB, this step should be pretty safe and non-destructive as you can always re-import LB if you remove too much.

Removable Items	Description
Demo Scenes	This removes the demo scene LBDemoScene2. You would never need this in your final product – go ahead and tick it.
Demo Assets	Ok, so you might actually be using some of these in one of your scenes. If you know which ones, move them now out of the Demo Scene subfolders. If you don't already have one, create another folder outside the LandscapeBuilder folder. If you do miss something and it gets deleted, don't panic you can just selectively reimport the LB package and just tick the assets that you're missing. We also try to delete other sample assets that come with LB in this step (not just those in the Demo Scene folder).
Legacy Unity Water	You're probably not using these but like the Demo Assets, you can just selectively reimport from "Standard Assets/Environment" in the LB package if you are.
Modifiers & Images	If you have created or added any custom Topography Image Modifier files to the Modifiers folders, you will want to move them or take backups before enabling this option. This option will DELETE ALL modifiers from the Modifiers folder and also remove any sample heightmap and mask textures that we include in the Images folder.
Runtime Samples	Hopefully, if you've been using these you have followed our advice and created your own scripts "similar" to the runtime samples rather than editing the ones that come with LB (which BTW, may get overwritten with each LB update or patch). IF NOT, fix this up now before removing them.
Editor Scripts	If you've stopped updating you landscape(s), you don't need these. Once again, you can reimport them if you need them.
SRP Packages	If you're using LWRP, URP or HDRP, you should have already applied these to your project. Either way, you don't need them in your final game.

If you are paranoid, you could once again take a full backup of your project, being careful not to overwrite any previous file system backups you may have taken. Otherwise, you're good to go and press the "Uninstall" button which will remove any of the above ticked items.

If you are planning to remove the whole "LandscapeBuilder" folder, you need to consider if you are using runtime components. Things that will break if you take this approach include:

- Camera Animator
- LB Lighting
- LB Image FX
- LB Screen Shot
- LB Celestials (stars)
- LB Check Ground Texture (for testing the ground a character is walking on)

If you remove all of Landscape Builder folder you will not be able to perform the following things at runtime (using Landscape Builder):

- Generate a heightmap
- Update or populate ground textures
- Add Unity terrain trees
- Add Unity terrain grass
- Populate the landscape with prefabs using the Groups system
- Use LB Lighting or LB Image FX
- Display stars in the sky with LB Celestials

While some of the above may seem obvious to some people, we thought we should mention them to avoid unpleasant surprises.

LB Path Importer

This tool will help you create Group Object Paths from an external source (e.g., EasyRoads3D). It is currently in Technical Preview.

It allowing you to import and update Group Object Paths in Uniform Groups with road, highway, path, fence spline data. This allows you to mix and match features between the two products to get the best of both worlds.

To use the Path Importer with EasyRoads3D:

1. In a scene, build a Road Network with EasyRoads3D Pro
2. Create a landscape with the Landscape Builder Editor
3. Open the LB Path Importer (Window, Landscape Builder, Landscape Builder Path Importer)
4. In the LB Path Importer, set the landscape
5. Click "Get Roads" to retrieve a list of the roads in the ER3 road network
6. Select the (Uniform) Group you want to import into (if you don't have any Uniform Groups in your landscape a message will be displayed)
7. Optionally, click "Filter by Road Type" and select the road types you want to import
8. Select the roads you want to import

9. There are two options, "Copy->New" and "Update+New". The first option will always create new Group Object Paths for each selected road. The second will attempt to update existing Object Paths and will create new Object Paths only if it cannot find a match.

Camera Animator

Landscape Builder comes with a camera animator and a camera path creator, to allow you to smoothly animate any cameras in your scene along a path you define. This can be helpful for creating cut scenes in your game or project. Cut scenes can give your project an in-game cinematic look and feel which can set the mood for a gameplay element or reward the user for completing a level.

To get started quickly with the Camera Animator, click on the Landscape Tab, expand the "Scene Settings" and click the "Add Camera Animation to Scene" button. Next add points to your path using the instructions below, then configure the Camera Animator to animate it along the path.

Manually Creating a Path

You can create a path by clicking on the "GameObject" button at the top of the Unity editor, then selecting "3D Object", "Landscape Builder", and then "Camera Path" (you can also access this menu item in the Unity Scene Hierarchy window by clicking "Create", "3D Object" and then "Camera Path" in the Hierarchy window). This will create a GameObject with a LB Camera Path component attached. You can also turn one of your existing gameobjects into a camera path by clicking "Add Component > Landscape Builder > Camera Path".

After you've created your path object, you can begin adding points and editing your path.

Adding Points and Editing a Path

First, make sure you have the camera path object selected in the scene Hierarchy. Then expand the list of points by clicking the small arrow next to "Path Points".

You can add points (positions, or waypoints) to the end of your path by clicking the "+" button in the camera path component. You can remove points from the end of your path by clicking the "-" button. You can move points in your path by either modifying the Vector3 shown in the editor or by clicking and dragging the points with the position handles just as you would with any gameobject.

To locate a point in the scene view, click the (F)ind button next to point. To insert a point above a path point, click the (I)nsert button next to the point. To (D)elete a path point, click the "X" button to the right of the point.

The Camera Path points can also be added from the central spline of an existing Map Path in your scene (see the section in this manual called "Scene Paths – Add Map Path to Landscape" for more details on how to create a Map Path). Click the "Import from Map Path" button then locate the Map Path in the scene Hierarchy.

Create a Path with EasyRoads Integration

If you have EasyRoads3D[12] version 3 also installed in your project, you can create a path based on one of more roads in the scene. This can be useful for building cut scenes. First create the path object using one of the methods described above. Then click on the Camera Path object in the scene Hierarchy.

When you click "Use EasyRoads", you should see an "Installed" indicator next to the check box. If not, you probably don't have EasyRoads version 3.x installed in the current project.

Property:	Function:
Camera height	This is the distance above the road that you want the camera to be as it travels along the path. The path points will be adjusted accordingly.
Spline Type	This will use one of the various splines created by EasyRoads3D for each road. The default type uses the same markers you used when creating the road using the EasyRoads3D tools. If you want the camera to more closely follow the contours of the road use either Centre, Left or Right Splines. Note, these spline points are filtered so that you don't end up with too many path points in your scene.

To populate the path:

1. Click "Get Roads"
2. Select the roads you want to include in the path
3. Arrange the list of selected roads in the correct order
4. Click "Update Path"

Button:	Function:
Get Roads	Retrieve the list of non-finalised roads from the current scene. Once the roads have been finalised, this function will not return points for those roads.
Update Path	Replace the existing Path Points with the points from the selected roads
Undo Path	Roll back the last Update Path command

The list of roads returned by the Get Roads command have a number of different properties that help you build a list of camera path points.

Property:	Function:
v	Move the road down one place in the list. If it is the last in the list it will wrap around to become the first in the list
Selection box	Select or unselect a road to include or exclude a road when the Update Path command is issued.
R	Reverse the order of the points in this road. This is helpful if you want the camera to start at the opposite end of the road
	Name of the road as defined in EasyRoads

Animating a Camera Along a Path

If you didn't use the "Add Camera Animation to Scene" button from the Landscape tab (recommended), then to animate a camera in your scene along a path you have created, you first

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[12] EasyRoads3D is a third-party asset available from the Unity Asset Store

have to add a couple of components to your camera. You can do this by performing the following tasks:

1. Select the camera in the scene Hierarchy
2. From the Unity "Component" menu, select "Landscape Builder", then "Camera Animator".
3. This will also add an Audio Listener to the Camera gameobject if one doesn't already exist.

You then have a number of options in the Camera Animator component to set up for your camera. These are detailed below:

Property:	Function:
Camera Path	The camera path to animate the camera along.
Animate Speed	If checked, the speed of the camera as it is animated along the path will be based on a curve.
Min Move Speed	The (approximate) minimum move speed of the camera if its speed is animated, in metres per second. This option is only shown if Animate Speed is checked.
Max Move Speed	The (approximate) maximum move speed of the camera if its speed is animated, in metres per second. This option is only shown if Animate Speed is checked.
Speed vs Dist Curve	A curve that dictates the speed of the camera over the distance of the path. 0 and 1 on the x-axis correspond to the start and end of the path. 0 and 1 on the y-axis correspond to the min and max move speeds. This option is only shown if Animate Speed is checked.
Move Speed	The (approximate) speed the camera will move along the path if its speed is not animated, in metres per second. If this is a negative value, the camera will move backwards along the path. This option is only shown if Animate Speed is not checked.
Rotate Camera	If checked, the camera's rotation will be animated.
Rotation Tangent Distance	Increasing this value will (up to a point) make the animation of the camera's rotation smoother but will potentially make it less accurate.
Start On Awake	If checked, the camera will automatically start animating along the path when the scene loads.
Start Distance Offset	The distance, in metres, from the start of the path, the camera animation will begin.
End Distance Offset	The distance, in metres, from the end of the path, the camera animation will stop.
Enable Audio Listener	If you disable the audio listener in the scene by disabling a camera or gameobject, these option enables you to enable an Audio Listener while the animation is running.
Fade In	Fade the camera animation in when it first starts. This requires LBLighting to be in the scene which can be added from the Landscape tab.
Fade In Duration	The length of time in seconds, it takes to fully fade in the camera animation
Cameras to disable	Click the "Get Cameras" button to retrieve a list of cameras from the scene (including any other Camera Animation cameras in the scene). Delete any camera entries from the list that you want to remain active during the animation by removing them with the "x" button. You can also manually add cameras by clicking the "+" button and either dragging the camera gameobject into the slot or by using the Unity selector to the right of the slot. Any Audio Listeners attached to the camera gameobject will be disabled during an animation then enabled with the animation has ended.

Property:	Function:
GameObjects to disable	You may have gameobjects or scripts that you don't wish to be active when the animation is running. Add them to this list by clicking the "+" button then dragging them into the slot from the scene Hierarchy or by using the selector. Arrange the list using the "v" arrow buttons into the order you want the gameobjects to be disabled. When the animation ends, they will be re-enabled in reverse order.

Scripting Camera Animation

You can control the animation of an animated camera through scripting, through the following functions:

Function:	Details:
BeginAnimation (bool StartAnimation, float StartAtDistance)	Initialises the camera animator. It disables any cameras included in the "Cameras to disable" list, and disables any game objects in the "GameObjects to disable" list. Optionally can initial but not start the camera moving with the *StartAnimation = false* parameter. Optionally can start from a position other than the beginning of the path with the *StartAtDistance* parameter which takes a distance in metres.
EndAnimation ( )	Stops the animation, turns off the animation camera, re-enables the gameobjects that were disabled in the reverse order, and re-enables any cameras that were disabled.
ReversePath()	Reverses the path points. This can let the camera travel along the path in the opposite direction.
StartFromBeginning ( )	Set the camera position to the start of the path and start it moving along the path.
Stop ( )	Stop the camera moving along the path.
Continue ( )	If the camera has stopped, start it moving along the path again.
MoveTo (float distance)	Move the camera to the point that is (approximately) *distance* metres along the path.
SetMoveSpeed (float speed)	Set the movement speed of the camera to *speed* metres per second.
GetCameraAnimatorsInLandscape (LBLandscape lbLandscape)	Get a list of all camera animators that are under of children of a landscape
GetFirstCameraAnimatorInLandscape (LBLandscape lbLandscape)	Return the first valid CameraAnimator with a valid CameraPath in the landscape

```
// Get the first Camera Animator in the scene, snap the camera path to the terrain,
// and start moving the camera along the camera path.
LBCameraAnimator lbCameraAnimator = LBCameraAnimator.GetFirstCameraAnimatorInLandscape(landscape);
if (lbCameraAnimator == null) { Debug.LogWarning("GetFirstCameraAnimatorInLandscape returned
null"); }
else
{
    // Get the LBPath instance which contains the points along the camera path
    LBPath lbPath = lbCameraAnimator.cameraPath.lbPath;
    if (lbPath == null) { Debug.LogWarning("Could not find the camera path instance for the
animator"); }
    else
```

```
    {
        // Optionally update the path points to match the terrain
        lbPath.heightAboveTerrain = 10f;
        lbPath.snapToTerrain = true;
        lbPath.RefreshPathHeights(landscape);

        // Start the camera moving from the start of the path.
        lbCameraAnimator.BeginAnimation(true, 0f);
    }
}
```

Texture Generator

Many textures only have a single flat texture. This can produce a flat, featureless and unrealistic look on terrains and objects within your scene. The Texture Generator enables you to bring terrain and mesh textures to life with professional looking Albedo, Metallic, Normal, Height, Occlusion, and Emission Maps.

It has two Generator Modes; Texture Generator and Texture Combiner. The later can combine several textures into a single texture, which can be useful when making a single LB Map texture for Grass, Trees and/or Mesh placement.

Common properties to all Output Types include:

Property:	Function:
Asset Name	The name of the saved map or texture asset.
Source Texture	The texture to base the generated map or output texture on.
Normalise Colour Range	If enabled, the lightest colour will be white and the darkest colour will be black
Invert Colours	Use the reverse or inverted colours in the source texture to produce the map
Update Texture Preview	When this is enabled, a preview of the source and output textures will be displayed in the editor window
Preview Quality	Options are Low, High and Ultra. The higher the output the slower it will be to update.

Albedo

In "Albedo" mode, you can remove shadows or a colour tint from your texture. There are a number of additional settings available for Albedo map generation, which are detailed below:

Property:	Function:
Albedo Algorithm	Shadow Removal, Colour Tint Removal, or both.
Lightest Shadow Colour	The colour of the lightest shadows. Used with Shadow Removal.
Tint Colour	The tint colour to remove from the texture. Used with Colour Tint Removal.

Albedo and Smoothness

In "Albedo and Smoothness" mode, you can remove shadows or a colour tint from your texture, while encoding smoothness data into the alpha channel of your texture. There are a number of additional settings available for Albedo map generation, which are detailed below:

Property:	Function:
Albedo Algorithm	Shadow Removal, Colour Tint Removal, or both.
Lightest Shadow Colour	The colour of the lightest shadows. Used with Shadow Removal.
Tint Colour	The tint colour to remove from the texture. Used with Colour Tint Removal.

Calculate Smoothness Data	Whether the smoothness data encoded into the texture is calculated
Smoothness Algorithm	Pixel Variance – the algorithm used for calculating encoding smoothness data
Smooth Variance	The variance between pixels classified as "smooth". That is, an encoded smoothness value of 1.0
Steep Variance	The variance between pixels classified as "steep". That is, an encoded smoothness value of 0.0.
Smoothness Parameter	Used when Calculate Smoothness Data is NOT selected. The smoothness value that will be encoded into the texture.

Metallic and Smoothness

In "Metallic and Smoothness" mode, you can create a texture to be used in materials with the standard shader that provides extra metallic and smoothness data. Metallic data is encoded into the RGB channels while smoothness data is encoded into the alpha channel.

There are a number of additional settings available for the metallic and smoothness map generation, which are detailed below:

Property:	Function:
Calculate Metallic Data	Whether the metallic data encoded into the texture is calculated.
Metallic Algorithm	The algorithm used for calculating encoded metallic data. Specular or Match Colour
Min Metallic Colour	This option is available with a Specular Metallic Algorithm. The colour closest to the 'max metallic colour' that is designated as having a 0.0 metallic value.
Max Metallic Colour	This option is available with a Specular Metallic Algorithm. The colour designated as having the highest metallic value in a texture.
Metallic Colour	Available when Match Colour is set. The colour of the texture that most corresponds with a high metallic value.
Colour Range	Available when Match Colour is set. The size of the metallic colour range - increasing this value will increase the number of colours in the texture that are classified as metallic.
Metallic Parameter	Used when Calculate Metallic Data is NOT selected. The metallic parameter that will be encoded into the texture.
Calculate Smoothness Data	Whether the smoothness data encoded into the texture is calculated.
Smoothness Algorithm	Pixel Variance - The algorithm used for calculating encoded smoothness data.
Smooth Variance	The variance between pixels classified as 'smooth', i.e. an encoded smoothness value of 1.0.
Steep Variance	The variance between pixels classified as 'steep', i.e. an encoded smoothness value of 0.0.
Smoothness Parameter	Used when Calculate Smoothness Data is NOT selected. The smoothness parameter that will be encoded into the texture.

Specular

In Specular mode, you can create a texture that provides extra specular data to your shaders. Specular data is encoded into the RGB channels. There are a number of additional settings available for the specular map generation, which are detailed below:

Property:	Function:
Min Specular Colour	The colour closest to the 'max specular colour' that is designated as having a 0.0 specular value.
Max Specular Colour	The colour designated as having the highest specular value in a texture.

Height Maps

In "Height Map" mode, you can create a texture to be used as a parallax map for its input. There are a number of additional settings available for height map generation, which are detailed below:

Property:	Function:
Height Algorithm	The algorithm used for calculating encoded height data: Shadow Detection, Colour Range, or Shadow Detection and Low Colour.
Lightest Shadow Colour	Available when Shadow Detection is selected. The grayscale colour of the lightest shadows - making this colour lighter this will remove more shadows but may lighten the overall texture.
Low/Mid/High Colour	The colour on the texture which denote the various heights in the base texture when the Height Algorithm is set to "Colour Range"
Low Colour	The colour designated as being the 'lowest' in a texture when the Height Algorithm is set to "Shadow Detection and Low Colour"
Low Colour Range	The size of the 'low' colour range - increasing this will increase the number of colours in a texture designated as 'low' when the Height Algorithm is set to "Shadow Detection and Low Colour"

Normal Maps

Normal maps change the way that normals are calculated across the faces of a mesh (or terrain, in this case) in such a way that it appears that the geometry of the mesh is far more complicated than it really is. Modern graphics hardware is able to do this at a very low performance cost. However, most terrain textures don't come with their own normal maps – normal mapped terrain textures can, indeed, be really hard to find.

There are a number of additional settings available for normal map generation, which are detailed below:

Property:	Function:
Height Algorithm	The algorithm used for calculating encoded height data: Shadow Detection or Colour Range.
Lightest Shadow Colour	Available when Shadow Detection is selected. The grayscale colour of the lightest shadows - making this colour lighter this will remove more shadows but may lighten the overall texture.

Low/Mid/High Colour	The colour on the texture which denote the various heights in the base texture when the Height Algorithm is set to "Colour Range"
Low Colour	The colour designated as being the 'lowest' in a texture when the Height Algorithm is set to "Shadow Detection and Low Colour"
Low Colour Range	The size of the 'low' colour range - increasing this will increase the number of colours in a texture designated as 'low' when the Height Algorithm is set to "Shadow Detection and Low Colour"

Once you are happy with your settings, you can click the "Generate Normal Map" button to create the normal map file in your project. The created assets will be saved in the LandscapeBuilder/NormalMaps folder. The button will only be available once you have selected a source texture.

The normal map can only be created if the source texture has read/write enabled. If the source texture you selected doesn't have this option enabled, Landscape Builder will attempt to automatically set it. Alternatively, you can manually enable it by selecting the texture in the project, switching the Texture Type to "Advanced" and checking the "Read/Write Enabled" option.

Occlusion Maps

In Occlusion mode, you can create a texture that provides occlusion data to your shaders. Occlusion data is encoded into the RGB channels. There are a number of additional settings available for occlusion map generation, which are detailed below:

Property:	Function:
Occlusion Algorithm	The algorithm used for calculating encoded occlusion data - Shadow Detection or Pixel Variance
Lightest Shadow Colour	Available when Shadow Detection is selected. The grayscale colour of the lightest shadows - making this colour lighter this will remove more shadows but may lighten the overall texture.
Smooth Variance	Available when Pixel Variance is selected. The variance between pixels classified as 'smooth', i.e. an encoded smoothness value of 1.0.
Steep Variance	Available when Pixel Variance is selected. The variance between pixels classified as 'steep', i.e. an encoded smoothness value of 0.0.

Emission

In Emission mode, you can create a texture that provides emissive data to your shaders. Emissive data is encoded into the RGB channels. There are a number of additional settings available for the emission map generation, which are detailed below:

Property:	Function:
Min Specular Colour	The colour closest to the 'max specular colour' that is designated as having a 0.0 specular value.
Max Specular Colour	The colour designated as having the highest specular value in a texture.

Noise

In Noise mode, you can create a texture using a noise algorithm. There are a number of additional settings available for the noise generation, which are detailed below:

Property:	Function:
Texture Resolution	Output textures of various sizes from 64x64 pixels to 8192x8192.
Noise Octaves	The number of Perlin noise octaves. Increasing this value will add more detail to the output texture.
Is Tileable	Whether the output texture is tileable. If you are going to place the texture side by side in a scene, then tick this box.
Noise Tile Size	The number of times the noise will be tiled within the output texture. It is recommended to start with the default (1).
Distance to Centre Mask	If you want the effect, or strength, of the noise to diminish the further the pixel is away from the centre, enable this option.
Output Strength	The relative strength of each pixel in the output texture.

Texture Combiner

Selecting the "Texture Combiner" mode in the Landscape Builder Texture Generator allows you to combine multiple textures together in different ways. The way in which the textures are combined can be chosen by changing the Texture Combine Mode.

In Additive mode, the values of each pixel in the combined texture is determined by the addition of the value of each corresponding pixel from the other textures.

In Minimum mode, the darkest pixel value from each of the provided textures is used for the combined texture. Maximum mode behaves similarly but instead uses the brightest pixel value.

In Channels mode, each channel of the combined texture takes input from a different texture. For each channel (R, G, B and A), you can choose a texture to use for the input and which channel (or channels) the input should be taken from using the Input Channel/s property. This mode allows you to encode multiple textures into the channels of a single texture, which is helpful for creating textures for use with particularly efficient shaders that require multiple texture inputs to read from the same texture, such as the way that Unity's standard shader can take metallic and smoothness inputs from a given texture.

You can add and remove textures to be combined by clicking the "Add Texture" and "Remove Texture" buttons at the top of the window (except in Channels Mode, which requires exactly four textures) and by selecting the textures you want to use in the provided texture slots. You can also specify the resolution of the generated texture. Textures inputs with a resolution smaller than the specified resolution will be tiled across the combined texture, and inputs with a larger resolution will only have the part of the texture that fits read into the combined texture.

Ground Texture Checker

Included, are some APIs and scripts that enable you to check the textures at a given world space position, and take some action based on the results. For example, you could play different footsteps in a first-person game depending on the material on the ground. In a racing game, you could play different sounds as the wheels of the vehicle drove over grass, snow, gravel or sand.

A sample class LBCheckGroundTexture, demonstrates how the APIs are called and how to take action in your game based on the results. The script can be added to an existing FPS Controller or similar for immediate testing. Click a few options, add some texture names, drop in some of your audio FX clips, and you're ready to go.

Of course, there are many other uses for the APIs and you could create your own actions. The sample class is just to get you thinking of possibilities. Let us know what you come up with.

The API methods are in the LBLandscapeTerrain class and can be called at runtime.

Method:	Use:
GetTextureNameAtPosition	Get the name of the dominant texture on the landscape at this world position location. Can optionally compare the height of the terrain (with a tolerance level) with the Y-axis world position of the object or character controller.
IsTextureNameAtPosition	Does the texture exist at this position? If so, does it have a minimum strength? Texture Strength is relative to other textures at same location is in the range 0.0 to 1.0. Can optionally compare the height of the terrain (with a tolerance level) with the Y-axis world position of the object or character controller.

Runtime

Conditions of Runtime Usage

Landscape Builder can be used to generate a landscape at runtime. Any scripts required, except the LandscapeBuilderWindow.cs script can be included with you compiled game provided that:

1. Landscape Builder scripts are not included with products you wish to distribute as components or packages which expose the C# scripts or shader code to end users in any human-readable format.
2. The Landscape Builder assets don't form more than 30% of your whole product
3. Your product is not a competitor in any market with Landscape Builder
4. Only Landscape Builder scripts or component actively used by your game or product are distributed with your product.

Runtime Samples

Landscape Builder comes with eight sample runtime scripts and seven sample prefabs to get you started. They are not considered production-ready but should help you to build your own runtime scripts for the project you're working on. Support is also available from the LB team via the forum or on Discord.

The sample can be found in the Assets/LandscapeBuilder/Samples folder. To get started:

1. Create a new scene
2. Delete the main camera (if using samples 01-04)
3. Drop one of the prefabs into the scene
4. Click Play to run the scene

Name:	Description:
RuntimeSample01	A simple example prefab and script that creates a landscape entirely at runtime. It creates the topography and textures the landscape. This basic example doesn't create a LBLandscape script instance in the scene.
RuntimeSample02	Example prefab and script that creates a landscape entirely at runtime. It creates the topography (with a distance to centre mask) and textures the landscape. This basic example doesn't create a LBLandscape script instance in the scene.
RuntimeSample03	Example prefab and script that creates a landscape entirely at runtime. It creates the topography and textures the landscape. It uses the Layer-based topography generation type first available in version 1.3.0.
RuntimeSample04	Example prefab and script that creates a landscape entirely at runtime. It creates the topography and textures the landscape. It uses new Layer-based topography generation type. Water is added to the scene at runtime. This sample creates 1 or more terrains with size of w:2000 l:2000 h:2000. There is no error checking for different sized terrains.
RuntimeSample05	Example prefab and script that creates a landscape entirely at runtime. It creates the topography and textures the landscape. It uses the Layer-based topography generation type and includes an example of using Stencils at runtime. There is no error checking for different sized terrains. NOTE: Ensure Project Settings, Color Space = Linear.
RuntimeSample06	Example prefab and script that creates a landscape entirely at runtime. Stencil, Topography, Texturing, Trees, Grass, and Groups code was creating using the (S) scripting buttons from an existing landscape. NOTE: Ensure Project Settings, Color Space = Linear. There is no error checking for different sized terrains. MANAUL STEPS REQUIRED 1. In the Application.dataPath folder, create a Heightmaps folder. In the Editor the Heightmaps folder should be created in the Project pane. For Standalone PC Builds, it should be added to the [project]_Data folder. 2. Create a duplicate of LandscapeBuilder/Modifiers/Mountains/DeathValleyDryMountain.raw 3. Copy the .raw file into the new Heightmaps folder. 4. Ensure the file in Heightmaps folder is the same name as the original.
RuntimeSample07	Example script that creates a landscape entirely at runtime. GPU is used where possible. Stencil, Topography, Texturing, and Groups code was creating using the (S) scripting buttons from an existing landscape. NOTE: Ensure Project Settings, Color Space = Linear. There is no error checking for different sized terrains. MANAUL STEPS REQUIRED

	1. In the Application.dataPath folder, create a Heightmaps folder. In the Editor the Heightmaps folder should be created in the Project pane. For Standalone PC Builds, it should be added to the [project]_Data folder. 2. Create a duplicate of LandscapeBuilder/Modifiers/Valleys/LauterbrunnenValleyCH.raw 3. Copy the .raw file into the new Heightmaps folder. 4. Ensure the file in Heightmaps folder is the same name as the original.
RuntimeSample08	Example script that creates a landscape at runtime that shows how to import Group Object Path points from a set of JSON files. MANUAL STEPS REQUIRED 1. In the Application.dataPath folder, create a Heightmaps folder. In the Editor the Heightmaps folder should be created in the Project pane. For Standalone PC Builds, it should be added to the [project]_Data folder. 2. Create a duplicate of LandscapeBuilder/Modifiers/Hills/IsleOfEiggScotlandUK.raw 3. Copy the .raw file into the new Heightmaps folder. 4. Ensure the file in Heightmaps folder is the same name as the original. 5. Copy the RT8_CottageObjectPath1_Points* files from the LandscapeBuilder/Samples/Misc folder into a LB_JSON folder in the Application.dataPath folder (like you did for the Heightmaps).

Using LBLighting and ImageFX at Runtime

Once LBLighting has been added to a scene, it can be configured at runtime. The weather can also be controlled at runtime by calling publicly exposed methods. Some helpful LBLighting methods and properties are included in the following tables.

Method:	Use:
UpdateLightingPreview	Typically, not called from your runtime script, but useful to help see how a point-in-time update occurs
Update	Useful to see how lighting and weather is updated each frame.
TransitionToWeatherState	Instantly begin transitioning to a new weather state
TransitionToWeatherStateByName	Instantly begin transitioning to a new weather state. If you know the weatherState index in the weatherStatesList, use TransitionToWeatherState as it will be slightly faster.
GetCurrentGlobalWetnessValue	Public method that can be used to extract the current global wetness value
UpdateStartingWeatherState	Set the start Weather State based on public startWeatherState
SetStartingWeatherStateByName	Set the Starting WeatherState by name. This will return false if the name is not found in the list of WeatherStates currently configured.
SetCurrentWeatherStateByName	Set the Current WeatherState by name. This will return false if the name is not found in the list of WeatherStates currently configured. Typically, you'll want to use TransitionToWeatherState or TransitionToWeatherStateByName.
StartScreenFade	Fade the screen in or out. The lighting will continue to be updated as normal.
StopScreenFade	Stop the screen from fading in or out

Property or Field:	Use:
useWeather	This needs to be set to true, if you'd like LBLighting to configure and control ImageFX in your scene
useClouds	Set to true if you'd like to enable clouds
CurrentWeatherStateName	Returns the user-defined name of the current weather state. E.g. Clear, Cloudy, Light Rain, Stormy etc. If there are no weather states or (for some reason) the current weather state is invalid, this Property will return an empty string.
NextWeatherStateName	Returns the user-defined name of the next potential weather state. E.g. Clear, Cloudy, Light Rain, Stormy etc. If there are no weather states or (for some reason) the current weather state is invalid, this Property will return an empty string. If allowAutomaticTransistion is disabled, this will always return the same as CurrentWeatherStateName.
allowAutomaticTransistion	Allow LBLighting to automatically transition from one State to another
minWeatherTransitionDuration	The minimum amount of time before the next State transition will occur if allowAutomaticTransistion is enabled
maxWeatherTransitionDuration	The maximum amount of time before the next State transition will occur if allowAutomaticTransistion is enabled
IsScreenFadingIn	Can be used to determine if the LBLighting is currently fading in the screen. Read-Only.
IsScreenFadingOut	Can be used to determine if the LBLighting is currently fading out the screen. Read-Only.

Using SSRR at runtime

The Screen Space Ray-tracing Reflection properties of ImageFX can be changed at runtime. A typical scenario is when you'd like to change the performance or quality of the scene based on a user selection. Alternatively, you could examine the platform your game is running on and dynamically adjust the SSRR properties. Here is a simple example of how you might change between Near and Far Pixel Reflection in the shader at runtime.

```
/// <summary>
/// Enable or disable Simple Screen Space Ray-traced Reflection for near pixels.
/// When enabled, objects close to the reflective surface are reflected giving
/// a high quality reflection at the expense of performance.
/// </summary>
/// <param name="camera"></param>
/// <param name="isEnabled"></param>
/// <returns></returns>
private bool EnabledSSRRNearPixels(Camera camera, bool isEnabled)
{
    bool isSuccessful = false;

    // Perform some basic validation
    if (camera == null) { Debug.LogWarning("ERROR: EnabledSSRRNearPixels - camera is null"); }
    else
    {
        LBImageFX lbImageFX = camera.GetComponent<LBImageFX>();
        if (lbImageFX == null)
        {
            Debug.LogWarning("ERROR: EnabledSSRRNearPixels - LBImageFX component is not attached to " +
camera.name);
        }
        else
        {
            // If Near Pixels is not enabled, make sure Reflect Far Pixels is
            if (!isEnabled) { lbImageFX.reflectFarPixels = true; }
            lbImageFX.reflectNearPixels = isEnabled;
```

```
            isSuccessful = true;
        }
    }

    return isSuccessful;
}
```

Auto Script Generation

In the Landscape Builder editors, some items have a small "S" script button beside them. Clicking these buttons will generate that item as a C# script which is output to the Unity Console window. Cut and paste these into your own scripts for runtime generation.

Vegetation Studio Integration

> The third-party Vegetation Studio has been deprecated from the Unity Asset Store, however, if you have a license you can still use it with Landscape Builder.

Landscape Builder 2 will allow you to build and maintain textures, trees and grass, while also using Vegetation Studio in a project. We currently support the following:

1. Multi-terrain support for Vegetation System (1 gets added as a child of each terrain in the landscape when you enable Vegetation System in Terrain Settings on the Landscape tab)
2. Textures are update in the Vegetation Systems automatically from the LB Texturing tab when changes are applied to the landscape
3. Grass types are automatically applied to the Vegetation Systems from the LB Grass tab when changes are applied to the landscape
4. Tree types and tree instances are automatically applied in Vegetation Studio from the LB Trees tab when changes are applied to the landscape
5. Map Path - map textures can now be generated that are compatible with Vegetation Studio Texture Masks (1 per terrain will be generated)
6. Stencils - map textures can now be generated that are compatible with Vegetation Studio Texture Masks (yep, 1 per terrain will be generated here too)

Landscape Builder height, inclination and noise rules will be honoured in Vegetation Studio. Texture masks need to be applied manually to each terrain Vegetation System - however, they should not be overwritten when you apply changes in the various LB tabs (let us know if you see any issues with this).

There is a small bug that means you may need to apply trees to landscapes twice (in the LB Trees tab) to see any changes in the scene when Vegetation Systems are enabled on terrains made in Landscape Builder. We are investigating this and will post a patch as soon as we can.

To enable VS for LB Landscapes, complete the following tasks:

1. Create a landscape using Landscape Builder (can have 1 or more terrains)
2. Add textures, trees, and/or grass using the standard LB workflow
3. Install Vegetation Studio in the project (you can install VS before creating landscapes, the order is not so important – however, VS should be configured AFTER the following steps)

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4. If you default camera does not have a MainCamera Unity tag, or you will be using multiple cameras, go to the LB Editor Advanced tab, scroll down to the "Vegetation Studio Integration" section and add your cameras (you can also do this in a C# script)
5. On the LB Landscape tab, expand Terrain Settings
6. Click "Use Vegetation System"
7. Click "Apply Terrain Settings"
8. Most other things like updating Trees and Grass in the LB Editor should work as normal and will update Vegetation Studio as required.

Please ask if you need any assistance with integrating Landscape Builder and Vegetation Studio.

We have not yet integrated Group zones, Group texturing, and Group grass. Let us know if you have any suggestions on how you'd like to see these working with Vegetation Studio. We have more Group-based integration with Vegetation Studio Pro (see below).

Vegetation Studio Pro Integration

The third-party Vegetation Studio Pro has been deprecated from the Unity Asset Store, however, if you have a license you can still use it with Landscape Builder.

Landscape Builder 2 will allow you to build and maintain textures, trees and grass, while also using Vegetation Studio Pro in a project. We currently support the following:

1. Two-click integration with VS Pro (yep, just click the box in Terrain Settings and Apply)
2. Unity terrain trees are automatically surfaced in VS Pro (full integration with LB Trees tab)
3. Texture tab seamlessly surfaces textures in VS Pro
4. Grass tab grasses and rules are surfaced in VS Pro
5. Imported Unity terrain grass is added to VS Pro persistent storage
6. You can use your own pre-configured biome rather than have LB create one for you
7. Group tab grass zones are surfaced in VS Pro as Vegetation Mask Areas
8. Unity Terrain trees removed in Clearing Groups will be surfaced in VS Pro
9. Grass can be removed from Group Object Paths
10. Group Filters, Zones and Object Paths can be assigned VS Pro Biomes.

Landscape Builder height, inclination and noise rules will be honoured in Vegetation Studio Pro.

VSP – LB Integration notes:

1. If you cannot get vegetation to appear, go to the Landscape Tab, expand Terrain Settings, and click Apply Terrain Settings again. This can be an issue the first time you use VSP in a scene with Landscape Builder.
2. Sometimes trees will not render until you have gone into play mode at least once
3. To use you own biome, on the Landscape tab, under Terrain Settings, tick "Use Custom Biome" and select your biome (vegetation package) that was created directly in VS Pro.
4. Make sure you've set up the camera in the Vegetation Studio Pro script (under Vegetation Studio Manager in the scene).
5. To prevent grass from appearing where there is a particular ground texture (from the LB Texturing tab), on the LB Grass tab, click "Add Filter" and select the Texture you want to affect. Ensure it is a NOT filter.

6. Unity terrain trees are updated in VSP persistent storage using a LB identifier
7. Imported terrain grass is updated in VSP persistent storage using a LB identifier
8. To exclude Unity grass (detail) from a whole Clearing Group, tick the box on the Group's General tab.
9. To exclude Unity grass (detail) from part of a Clearing Group, you need to create a rectangular or circular NOT zone. This can be visually done in the Group Designer or the LB Editor.
10. In Groups, VS Pro biome masks can be automatically created for whole Groups (Filters), Zones, and/or Object Paths (with Width enabled).

Please ask if you need any assistance with integrating Landscape Builder and Vegetation Studio Pro.

Complete Terrain Shader (CTS) Integration

The third-party CTS has been deprecated from the Unity Asset Store, however, if you have a license, you can still use it with Landscape Builder.

For CTS 2019 integration. Basic steps:

1. Install CTS 2019
2. Install Landscape Builder 2.2.4 or newer
3. Create a landscape with LB
4. Window > Procedural Worlds > CTS > Add CTS To All Terrains
5. Window > Procedural Worlds > CTS > Create and Apply Profile
6. In the LB Editor window, Landscape tab, Terrain Settings
7. Use CTS 2019
8. Apply Terrain Settings
9. Use LB as normal and textures should update correctly in CTS

Currently only CTS Basic Profile settings are supported.

If CTS is uninstalled from a project while it is still set as the Terrain Material Type it may show a warning in the Landscape tab under Terrain Settings. If this happens, go to the Advanced tab, Select Tools, and click "Refresh Scene".

Support

Contacting Us

Support for Landscape Builder is provided via the Unity Discussions forum. This forum is actively monitored by the LB team. If you prefer, we have a Discord channel.

https://discussions.unity.com/t/617937
https://discord.gg/kv3tZ72

You may also contact us by clicking the link to support following website. If using the web form ensure you provide your name, the version of LB (from the Landscape Tab), a valid email address, and a brief description of your issue.

https://scsmmedia.com/landscape-builder

Known Issues

- Multi-terrains may sometimes appear not to join correctly due to a terrain LOD issue. Add lbLandscape.SetTerrainNeighbours (true) in Start() of any script in your scene (see forum post for more info) OR on the Landscape tab, under Landscape Stats, click "Refresh". If the problem persists, please report.
- Clouds render as large grey areas - check ParticleSpark.mat and Spark.png are in Project Assets LandscapeBuilder\Prefabs\Resources folder. If there is no LandscapeBuilder\Shaders\Resources folder in the Project, delete the LandscapeBuilder\Shaders\Textures folder and re-import the latest LB package. Try switching your Project Player Settings Color Space to Linear.
- In LBImageFX, if Clouds End Height > Clouds Start Height + 2000, the clouds may seem to be "stripy" on the Y axis.

Useful Forum Posts

Creating an Island or Beach
https://forum.unity.com/threads/387912/page-8#post-3634531
https://forum.unity.com/threads/387912/page-2#post-2664604
https://forum.unity.com/threads/387912/page-2#post-2663507
https://forum.unity.com/threads/387912/page-2#post-2663527

PNG v TIFF v RAW
https://forum.unity.com/threads/387912/page-10#post-3728821
https://forum.unity.com/threads/387912/page-13#post-3916954

GeoTIFF and Realworld
https://forum.unity.com/threads/387912/page-6#post-3282845
https://forum.unity.com/threads/387912/page-6#post-3292876
https://forum.unity.com/threads/401254/page-8#post-3962863
https://forum.unity.com/threads/387912/page-19#post-7016854

Off-world MOLA (Mars) Data
https://forum.unity.com/threads/387912/page-19#post-6857870

Vegetation Studio to VS Pro upgrade
https://forum.unity.com/threads/387912/page-12#post-3873394

Vegetation Studio Pro Biomes
https://forum.unity.com/threads/387912/page-17#post-6041414

Templates - Backup or Copy a Landscape, changing size etc
https://forum.unity.com/threads/387912/page-13#post-3969715
https://forum.unity.com/threads/387912/page-6#post-3269725
https://forum.unity.com/threads/387912/page-5#post-3246688
https://forum.unity.com/threads/387912/page-4#post-2978401

Runtime
https://forum.unity.com/threads/387912/page-7#post-3359646

Importing non-LB terrains
https://forum.unity.com/threads/387912/page-5#post-3261130

Object Paths
https://forum.unity.com/threads/387912/page-7#post-3564340
https://forum.unity.com/threads/387912/page-14#post-4264366
https://forum.unity.com/threads/387912/page-14#post-4296946
https://forum.unity.com/threads/401254/page-9#post-4300261
https://forum.unity.com/threads/401254/page-9#post-4372120
https://forum.unity.com/threads/401254/page-8#post-4232752
https://forum.unity.com/threads/401254/page-8#post-4244266

Object Paths – Importing Path Points
https://forum.unity.com/threads/401254/page-9#post-5275257
https://forum.unity.com/threads/387912/page-18#post-6684508

Create New Image Modifiers
https://forum.unity.com/threads/387912/page-14#post-4271680

Ground Texture Checker
https://forum.unity.com/threads/401254/page-2#post-2951636

Placing water (puddles) on flat surfaces (mesh)
https://forum.unity.com/threads/387912/page-3#post-2806096
https://forum.unity.com/threads/387912/page-3#post-2812420

LB Manager
https://forum.unity.com/threads/401254/page-9#post-4360087

LB Path Importer (including EasyRoads3D integration)
https://forum.unity.com/threads/401254/page-9#post-4379953

Version History

Version 2.4.9 June 2024
[NEW] LBLighting - IsSunShown, IsMoonShown
[NEW] LBStencil - Export navigation meshes to a project folder
[FIXED] LBStencil - WindowLayout.SaveWindowLayout not found in U2023.2+
[FIXED] LBStencil - no menu named Window/AI/Navigation in U2022.2+
[FIXED] failed because there is no menu named Edit/Frame Selected in Unity 6000.0+
[IMPROVED] NavMeshes do not affect lighmapping
[IMPROVED] Support for new NavMesh baking in U2022.2+
[IMPROVED] Support for Unity 6.0

Version 2.4.8 February 2024
[NEW] LBLighting - Hide\Show Sun, Moon. External Culling Mask option.

[NEW] Runtime landscape finalise optimisations via API
[NEW] Extendable Floating-Point component - In Technical Preview
[NEW] Groups random seed advanced option
[IMPROVED] Runtime Perlin Additive or Subtractive topography layer checking
[IMPROVED] Render Pipeline detection in 2023+

Version 2.4.7 November 2023
[NEW] LBStencil - replace existing stencil layer with PNG, Tex or heightmap
[FIXED] LBPath - CacheSplinePoints does not check for path with no points
[FIXED] WindowLayout.LoadWindowLayout not found in U2023.1+
[IMPROVED] Minor GC optimisation
[IMPROVED] Compatibility with U2023.1

Version 2.4.6 August 2023
[NEW] Minimum supported version Unity 2020.3.25
[FIXED] Copied style is null. Using StyleNotFound instead (U2022.3 only)
[FIXED] Demo scene SRP warning text
[IMPROVED] Updated URP and HDRP packages for 10.7.0+

Version 2.4.5 July 2023
[NEW] Apply Template - Groups use Actual Heights option (rather than use relative heights)
[NEW] Sample runtime script that loads Group Object Path points from JSON files
[NEW] Camera Animator - ReversePath API
[FIXED] Apply Template - Update Terrain Heights ignored if Import Topography not enabled
[FIXED] Missing Search bar in Groups and Trees tabs with Unity 2023.1+
[IMPROVED] Group-level options layout
[IMPROVED] Support for Relief Terrain Pack 3.3r
[IMPROVED] Compatibility with Unity 2022.3

Version 2.4.4 February 2023
[NEW] LBLighting - Skybox ambient light option for built-in RP
[NEW] LBLighting - Use External Fog option
[FIXED] Group Paste message typos
[IMPROVED] Updated link to tutorials

Version 2.4.3 January 2023
[NEW] Groups - Scale Prefab by Original (Advanced Options)
[NEW] Groups - Max No Prefab Time (Advanced Options)
[FIXED] Grass will not render in 2022.2. Unity made breaking change to grass (detail)
[IMPROVED] Groups are not spawned when min and max height rules are the same
[IMPROVED] Compatibility with Unity 2022.2

Version 2.4.2 October 2022
[NEW] Groups - copy and paste between landscapes and scenes
[NEW] Groups - Context menu option to show actual, rather than relative heights
[IMPROVED] Template import unselect all option
[IMPROVED] Camera Animator - Reset speed curve button
[IMPROVED] Grass - more detailed editor tooltips
[IMPROVED] Grass - reset buttons for health and dry colour
[IMPROVED] Compatibility with EasyRoads3D 3.2.2

Version 2.4.1 Jun 2022
[NEW} LBLighting pause and resume options (editor or runtime)

[IMPROVED] Stencil editor automatically disables terrain draw instanced while shown

Version 2.4.0 Mar 2022

[NEW] Support for Grass Instancing in U2021.2+ URP and HDRP
[NEW] Landscape Extensions support a grid of planes
[NEW] Splatmaps can be exported to coloured textures for Landscape Extensions
[NEW] Stencil - IsPointPaintedInLayer API to check world space positions
[NEW] Override Undo - Texturing, Grass, Trees for Huge landscapes
[FIXED] Textures - Stencil Filters are incorrectly duplicated when (I)nsert is used
[FIXED] Draw Instanced is not applied when creating a new Landscape
[IMPROVED] LBScreenShot tool now includes a TakeScreenShot API method
[IMPROVED] Template Editor - Debug Mode

Version 2.3.9 Dec 2021

[NEW] Compatibility with SoulLink Spawner
[IMPROVED] LBLighting exposes rain, hail and snow values via API
[IMPROVED] Store Terrain Data in Project - out of Technical Preview

Version 2.3.8 Sept 2021

[NEW] Topography - Image Modifiers (Asinara, Ibiza, La Maddalena, Menorca)
[NEW] Transfer Group Object Path points between projects using JSON files
[IMPROVED] Terrain to Mesh workflow
[IMPROVED] Compatibility with MicroSplat 3.8
[IMPROVED] Repairing holes in TIFF data - pixel range option
[IMPROVED] Compatibility with 2021.2

Version 2.3.7 May 2021

[NEW] Instructions for importing MOLA (Mars) data
[FIXED] RTP Integration - Normal maps may revert to default textures
[FIXED] Trees - NullReferenceException with Add Filter
[IMPROVED] Group Designer - zone selection in large clearings

Version 2.3.6 Apr 2021

[NEW] Topography Image Modifier Layer - Oakworth UK
[NEW] Topography Layers - Repair Threshold for imported TIFF files
[NEW] GroupDesigner - optionally show group flatten terrain area
[FIXED] LBImportTIFF variable warnings
[FIXED] SelectionMode.OnlyUserModifiable' is obsolete in U2021.1.4 or newer

Version 2.3.5 February 2021

[NEW] Stencils - Negative image option to reverse or invert Stencil Layer data
[NEW] Demo bridge support models - useful for building bridges with Groups system
[NEW] Demo concrete safety barrier model
[NEW] Topography - support for Tiled (Geo)TIFF files
[FIXED] Game view is not restored after editing a Stencil in Unity 2020.2+
[IMPROVED] LBTemplate - VS or VS Pro usage visible in Template Editor
[IMPROVED] Compatibility with EasyRoads3D 3.1.9
[IMPROVED] LB Path Importer is out of Experimental state and now is in Technical Preview
[IMPROVED] Group Object Path (width-based) point heights can be all adjusted when CTRL key is held down

Version 2.3.4 January 2021

[NEW] Topography MapPath Layers - option to Subtract Height when type is Flatten
[FIXED] RTP Integration - CombineNormals Due to: Attempted to access a missing member
[IMPROVED] Camera Animator - add note about Fade-In using LB Lighting

[IMPROVED] Topography - Can switch Volume Picker on Image Modifier Layers with single click
[IMPROVED] Topography - Image Modifier picker estimates Use Blending values
[IMPROVED] Support for RTP 3.3q

Version 2.3.3 October 2020
[NEW] Vegetation Studio Pro integration - imported unity terrain grass uses persistent storage
[NEW] Vegetation Studio Pro integration - selectable default biome for the landscape
[NEW] Groups - Object Path Width-based Series can include fixed positions for some prefabs
[FIXED] MicroSplat Integration - error when upgrading to MicroSplat 3.5 or newer
[IMPROVED] Topography - memory management with multiple layers (GPU)
[IMPROVED] Topography - GPU smoothing supports 4K heightmaps
[IMPROVED] Importing Texturing, Trees, Grass - can quickly (re)import if required
[IMPROVED] Stencils - display uncommitted changes warning when painting

Version 2.3.2 August 2020
[NEW] Tree and Grass - Texture Filters include an adjustable cut-off value
[NEW] Grass and Tree tab search filters
[NEW] Texture filters now work natively on GPU
[NEW] Camera Path - path direction can be reversed
[FIXED] Texturing, Grass or Tree Filter - NullReferenceException
[FIXED] LB Template inspector - EndLayoutGroup: BeginLayoutGroup must be called first.
[FIXED] Stencil Filters do not work with GPU acceleration and 8K stencil layers
[FIXED] Camera Animator - TargetParameterCountException on Preview in Editor
[IMPROVED] Terrain Settings - Autoconnect, Group ID and grass wind settings are added with (S)cripting tool
[IMPROVED] LBUpdate.LandscapeUpdate() API can be run in silently
[IMPROVED] LBTemplate - material types CTS and URP are now retained
[IMPROVED] Stencils - Mesh Offset Y option for reduced flickering with NavMesh

Version 2.3.1 July 2020
[NEW] Advanced Option to override creation of Unity Layer for Celestials
[NEW] LBManager - Get Inventory
[NEW] Demo scene with Groups
[FIXED] Terrain Settings - relink may fail on first attempt
[FIXED] Create Landscape - it should not be possible to generate a new landscape with no size.
[FIXED] Templates - incorrect sample tree prefab names
[FIXED] LBManager - EndLayoutGroup: BeginLayoutGroup must be called first.
[FIXED] LBStencil - cannot delete a stencil layer in U2019.4+
[FIXED] Vegetation Studio integration - modify Grass - ArgumentOutOfRangeException
[FIXED] Vegetation Studio integration - modify Trees - NullReferenceException
[IMPROVED] LBManager can now remove many more LB demo and sample assets
[IMPROVED] Reduce wind effect on sample trees
[IMPROVED] Creating a landscape from the TemplateEditor retains GroupID and autoconnect

Version 2.3.0 June 2020
[NEW] Topography Image Modifier Layer - 4 mountains/valleys from Egypt
[NEW] Texturing - Relink Button (find missing textures in asset database)
[NEW] Landscape Terrain Settings - relink terrain data files after moving Project folder
[FIXED] Groups - NullReferenceException when switching from Prefab to Object Path
[FIXED] Groups - ArgumentOutOfRangeException when refreshing an inactive Object Path member
[FIXED] Links to Turboscalpeur, MegaSplat asset pages
[FIXED] Turboscalpeur grass asset paths may not update correctly in Advanced tab
[FIXED] Clean up undo files should not be available when an object path is being edited
[FIXED] LB Manager - some editor content in LibTIFF folder may not be removed
[CHANGED] Demo trees are included in Demo Scene folder

[IMPROVED] Groups - allow Object Paths to be up to 1000m wide
[IMPROVED] Reformed Advanced tab in LB Editor
[IMPROVED] manual - added LB Manager documentation

Version 2.2.6 April 2020
[NEW] Topography Image Modifier Layers - option to change the appearance of volume picker
[NEW] Topography Image Modifier Layers - flexible terrain blending options
[NEW] Topography Image Modifier Layer - mountains from Jordon and Saudi Arabia
[FIXED] Version title is not refreshed correctly in the editor
[IMPROVED] Support for Sci-Fi Ship Controller integration

Version 2.2.5 February 2020
[FIXED] LBIntegration.cs(5735,60): warning CS0618: 'Terrain.materialType' is obsolete
[FIXED] Cannot move terrain data to a project folder when Vegetation Studio / Pro is installed
[FIXED] Templates - MissingReferenceException: The object of type 'Texture2D' is destroyed
[IMPROVED] MicroSplat integration - support for Unity 2019.2+ and imported terrains
[IMPROVED] Create a new landscape when importing a Template (or from the Template Editor)

Version 2.2.4 January 2020
[NEW] Technical Preview support for CTS 2019 integration
[NEW] Import Group Object Path points from RAM splines
[NEW] Texturing - Blending Mode for height and inclination rules
[NEW] Topography – 5 new Hills Image Modifiers for creating islands

Version 2.2.3 December 2019
[IMPROVED] Display error if LandscapeBuilder is in a non-default folder

Version 2.2.2 November 2019
[NEW] Imported Terrains - Support for GPU acceleration of imported Textures
[NEW] Terrain Settings - Support for Universal Render Pipeline (URP) in 2019.3+
[FIXED] Export to Project sets the incorrect terrain data folder in the landscape
[FIXED] Terrain Settings - Per Pixel Normals does not persist after enabling
[FIXED] Groups - Imported Group has wrong position if Landscape is not at 0,0,0.
[FIXED] RuntimeSample03 - restored missing Stencil Layer Image (CottageHeightmap1)
[IMPROVED] Detect when terraindata object has been deleted
[IMPROVED] Terrain Settings - Support for 4K alpha/splatmaps in 2019.3+
[IMPROVED] Terrain Settings - Option to move terrain data from scene to project
[IMPROVED] LB Manager is now in Technical Preview (was Experimental)
[IMPROVED] RuntimeSample03-07 compatibility with U2019.2+

Version 2.2.1 October 2019
[NEW] Groups - Manual Clearings can have individual set (fixed) rotations
[NEW] Groups - Zones for Manual Clearings are visible in scene when editing positions.
[NEW] Groups - Grass can (also) be removed from a whole Group with Vegetation Studio Pro
[NEW] Groups - Vegetation Studio Pro biomes can be used with Filters, Zones, and Object Paths
[FIXED] Terrain material may not be applied when HDRP landscape is created in 2019.2+
[FIXED] Terrain Settings - May not be able to switch to Built-In Standard Material Type in 2019.2+
[FIXED] Grass - Stencil Filters with GPU Acceleration may not be applied correctly
[FIXED] Groups - by default members that follow path height should not also follow terrain
[FIXED] Small issues in Runtime samples
[IMPROVED] Terrain import process with better messaging.
[IMPROVED] Updated LB Editor visuals
[IMPROVED] Stencil painter supports HDRP 6.9.0
[IMPROVED] Terrain Settings - option to modify GroupingID and AutoConnect in 2018.3+

[IMPROVED] Import Groups - imported prefabs default to ignoring proximity of other prefabs
[IMPROVED] LBLighting - ability to change the celestial's unity layer through LBCelestrials
[IMPROVED] Groups - members that follow path height have an option to follow trend of the terrain
[IMPROVED] Rectangle AND Circle Grass Zone NOT filters create Vegetation Studio Pro mask areas.

Version 2.2.0 September 2019
[NEW] Support for Shortcut keys in 2019.x
[NEW] Spawn (Sub)Groups along Object Paths within Uniform or Clearing Groups
[NEW] Groups - create new Groups by importing existing prefabs in a scene
[NEW] Topography – 3 new Hills, 1 Mountains, and 3 Valley Image Modifiers
[NEW] Groups – prefab randomise X,Z additional rotation
[NEW] Object Path core and surround textures can optionally use noise on GPU
[FIXED] Group Designer - Object Path members may not appear if landscape not at origin
[FIXED] Group Designer - The object of type 'Transform' has been destroyed in 2019.3+
[FIXED] Group Designer - Show Object Path context menu does nothing when all members are hidden
[FIXED] LB Editor SceneGUI - there was an error with the GroupDesigner
[FIXED] Groups - Manual Clearing Positions are not removed from scene when Group is deleted
[FIXED] Groups - Context Menu Member Move to Start/End does not refresh designer if required
[FIXED] Groups - Surface mesh and textures are incorrectly placed when landscape not at origin
[FIXED] Groups - Surface mesh may become orphaned in the scene
[FIXED] Groups - Surface Base mesh may not appear on all Clearing groups
[FIXED] Object Path - Surface mesh normals may be incorrect in Clearing Groups
[FIXED] Object Path - Vegetation Studio Pro vegetation masks are incorrect when landscape not at origin
[FIXED] Object Path - Incorrect terrain texture applied when one or more are disabled on Texturing tab
[FIXED] Unity terrain trees are not saved in Vegetation Studio Pro before an editor restart
[FIXED] LBLandscapeTerrain.PopulateWithTrees - could not find LBTerrainData
[FIXED] Templates - duplicate primary water may be imported when using Template Editor
[IMPROVED] Groups - added RandomUnique option to spawn prefabs along an Object Path
[IMPROVED] Groups - improved warnings when changing Group Types
[IMPROVED] Groups - add a new Stencil directly from the Filters tab
[IMPROVED] Groups - tinted and/or rotated textures work with zones or along Object Paths
[IMPROVED] Groups - refresh Group Designer when closing Object Path Designer with AutoRefresh on
[IMPROVED] Object Path Series - new option to Randomise per Group instance
[IMPROVED] Object Paths - can copy path points between all similar Group types
[IMPROVED] Object Paths - surface meshes have the option to switch UV directions
[IMPROVED] Object Paths - set all path point heights to selected, min, max or average via context menu
[IMPROVED] Topography Layers - show warning on Image Modifier picker when gizmos are disabled in 2019+

Version 2.1.4 August 2019
[FIXED] Textures are not retained on Imported Terrains in 2018.3+.
[FIXED] Not all of a stencil layer is paintable when using imported terrains
[IMPROVED] TerrainLayer assets are saved in the project folder when terrain data is stored in project folder
[IMPROVED] Group-level Stencil Filter layout
[IMPROVED] Procedural Group placement can now consider their radius when filtering by a stencil

Version 2.1.3 June 2019

[IMPROVED] Topography - Changing Perlin presets of the same type retains Restrict Area and Layer Filter settings
[IMPROVED] Support for Unity 2019.2

Version 2.1.2 April 2019

[NEW] Groups - Multiple Object Paths can share the same Object Series' configuration
[NEW] LB Manager - finalise landscapes (Experimental)

[NEW] LB Path Importer - create Group Object Paths from an external source e.g. EasyRoads3D
[FIXED] Template Editor - scene is not marked dirty when landscape is created from a template
[FIXED] Topography Layers - Custom Image Modifier layers lose their data source
[FIXED] Groups - Save and Exit Positions context menu does not unlock terrains
[IMPROVED] GPU Acceleration (Path) is out of Technical Preview
[IMPROVED] Groups - Object Path Width-based Series is out of Technical Preview
[IMPROVED] Groups - Object Path with Width is out of Technical Preview
[IMPROVED] Integration with EasyRoads3D v3.1.6
[IMPROVED] Topography Layers - optional descriptive names
[IMPROVED] Terrain Settings - option to create terrain data files in the project folder
[IMPROVED] Support for 2019.1

Version 2.1.1 March 2019

[NEW] Groups Object Path - Remove Trees (includes integration with Vegetation Studio Pro)
[NEW] Groups Object Path - Base Mesh for construction of bridges or overpasses
[NEW] Groups Object Path - Copy path points between group members
[NEW] New landscapes are set to GPU Acceleration by default on supported platforms
[FIXED] Groups Scripting - lbObjPath.isRemoveExistingGrass is incorrectly scripted as a float
[FIXED] Groups Object Path - in Edit mode, heights, textures and trees are not restored if member is deleted
[FIXED] Groups Object Path - grass is not removed correctly for Clearing Groups with Vegetation Studio Pro
[FIXED] Groups - when Ignore Prox of Others is enabled, sometimes others ignore this group member too
[FIXED] Groups - Circle zones are displayed incorrectly in the Group Designer
[FIXED] Templates - Object Path surface materials are not exported correctly and may produce null exception
[FIXED] "Import Now" does not appear when adding LB Landscape script to non-LB created terrains
[IMPROVED] Groups Object Path - members in Clearings can now use Path Height
[IMPROVED] Group Designer now calculates object path member proximity
[IMPROVED] Group Designer - river surface meshes are now visible in the designer
[IMPROVED] LBLighting - on screen clock has option to display seconds in HH:MM:SS format

Version 2.1.0 February 2019

[NEW] Topography Image Modifiers - 4 new realworld valleys
[NEW] Topography - support for GMRT GeoTIFF underwater heightmap data
[NEW] Path GPU acceleration (Experimental) 100X FASTER for MapPath Create Map Texture
[NEW] Path GPU acceleration (Experimental) 5X FASTER for Topography MapPath Layer
[NEW] Final Pass Smoothing on GPU is 30X FASTER
[NEW] Groups - Make walkways, trails and paths in Groups using Object Path
[NEW] Groups - Object Path Series - Add multiple sets of prefabs along a path with various rules
[NEW] Stencil - import psd, tif, or jpg textures into a new stencil layer from the assets folder
[NEW] Automatically remove undo files > 7 days old
[NEW] Runtime sample (#7) that includes new Object Path on GPU
[NEW] Camera Path - import path points from Group Object Path
[FIXED] Compute shader (LBCSTopo): Property (stencilLayer128Tex2DArray) at kernel index (1) is not set
[FIXED] Compute shader (LBCSTopo): Property (modifierCurves) at kernel index (1) is not set
[FIXED] LBIntegration.VegetationStudioProEnable - could not get type VegetationSystemPro
[FIXED] Vegetation Studio Pro Integration - Trees duplicated with (I)nsert are not rendered
[FIXED] Vegetation Studio Pro Integration - Trees are not snapped to terrain with Groups flatten
[FIXED] MicroSplat integration - Terrain Settings Config and Shader buttons have no effect
[FIXED] Topography Image Modifier - scene picker not updated when Invert enabled or disabled
[FIXED] Topography - Stencil Layer Filters only work on one Layer when GPU Acceleration is enabled
[FIXED] Template - image modifier may be incorrect if destination landscape has different start position
[FIXED] Template - Topography Layer Filters are not saved or restored with Templates
[FIXED] Template - Object Path positions are incorrect when the target landscape is a different size
[FIXED] Create New Landscape - grass wind settings are not updated
[FIXED] DemoScene - ExecuteMenuItem failed because there is no menu named Edit/Settings
[FIXED] Add Texture and Assign Textures from Preset does not turn off Disable All Textures
[FIXED] Position MainCamera to Scene View incorrectly adjusts the MainCamera Viewport Rect
[FIXED] Groups - Available textures are not updated when a new landscape is created
[FIXED] Groups - Object Paths in Uniform Groups ignore the landscape Start Position

[FIXED] Group Designer - changing Object Path properties can remove selected objects
[FIXED] Group Designer - opening it does not first close Object Path Designer in another Group
[IMPROVED] GPU Acceleration Topography, Texturing, and Grass moved from Experimental to Preview
[IMPROVED] Templates - option to not import terrain settings into existing landscape
[IMPROVED] Compatibility with R.A.M. v1.6.0
[IMPROVED] RTP Integration - synchronising Textures in LB Editor
[IMPROVED] Groups - new button to estimate the area to flatten under a prefab
[IMPROVED] LBImageFX - Distance Fog considers user-defined water level
[IMPROVED] Set global grass (detail) density in Terrain Settings on Landscape tab
[IMPROVED] 2019.1 compatibility

Version 2.0.8 November 2018

[FIXED] The name 'lbRandom' does not exist in the current context for a new project
[FIXED] Windows Landscape Builder menu is not available for a new project

Version 2.0.7 November 2018

[NEW] Create heightmap NavMesh from painted Stencil Layers
[NEW] Preview support for LWRP 4.0.1 including terrain per pixel normals
[NEW] Preview support for HDRP 4.0.1 including terrain shader
[NEW] Curvature (convex, concave) placement rules for Texturing, Trees and Grass
[FIXED] MapPath mesh - incorrect normals at start of path result in incorrect lighting on path
[FIXED] MapPath - path is incorrectly drawn in scene when a point is deleted
[FIXED] Object Path - last object can have incorrect rotation when Snap Last Obj to End is enabled
[FIXED] Import Grass from existing terrain(s) may not import mesh grass data
[FIXED] Import Grass from existing terrain(s) fails when detail resolution is not 1024
[FIXED] Templates - Topography Image Modifier Layers may not be resized correctly
[IMPROVED] Vegetation Studio Pro integration - grass scaling, grass noise and texture filters
[IMPROVED] Landscape Extension - automatically update texture and normalmap changes
[IMPROVED] Bake NavMesh from MapPath mesh UI
[IMPROVED] MapPath UI and scene view context menu updated
[IMPROVED] Object Path - Reverse the direction of the path points
[IMPROVED] Object Path, MapPath - point gizmos within the scene view can be resized
[IMPROVED] Added Tree and (Mesh) Grass prefab preview in editor
[IMPROVED] Ability to make grass sparser by changing Grass (Detail) Resolution
[IMPROVED] Runtime support for LWRP terrain shader in RuntimeSample06
[IMPROVED] Runtime support for HDRP terrain shader in RuntimeSample06

Version 2.0.6 October 2018

[NEW] GPU Acceleration - Texturing (Experimental)
[NEW] GPU Acceleration - Grass (Experimental)
[NEW] GPU Acceleration - Topography (Experimental)
[NEW] Preview support for MicroSplat
[NEW] Preview support for Vegetation Studio Pro
[NEW] LBLighting - clouds and/or ambient lighting can use High Dynamic Range (HDR) colours
[NEW] LBLighting - ambient lighting can use separate colours for sky, horizon, and ground
[NEW] Map Path - context menu in scene view for faster path creation
[NEW] GeoTIFF - Fix holes (spikes) in imported data sets
[NEW] Topography Final Pass Smoothing - Added Stencil Layer filters (AND, NOT)
[NEW] Topography Final Pass Erosion - Added Stencil Layer filters (AND, NOT)
[FIXED] Layer Image Modifiers - volume picker may not appear or update unless mouse pointer is over scene view
[FIXED] Stencil - circle gradient layer brush paints inverted gradient colours with HDRP
[FIXED] Stencil - move to centre on right mouse click should not be active when Show Stencil is disabled
[FIXED] Topography Image Layers - Detailed smoothing should have no effect if there is no heightmap image
[FIXED] Topography Layer Restrict Area picker sizing label is incorrectly positioned
[FIXED] Topography Layer - Add/Remove Height is incorrectly considered when Remove Base Noise is not enabled
[FIXED] Topography Layer - Filters are not correctly copied when Inserting duplicate layers
[FIXED] Topography Layer - NullReferenceException if selecting None for Stencil Layer Filter
[IMPROVED] LBLighting is more compatible with Unity Post Processing stack 2.0

[IMPROVED] Topography Image Layer smoothing
[IMPROVED] Stencil - more zoom, and new keyboard navigation shortcuts
[IMPROVED] Better support for importing 16bit TIFF data from World Creator
[IMPROVED] Compatibility with MegaSplat 1.73+
[IMPROVED] 2018.3 support and new terrain system

Version 2.0.5 August 2018

[NEW] Groups - zone search filter in UI
[NEW] Groups - place prefabs with proximity extent of another member
[NEW] Camera Path - context menu in scene view
[NEW] Preview support for HDRP and LWRP
[FIXED] Vegetation Studio integration - NullReferenceException in LB Advanced tab after creating new landscape
[FIXED] GroupDesigner - zone labels behind the camera appear as ghosted labels
[FIXED] GroupDesigner - member proximity visual isn't updated in scene view when changed in LB Editor
[FIXED] GroupDesigner - should not be able to edit manual clearing positions while in the designer
[FIXED] GroupDesigner - incorrect Object Path points if Height Offset is changed
[FIXED] GroupDesigner - incorrect value appears in member control when switching tabs
[FIXED] Stencil - layer brush may paint in incorrect position on some scaled devices
[IMPROVED] Groups - expand range of Noise Tile Size for Grass and Textures

Version 2.0.4 August 2018

[NEW] High Definition Render Pipeline (HDRP) support in Preview
[NEW] Topography Image Modifier hills - Yorkshire Dales
[NEW] Groups - Populate prefabs along an Object Path (spline)
[NEW] Groups - Populate prefabs along Group Zone edges (circles and rectangles)
[NEW] Groups - Prefab Rotation Type: Face 2 Zone Centre
[NEW] Groups - Control Clearing rotation range
[NEW] Groups - Member search filter and context menu in UI
[NEW] GroupDesigner - Model to Ground option to set bottom of model at ground level
[NEW] Landscape Extension - Gives the illusion that the landscape is bigger than it is
[NEW] Stencils - import terrain heightmap mask into new Stencil Layer
[NEW] Export - Splatmap textures into Red Channel files (can be used with HDRP material for Terrains)
[FIXED] Topography - Image Modifier may contain edge defects when area rect is same as landscape size
[FIXED] Topography - ArgumentException when Volume Picker is enabled and the Image Modifier is deleted
[FIXED] Groups - manual clearing positions may remain in scene after group is deleted
[FIXED] Import existing terrains in LB Landscape. NullReferenceError when FIX NOW is clicked.
[FIXED] Sometimes cannot paint on stencil when Game view is visible
[FIXED] Landscape Stats - Display (terrain) Labels doesn't immediately turn on/off
[FIXED] Groups and Mesh/Prefabs - Child meshes don't scale or rotate correctly with Combine Mesh option
[FIXED] Groups - Populate sometimes hangs after adding a prefab to GroupDesigner and changing Y offset
[FIXED] Groups - Populate sometimes hangs if a clearing exceeds the bounds of the landscape
[IMPROVED] Stencil layer navigation - centre on point with right or middle mouse button
[IMPROVED] MapPath and CameraPath scene view path point selection
[IMPROVED] Groups - Zone placement, scaling and UI
[IMPROVED] Support for 2018.2

Version 2.0.3 April 2018

[NEW] Grass Populating Mode - Groups Only
[FIXED] Group-level Grass ignores noise Placement Cutoff and Octaves
[FIXED] Grass type is not selectable in Groups Grass tab if (I)nsert button used on Grass tab
[FIXED] Texture type is not selectable in Groups Tex tab if (I)nsert button used on Texture tab
[IMPROVED] Wider range for noise Grass Placement Cutoff
[IMPROVED] Support for 2018.1

Version 2.0.2 February 2018

[NEW] Vegetation Studio support - Texturing, Trees, Grass, MapPath, and Stencils.
[NEW] Landscape Stats Refresh button will adjust MapPath, CameraPath, and Groups to new start position

[FIXED] Import existing Terrain into a layer may display incorrect Min/Max Heights in Editor window
[FIXED] ImageFX may not render correctly when Use Moon is enabled but Use Celestials is not.
[FIXED] Manual Groups size cannot be reduced in the scene view with scale tool
[FIXED] Grass is updated with Uniform Groups when it is not required
[FIXED] MapPath - Adding a point to the end may incorrectly render the path in the scene
[IMPROVED] LBLighting - reduce garbage collection and improve performance

Version 2.0.1 January 2018

[FIXED] MapPath points are incorrect when using a landscape with non-zero start position
[FIXED] CameraPath points are incorrect when using a landscape with non-zero start position
[FIXED] Groups Manual Clearing locations are incorrect when using a landscape with non-zero start position
[FIXED] Height Picker slope is not displayed when clicking on the terrain
[FIXED] Texturing - a seam may appear along terrain borders when using Inclination rules
[FIXED] Groups - moving an item in list can reset Randomise Rotation Y
[FIXED] Groups - manual clearing locations may not be removed from scene when group is deleted

Version 2.0.0 January 2018

[NEW] Topography Image Modifiers with in-scene visualisation, positioning and rotation
[NEW] Topography Image Modifiers with RAW (16bit) and PNG support
[NEW] Groups - advanced procedural prefab placement
[NEW] 3D Group Designer - beginner, artist, level designer, and programmer friendly
[FIXED] MapPath points cannot have -ve z-axis locations when a landscape has a -ve z start position
[FIXED] 'Could not open TIFF file' and 'RAW File does not exist' errors when importing TIFF from network folder
[FIXED] MegaSplat integration - shader compile error when setting Material Type to MegaSplat in Landscape tab
[FIXED] Paths and Stencils are not linked correctly when importing a template directly from the Inspector
[FIXED] Legacy Noise Offset and Non-Square Terrains advanced settings not saved between sessions
[FIXED] Export heightmap to PNG uses world space size instead of heightmap resolution
[FIXED] Texturing - Area Filter ignores Landscape start position in worldspace
[FIXED] Mesh/Prefabs - Combined Meshes have incorrect position when landscape does not start at 0,0,0
[FIXED] Import Unity Trees - Tinting is not working on trees that support colour tinting
[FIXED] Template - MapPath mesh may not be correctly positioned if Apply Path Meshes is selected
[FIXED] Export RAW - sometimes fails with IndexOutOfRangeException
[FIXED] Import RAW files into a layer may display incorrect Min/Max Heights in Editor window
[IMPROVED] Export to Mesh - reduce the number of terrain meshes created (in most cases 50% less)
[IMPROVED] Texture Filters - new Area and Stencil NOT option
[IMPROVED] Tree Filters - new Stencil NOT option
[IMPROVED] Grass Filters - new Stencil NOT option
[IMPROVED] Mesh/Prefabs - Combined Meshes has better detection of empty objects
[IMPROVED] Grass - now supports imported 3D model mesh prefab
[IMPROVED] C# script generators for Topography, Textures, Trees, Grass, Groups, and MapPaths.

Version 1.4.3 November 2017

[FIXED] Heightmap images are not ignored on disabled Image Layers
[FIXED] Can create landscapes with a size smaller than the terrain size
[FIXED] Stencil Layer colour is not updated
[FIXED] A Stencil Layer is not saved if it is disabled while painting
[FIXED] Inserting a Stencil Layer incorrectly references the original Stencil Layer
[FIXED] Topography Layer - incorrect behaviour of Add/Remove Height
[FIXED] Fog is not disabled when the Stencil is shown in the scene
[IMPROVED] Support for Unity 2017.3
[IMPROVED] RTP Integration - support for RTP 3.3i
[NEW] Import RAW heightmap files into a Topography Layer
[NEW] Texture NOT Filter for Trees, Grass, and Mesh/Prefab placement
[NEW] Import 8/16/32bit GeoTIFF data into a Topography Layer

Version 1.4.2 October 2017

[FIXED] Importing a template does not update alphamap resolution

[FIXED] LBLighting - cannot remove an empty ImageFX camera slot using Delete (X) button
[FIXED] DemoScene2 - grass does not load from template in runtime build (tex not read/write)
[FIXED] Scene view may display large triangle in Unity 5.5 if Grass Path Fading Mode is Don't Fade
[FIXED] Texturing - TerrainData is missing splat texture (when there is no valid texture)
[FIXED] Topography Layer noise mirrored when negative landscape positions used
[IMPROVED] RuntimeSample04 and RuntimeSample05 updated
[IMPROVED] Runtime - Create C# for Landscape Terrain Settings from Script Button in Editor
[IMPROVED] Runtime - Create C# for Curves from Script Buttons in Editor
[IMPROVED] Template - Selectively import Topography, Textures, Trees, Grass, and Meshes.
[IMPROVED] Texturing - missing texture and normalmap detection
[IMPROVED] Trees - missing prefab detection
[IMPROVED] Grass - missing grass texture and prefab detection
[IMPROVED] Mesh - Add support for imported 3D Model asset prefabs
[IMPROVED] Mesh - missing prefab detection
[IMPROVED] LBMapPath - Better integration with River Auto Material (R.A.M.)
[IMPROVED] Support for Unity 2017.2
[NEW] Runtime methods ApplyTopography, ApplyTextures, ApplyTrees, ApplyGrass, ApplyMeshes
[NEW] Runtime - Use Stencils at runtime for procedural placement
[NEW] Runtime - Create C# for Topography Layers from Script Button in Editor
[NEW] Runtime - Create C# for MapPaths from Script Button in Editor
[NEW] Export landscape heightmaps to RAW files
[NEW] Import terrains created outside LB into Topography Layers
[NEW] Import terrain ground textures (splatmaps) created outside LB
[NEW] Import terrain trees created outside LB
[NEW] Import terrain grass textures created outside LB
[NEW] Transfer terrains created outside LB via Templates to other scenes or projects
[NEW] Grass - added support for mesh prefabs (Grass and Vertex Lit)
[NEW] Template - generate and populate a landscape directly from Inspector

Version 1.4.1 September 2017

[FIXED] Save Template - ArgumentNullException: Argument cannot be null.
[FIXED] Camera Animator - Calling BeginAnimation() sometimes fails to start animating camera
[IMPROVED] Camera Path - add Snap To Terrain
[NEW] Native Stencil Filters for Texturing, Trees, Grass, Mesh/Prefab placement
[NEW] Import external layout PNG files into stencil layers from Alpha, Grayscale, or R/G/B channels
[NEW] Sample script and prefab for applying Stencil Layers as filters at runtime

Version 1.4.0 August 2017

[FIXED] Apply Template warning "LBFilter.UpdateTextures - List of available textures is empty"
[IMPROVED] Support for Unity 5.6
[IMPROVED] Support for Unity 2017.1
[IMPROVED] LBTemplate - runtime support for creating Map Path meshes
[IMPROVED] LBImageFX - SSRR quality and performance upgrade
[IMPROVED] LBImageFX - Clouds are reflected with SSRR
[IMPROVED] Trees - Enable/disable tinting and vary tint strength
[IMPROVED] Mesh or Prefabs - Extend Min Proximity range to 0-1000m
[IMPROVED] MegaSplat 1.14 compatibility
[NEW] Weather - Hail
[NEW] Weather - Cloud Styles
[NEW] Texture Generator - noise textures
[NEW] Stencils - paint procedural placement maps in the editor
[NEW] Topography – Filter Type: Stencil Layer

Version 1.3.8 April 2017

[FIXED] TextureGenerator - Cannot create texture if LandscapeBuilder\Textures folder does not exist
[FIXED] LBLandscape' does not contain a definition for `GetMegaSplatAutoClosePainter'

Version 1.3.7 March 2017

[FIXED] Prompt to Delete Layer 0 when Topography Noise Generator Type is Value Based
[FIXED] Texture Filters are not applied correctly with applying Templates
[NEW] Texture Generator - combine selectable RGBA channels from 4 textures into new texture
[NEW] Texture Generator - create noise textures
[NEW] MegaSplat integration preview (terrain/mesh shader)
[NEW] Ground Checker - Take action in your game based on the textures at a location in the terrain

Version 1.3.6 January 2017

[FIXED] MapPath - Create Mesh may not remove previous water scripts when changing water types
[FIXED] LBLighting - Clouds and fog may flicker exactly on sunrise or sunset
[FIXED] LBLighting - Clouds do not render at night if there is no moonlight
[FIXED] LBImageFX - Reflections appear inverted on DirectX 11
[IMPROVED] Topography MapPath edge smoothing
[IMPROVED] Mesh/Prefab placement - override X/Z rotation option on models imported with non-0 rotations
[IMPROVED] Create mesh from MapPath - new options to make mesh double-sided and save to Project folder
[IMPROVED] LBLighting - Screen Fade-In speed refinement
[IMPROVED] Position MainCamera to Scene View now supports First/Third Person Controllers
[IMPROVED] Area Filters - Add resize in scene view
[IMPROVED] Templates - new option to include Map textures in exported packages
[NEW] Support for Calm Water 1.5.9+ (oceans, rivers, lakes, and ponds)
[NEW] Support for Rustic Grass 1.0

Version 1.3.5 December 2016

[FIXED] Insert duplicate Texture, Trees, Grass fails when no filters have been added
[FIXED] An enabled Mesh may not be added to scene if others are disabled
[FIXED] Weather State not enabled in Editor until State Settings expanded
[FIXED] Template Ignore Start Position also incorrectly ignores position of existing landscape
[FIXED] Combining Meshes ignores Normal Maps in material
[IMPROVED] Added keyboard shortcut to append points to MapPath in Scene View
[IMPROVED] Create Maps that exclude centre of MapPath for new texture, grass, trees placement scenarios.
[IMPROVED] Quickly expand or reduce the width of a variable width MapPath
[IMPROVED] Templates now support Map Path meshes
[IMPROVED] Updated support for Unity 5.5
[NEW] Mesh or Prefab placement - flatten surrounding landscape option
[NEW] Mesh or Prefab placement - clustering options including auto-alignment with terrain
[NEW] Mesh or Prefab placement - combine static prefab meshes and/or add mesh colliders
[NEW] Integrated LB Image FX combines features of Weather FX and SSRR
[NEW] Create variable polygon-count meshes from Map Paths including river surfaces, paths and roadways.
[NEW] Create mesh-based terrain chunks from procedurally generated topography
[NEW] Auto-configure Occlusion Culling for mesh-based terrains

Version 1.3.4 October 2016

[FIXED] An oversized sun may appear in the sky at runtime
[FIXED] The Screen Shot device may produce a black image - Added option to disable anti-aliasing during screenshot
[FIXED] SSSR shader texlod compile error on DirectX 11
[IMPROVED] In LBLighting, set WeatherState by name at runtime
[IMPROVED] Added wider range of Alpha Map Resolution Terrain values
[IMPROVED] LB Screen Space Ray-traced Reflection - new performance options
[NEW] Texture Generator combiner mode - for combining multiple Map textures

Version 1.3.3 September 2016

[FIXED] A MapPath error occurs when Closed Circuit is enabled
[FIXED] Topography Map Path with closed circuit results in gap in path topography
[FIXED] Handle should not be visible for selected point in Camera and Map Paths when "Show Path in Scene" is disabled.
[IMPROVED] Camera Animator - import path points from a Map Path

Version 1.3.2 September 2016

[FIXED] Topography Layers - Image Base - first time heightmap modified with Smoothing terrain edge is very high
[FIXED] Detail Smoothing has some issue near intersection of four terrains (run once, second time results ok)
[FIXED] Smooth Modifier incorrectly aligns terrain boundaries
[FIXED] Textures do not appear in LB Window when importing terrains not build with LB.
[FIXED] Links to LB Support and Beta Forums
[FIXED] Camera Animator deflected when crossing end/start of a closed path
[FIXED] Water4Advanced reflection camera is disabled by Camera Animator
[FIXED] Detail Smoothing places an extra edge along the borders of Image Additive and Subtractive layers
[FIXED] Change grass with L button. If same, doesn't update settings.
[FIXED] LBLIghting - blue night sky because Unity Lighting selects incorrect light source
[FIXED] LBLighting - Celestials (Moon and Stars) don't get built at runtime if not first created in Inspector
[FIXED] Builds can take a long time due to LB WeatherFX shader compile time
[FIXED] LBTemplate - terrain height is not set in landscape from Template
[IMPROVED] Numerous small improvements to assist with game development and workflow
[IMPROVED] Templates include LBLighting and Path settings
[IMPROVED] Selectively auto-build the landscape after applying a Template
[IMPROVED] RTP Integration - combines normal maps and tessellation auto-configuration
[IMPROVED] HQ Photographic Textures Grass Packs new default settings
[IMPROVED] UI support for Unity Pro and Unity Plus dark skin
[IMPROVED] Terrain Texturing - Added Colour Tinting
[IMPROVED] Camera Animator - Editor preview mode
[IMPROVED] Smoothing Modifier - restrict area by Map
[IMPROVED] Tree, Grass, Mesh - restrict area NOT filter
[NEW] Grass settings editor - User Defined grass configuration so you can save settings for re-use
[NEW] Create Map Paths in the Editor
[NEW] Create Map Paths from one or more roads constructed with EasyRoads3D v3 Pro
[NEW] Apply Additive/Subtractive/Detail Topography Layers with a Map filter
[NEW] WeatherFX animated volumetric clouds and height-based fog
[NEW] LB Lighting - Weather System control, including: clouds, wind, rain, and lighting
[NEW] Create flowing rivers with AQUAS 1.3 integration and LB Map Path
[NEW] Create rivers, pathways, and roadways with Map Path Topography Layers
[NEW] Texture Generator (Albedo, Metallic, Specular, Normal, Height, Occlusion, and Emission Maps)
[NEW] Screen Space Ray-traced Reflection camera FX
[NEW] Demo scenes based on LBTemplates

Version 1.3.1 June 2016

[FIXED] Camera Animator does not check for an audio listener
[FIXED] Camera Animator does not stop at end of path by default when Closed Circuit is disabled
[FIXED] Camera Animator pauses near end of path when Closed Circuit is enabled
[FIXED] Camera Path has incorrect last point when using EasyRoads3D centre, right or left splines
[FIXED] Camera Animator - if scene hasn't been run, cannot add GameObjects to disable
[FIXED] Highlighters and area pickers are not disabled when LB Editor windows is closed
[FIXED] Double-click scene to reload when water location highlighter is on doesn't turn off highlighter
[FIXED] Texture with noise isn't seamless across terrain boundaries
[FIXED] Landscape Stats are not updated when Topography is changed
[FIXED] Tree area filters reduce tree placement for other Tree Types
[FIXED] Secondary water bodies are incorrectly placed when landscape is offset from 0,0,0.
[FIXED] Lake water is incorrectly placed when landscape is offset from 0,0,0.
[FIXED] Area Rectangle Filters incorrectly placed when landscape is offset from 0,0,0.
[FIXED] Scene highlighters don't display correctly on landscapes with a z-axis position offset
[FIXED] New landscapes inherit previous landscape data which could result in loss of data
[FIXED] LB Standard terrain shader z-axis is stretched when no normal maps are on any Textures.
[FIXED] Procedural Skybox disappears if skybox settings not shown while in Editor
[FIXED] Topography Layers - Restrict Area edge may create a noticeable boarder with underlying topography
[FIXED] When create a new Landscape, the Stats don't get reset
[FIXED] Topography Layers - Restrict Area position is incorrect when noise x or y offset is not 0.
[FIXED] Textures, Trees, Grass, and Mesh don't place on inclination of 0
[FIXED] Can add non-prefab trees to Tree Type - now raise warning and block

[FIXED] LB Standard terrain shader doesn't support more than 4 active Textures
[IMPROVED] Numerous small improvements to assist with game development and workflow
[IMPROVED] AQUAS integration with Camera Animator
[IMPROVED] Modifiers terrain highlighter operations
[IMPROVED] Tree placement - Max Trees per square km per Tree Type
[IMPROVED] Tree placement is now twice as fast
[IMPROVED] Mesh placement is now up to 40% faster
[IMPROVED] Map performance is now more than 20% faster
[IMPROVED] Texture, Tree, Grass placement performance with disabled items
[IMPROVED] Restrict Area blending
[IMPROVED] Grass patch fading
[IMPROVED] Exporting EasyRoads3D roads to Map files
[IMPROVED] Mesh tab - use meshes or prefabs, added noise placement options
[IMPROVED] Runtime generation
[IMPROVED] Texture Mode Map - Advanced options for blending
[NEW] Fade Lighting in/out
[NEW] Topography Detail Layer Map filter
[NEW] Templates - copy landscape settings between projects and/or computers
[NEW] More Layer presets
[NEW] Grass placement noise option
[NEW] Integration with HQ Photographic Textures Grass Packs Vol 1 and 2.
[NEW] Direct links to Support, Beta Program, Asset Page and Help
[NEW] Relief Terrain Pack v3.3 integration
[NEW] Meshes or Prefabs can check proximity to other objects by Unity Layer or Tag

Version 1.3.0 May 2016

[FIXED] Terrain Detail Resolution is not set until grass is applied to a landscape
[FIXED] Scene is not set to changed when Camera Path is modified
[FIXED] Preset lists not always available before Assign Textures/Trees/Grass from Presets clicked
[FIXED] Using the height picker and clicking the terrain, will attempt to apply a modifier if the modifier tab is selected next
[FIXED] Interpolation Smoothing for Heightmap Resolutions of 65 and 129 sometimes fail
[FIXED] When Camera Path "Closed Circuit" is unchecked, the end points incorrectly influence the path shape.
[FIXED] Standalone Build errors and warnings
[IMPROVED] Valley and Lake landform modifiers now have the option to add water at the same time
[IMPROVED] Smoothing operations on imported heightmap images
[IMPROVED] Topography generation performance
[IMPROVED] Landscape Stats - min/max height added
[IMPROVED] Screenshot Device now supports Standalone Builds (Windows and OSX)
[IMPROVED] Camera Animator
[NEW] Enable or disable individual Texture, Tree and/or Grass types
[NEW] Enable or disable individual bodies of water
[NEW] Filters - Restrict Tree, Grass, Mesh placement by Terrain Texture
[NEW] Filters - Restrict Tree, Grass, Mesh placement by Area
[NEW] Filter - Restrict Texture by Area
[NEW] Runtime sample scripts and prefabs
[NEW] EasyRoads3D integration - create LBMap's to define road corridors for Texture, Grass, and Tree placement
[NEW] Create Camera Path from EasyRoads3D roads
[NEW] AQUAS Water Set and Lite integration - create an ocean or lakes in a Landscape
[NEW] Topography Layers - add one or more Base, Additive or Detail layers
[NEW] Landscapes remember their last topography creation settings
[NEW] LB Standard terrain shader for improved texturing on cliff faces

Version 1.2.0 April 2016

[FIXED] Mesh Tab error - numeric limits UInt16 max()
[FIXED] Heightmap import with Interpolation Smoothing with large landscapes
[FIXED] Normal Map Generator not setting "Create from Greyscale"
[FIXED] Read/Write permission on Textures not always set with "Fix Now" button
[FIXED] Scene is not set to changed when Auto Save is not enabled

[FIXED] Scene is not set to changed when Update Lighting Preview is clicked
[FIXED] Modifier highlighter may be active when a new scene is loaded
[FIXED] Can create a landscape with incorrect terrain width
[FIXED] Water Duplicating Meshes can attempt to add millions of meshes to a scene
[FIXED] Water does not scale correctly with Water4Simple standard asset
[FIXED] Sun and moon could be on at same time by default
[IMPROVED] Camera Path: first path point is added 2m above landscape corner
[IMPROVED] Modifiers - Flatten
[IMPROVED] Water asset integration in Landscape Tab (bring your own prefab)
[IMPROVED] Lighting control
[IMPROVED] Map texture validation
[REVISED] Modifiers - default settings for Topography and Image modifiers
[NEW] Landscape Stats
[NEW] Landscape Height picker
[NEW] Topography Curve Based modifier - Smooth Ridged
[NEW] Topography Curve Based modifier - Smooth Double Ridged
[NEW] Topography Curve Based modifier - Power of One Point Five
[NEW] Modifiers - drop hills, mesa, mountains, valleys into landscape
[NEW] Modifiers - users can add custom landform heightmaps
[NEW] Modifiers - Smoothing
[NEW] Import Terrains not created with Landscape Builder
[NEW] Texturing - minimal blending option
[NEW] Remove Grass near Mesh option with proximity
[NEW] Animated fog colour and density with timing control
[NEW] Procedural or 6-sized Skybox support in LB Lighting
[NEW] Combined Height, Inclination and Map option for Texture, Trees, Grass and Mesh placement
[NEW] Stitch two adjoining landscape's terrain topographies seamlessly

Version 1.1 – March 2016

[FIX] Editor loses connection with Landscape object after game is run
[FIX] Tree Removed invalid prototype error
[IMPROVED] Topography presets
[IMPROVED] Heightmap Image Generation - add interpolation smoothing
[NEW] Quick default resources setup (Textures, Trees, Grass)
[NEW] Position MainCamera to Editor Scene View option
[NEW] In Editor screen shot device
[NEW] Night skies with camera rotation
[NEW] Export landscape to heightmap image
[NEW] Modify texture, tree, grass and mesh placement with "map" images
[NEW] Topography Curve Based Noise - Add Double Ridged curve modifier preset
[NEW] Texturing and Trees noise (more natural placement)

Version 1.0 – Initial Release Feb 2016