GAR 301

TECH-ART

PROJECT CREATED BY
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FALMOUTH
DESERTIFICATION

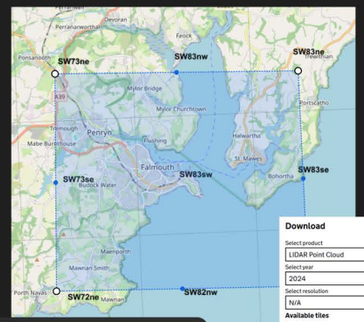
PCG+

TERRAIN GENERATION

EXPLORING LARGE SCALE TERRAIN CREATION TOOLS FOR VIDEOGAMES AND VFX USING PROGRAMS SUCH AS:
GAEA | HOUDINI | PHOTOSHOP AND UNREAL ENGINE. [FEATURING FAB ASSETS]

TERRAIN GEN

Want to turn any landscape into another landscape!? Explore working from initial creation using real world reference through to asset population.

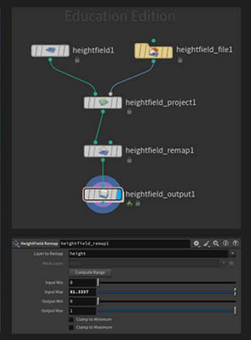


On the: **GOV.UK** website there is publically avalible **LiDAR** Data: high resolution scans of elevation compiled into **Pointclouds** which can be turned into data like height. The UK's system is organised into tiles Falmouth being found in: [SW83sw]

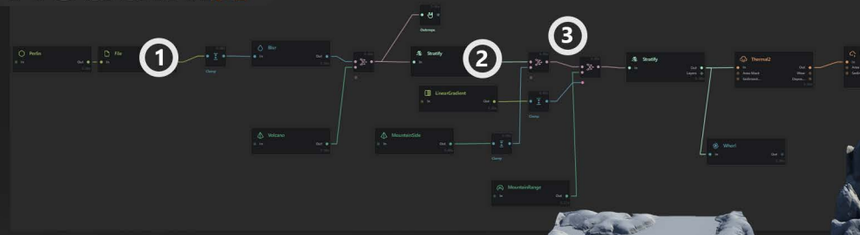
Within Houdini using a **HeightField** & **Project** converts the heightmap to a desired size [4096]. This can then be exported using a **HeightFieldOutput** node allowing useage in any other program.

GOV.UK

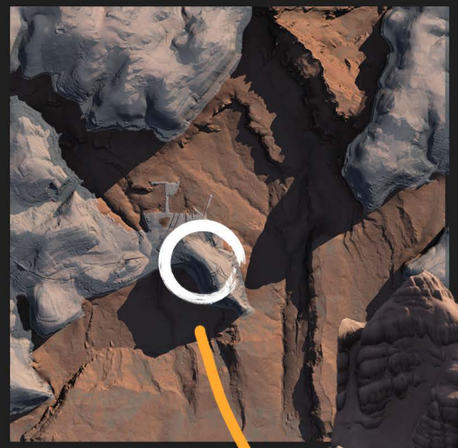
https://environment.data.gov.uk/survey



Houdini



GAEA



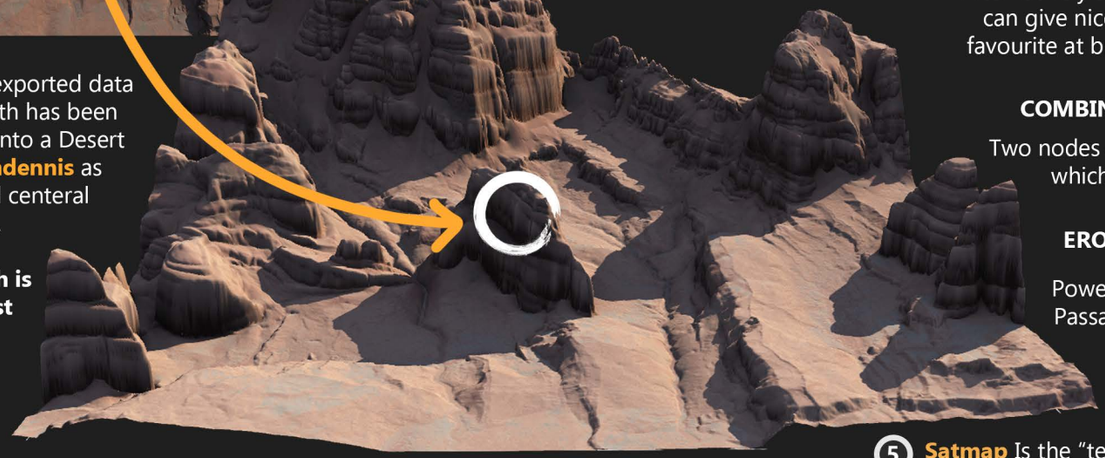
Here the exported data of Falmouth has been modified into a Desert Mesa. **Pendennis** as the circled centeral formation.

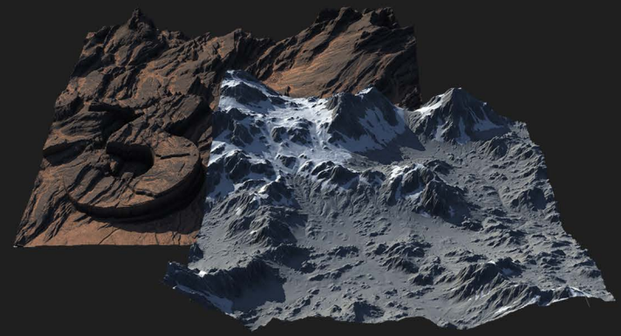
The Graph is shown just below!

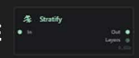
GAEA is a tool used to create landscapes utilising a **Node** based workflow. The general flow of which follows a colour gradient of Green through Red.

Starting with a (1) **File** Node [Bottom Left] and the exported Falmouth heightmap as a base the forms are modified with a **Clamp**, then **Blurred** this removes any unnaturally jagged edges or spikes.

Any file can be used for height data! [Simply act like alphas in other programs]



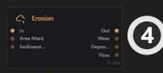


NOISE  (2)

Alternatively starting with noises like **Voronoi** or **Perlin** can give nice results [above] Stratify being a personal favourite at breaking up smooth shapes and creating a hearty "rocky" feeling.

COMBINE (3)

Two nodes can be blended together using **Combine** which has it's own blending modes & optional masking inputs.

ERODE  (4)

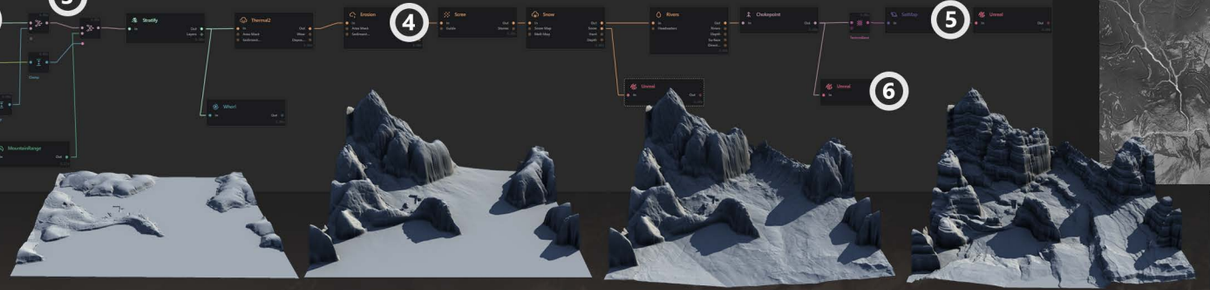
Powerful **Erode** nodes are used to simulate the Passage of time, rainfall and river downcutting.

(5) **Satmap** Is the "texturing" stage, sampling landscape point data (height, angle etc) is then remapped to a gradient.

(6) **Exporting**: Known as **Building** within GAEA is how you get the created maps out. Using the **Unreal** Node additional nodes can be marked for export as needed! Here a **Snow** mask was exported to drive materials within Unreal Engine.

TOP TIP: Unreal may encounter texture scale missmatches since GAEA's Free Versions export file size is 1009. To get around this, take into Photoshop, resize to 1024 to avoid file dimension missmatches.

[F] **VERY** useful **hotkey! F** Will Lock viewer to current node allowing changes made to earlier nodes to be veiwed at the current stage [Much Like Designer's Single Click]



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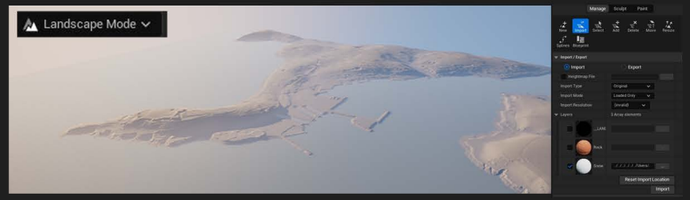
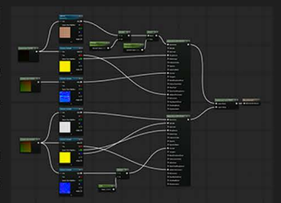
UNREAL

Importing from GAEA is done through Unreal's Landscape Creation toolset. Choosing the **HeightmapFile...** option.

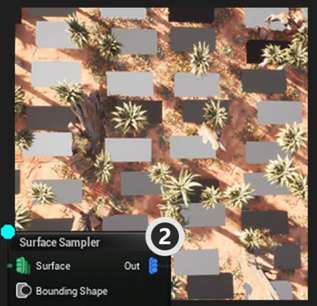


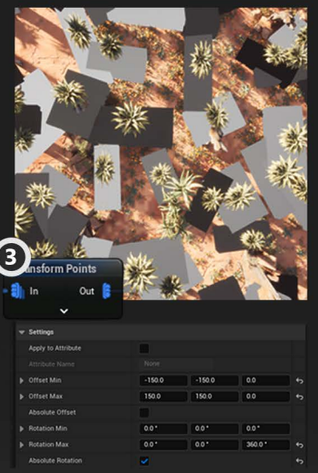
The Landscape material is a setup using **LandscapeCoordinate** as a UV Channel. **LayerBlends** then enable multiple material layers to exist simultaneously .



TOP TIP: Make sure to Fill the layers in the **Paint** menu section! UE5's Default is empty so no colour will be shown.

The Previously made Snow Mask is imported here under **LayerProperties[...]** painting the material to the masked areas.





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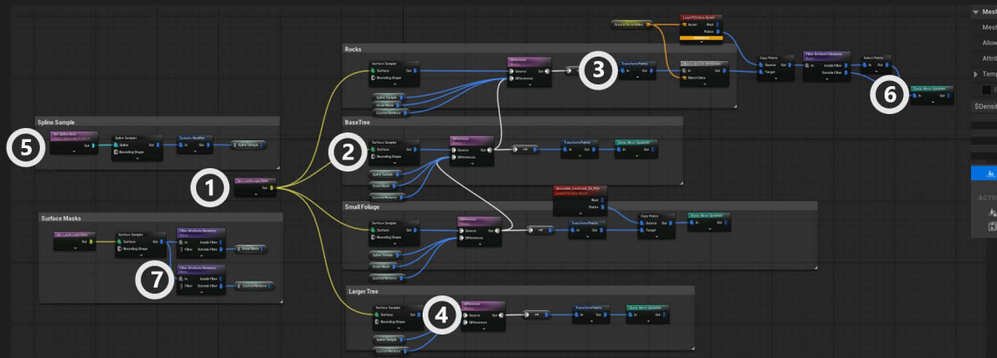
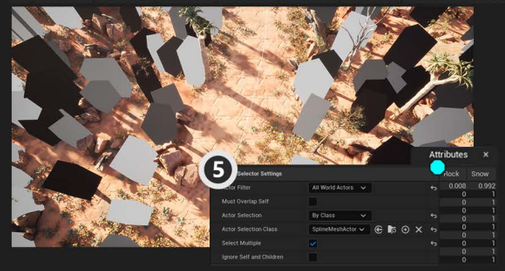




PCG or Procedural Content Generation is a toolset that enables the realtime editing of asset spawn behaviours. Driven by a highly customisable graph, used within both games and VFX [very similar to UE5's Blueprints]

The graph above is focused on creating a Biome split into: Trees, Rocks & Small Foliage.

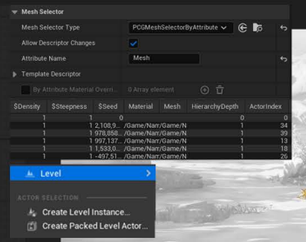
[D] **THE** most useful **Hotkey**! **D Visualise** [Debug] shows **point data** indicated by a blue "active" dot on the node!

Starting with a (1) **GetLandscapeData** Node provides info for a (2) **SurfaceSampler** this lays out **Points** [Grey squares seen left] at set intervals.

(3) **TransformPoints** directs how they are distributed (Randomised, Scaled, Rotated etc). Determining mesh Spawn Points.

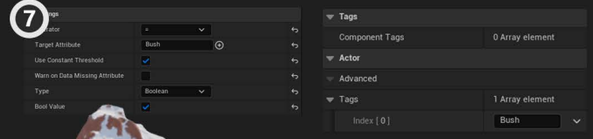
(4) **Difference** Nodes remove points, this is set here to: specified landscape **Atributes** [Snow from The Gaea map] Overlaped meshes and along custom (5) **Splines** for roads.

(6) **StaticMeshSpawn** is the final step where assets are chosen for spawning on the final points.



Level Instances are used for hand crafted arrangements, giving more creative control. **Tagging** Individual assets within these combined with an (7) **Atribute-Filter** Node set to **Boolean** gives a chance for meshes to not spawn, breaking up repetition. These are useable within the graph by converting to a **PCGAssetFromLevel** [Right Click in Content Drawer]

TOP TIP: CTRL + [E] Allows editing of level instances.



There is also an additional material layer painted on the landscape by hand, this is transparent, acting as an additional level of control; removing specific points.

[Required if cinematic shots are blocked by assets or to remove specific bothersome trees/ rocks]