

Spline Scatter PCG Tool Documentation

Field	Value
Asset Name	SplineScatter
Type	Unreal Engine PCG Graph (native, no external DCC required)
Engine Version	Unreal Engine 5.6
Author	Amro Ahmed

Requirements

SplineScatter is built entirely with Unreal's native Procedural Content Generation framework. It does not depend on Houdini, Houdini Engine, or any other external application.

- Unreal Engine 5.6.
- The Procedural Content Generation Framework plugin enabled (Edit → Plugins → Procedural Content Generation Framework). It ships with the engine but is not enabled by default in every project template.
- Static meshes of your own to scatter. The tool places meshes; it does not supply them.
- Paste the tool folder inside your project content folder

What This Tool Is For

SplineScatter distributes static mesh instances along a spline. A single PCG graph handles the sampling, the mesh, the surface snapping and the per-instance randomization, so a populated spline can be produced by placing the blueprint, drawing the spline and setting the spacing.

It is intended for the common repeating-along-a-path cases in an environment: roadside vegetation, fence lines and posts, rock borders, debris trails, street furniture, and any run of props that should follow a drawn path rather than fill an area. Because mesh selection is driven by an array, one spline can mix several meshes, either in a repeating sequence or in a randomised order.

How It Works

The parameters are exposed as properties on the blueprint actor that carries the graph, not as PCG graph user parameters. This means the tool is configured entirely from the blueprint actor's Details panel, and every instance placed in the level can be configured independently.

Scope:

- Scatter is spline-driven. The tool distributes along a path, not across a surface or inside a volume. For area coverage, use a surface sampler graph instead.
- Points are spaced evenly along the spline by the Spacing value. There is no density falloff and no per-segment variation; thinning is uniform and random rather than clustered.
- Snapping is vertical only. The ray direction is a straight up or down vector.
- The snapping trace only accepts hits on Static Mesh Actors that appear in the Snap To Actors list, plus the landscape according to Landscape Snapping. Geometry outside that list is ignored, so anything the instances should sit on must be added explicitly.
- Meshes in the Snap To Actors list are only detected if their collision is enabled and set to World Static. This is the most common reason for instances failing to snap: the actor is listed correctly, but its collision is disabled or assigned to another channel, so the trace passes straight through it and the points stay at the spline height.
- Mesh selection is unweighted. Every entry in the Static Meshes array has an equal chance of being chosen when randomization is enabled.

Inputs and Outputs

Input: the spline on the actor carrying the graph. Get Spline Data resolves it from the actor itself, so the tool is used by placing the SplineScatter blueprint actor and drawing its spline; no external spline reference is set.

A second input is the optional Snap To Actors list, an actor reference property read from the same actor. It defines which Static Mesh Actors the snapping trace is allowed to hit.

Output: static mesh instances, spawned by the graph and managed by the PCG component. Regenerating replaces the previous output; instances are not individually editable in the level, and edits should be made through the parameters rather than by moving instances by hand.

Parameters

All parameters are actor properties on the SplineScatter blueprint actor and are edited in the Details panel.

Scatter Settings

Parameter	Type	Description
Static Meshes	Array	The set of meshes to distribute along the spline.
Spacing	Float	Distance between consecutive sample points along the spline. Lower values place instances closer together and increase the point count proportionally.

Parameter	Type	Description
Points Density	Float	Keep ratio for the Select Points node, in the 0–1 range. At 1.0 every sampled point is kept; at 0.5 roughly half are discarded at random. This is the intended way to thin a run without changing Spacing, and it produces a more broken-up result than simply widening the spacing.
Points Density Seed	Integer	Seed for the Points Density. Changing it selects a different subset of points at the same density; keeping it fixed makes the result deterministic between regenerations.
Randomize Meshes Order	Boolean	When enabled, the tool picks an entry from the Static Meshes array at random for each point, so repeats can occur. When disabled, the tool assigns entries in array order, producing a regular repeating sequence along the spline.
Meshes Order Seed	Integer	Seed for the random mesh assignment. Has no effect when Randomize Meshes Order is disabled. Change it to reshuffle which mesh lands where without altering any other setting.

Snapping Settings

Parameter	Type	Description
Snapping	Enum (None / Down / Up)	None places instances at the spline position with no trace and skips the projection entirely, which is also the cheapest option. Down fires the ray straight down, the usual setting for dropping props onto the ground. Up fires it straight up, for attaching to a surface overhead such as a ceiling or the underside of a structure.
Snap Trace Start Height	Float	Vertical offset applied to the ray origin before the trace is fired, supplied as the Z component of the ray start position. Raise it when tracing down onto geometry that sits above the spline, or lower it when tracing up. Has no effect when Snapping is set to None.
Landscape Snapping	Enum (None / Include / Exclude / Require)	Controls how landscape hits are treated by the trace. Include accepts the landscape alongside the static meshes in the Snap To Actors list. Exclude rejects landscape hits, so instances snap only to those meshes. Require accepts landscape hits only. None leaves landscape selection unfiltered.
Snap To Actors	Array (Actor references)	The Static Mesh Actors the snapping trace is allowed to hit. Any surface the instances should land on other than the landscape must be listed here; unlisted geometry is ignored by the trace. Listed actors must also have collision enabled and set to World Static, since that is the channel the trace runs on. A mesh with collision disabled, or set to a channel that does not block World Static, will be skipped even though it appears in the list.

Random Transform

Each pair below defines a range, applied by the Transform Points node. A value is drawn per instance between the minimum and the maximum on each axis, so setting a minimum equal to its maximum

removes variation on that axis. Scale is applied non-uniformly, meaning the three axes are drawn independently.

Parameter	Type	Description
Offset Min / Max	Vector (X, Y, Z)	Random positional offset in applied after snapping. Offsetting on the axis perpendicular to the spline breaks up the single-file line that even spacing produces; a small Z range sinks or lifts instances relative to the surface they were snapped to.
Rotation Min / Max	Rotator (Pitch, Yaw, Roll)	Random rotation in degrees applied per instance. A full 0–360 range on yaw is the usual setting for natural props such as rocks and vegetation. Small pitch and roll ranges add lean; large ones will tip instances over.
Scale Min / Max	Vector (X, Y, Z)	Random scale multiplier per instance, defaulting to 1.0 on every axis for no variation. Because scaling is non-uniform, entering the same range on all three axes still produces slightly stretched instances; keep the ranges narrow for man-made props where distortion is obvious.

Typical Setup

- Place the SplineScatter blueprint actor in the level and draw the spline the scatter should follow.
- Add one or more meshes to Static Meshes and set Spacing to suit their footprint.
- Set Snapping to Down and Landscape Snapping to Include so instances sit on the terrain. If they also need to sit on roads, platforms or other meshes, add those actors to Snap To Actors and confirm each one has collision enabled and set to World Static.
- Raise Snap Trace Start Height if the spline sits below the surface being traced against, so the ray starts above it.
- Open Random Transform and set a yaw range, and small offset and scale ranges, so the run does not read as a repeated single asset.
- Regenerate. Adjust Points Density Seed or Meshes Order Seed to reroll the result without changing the configuration.

Performance Notes

Point count is driven directly by spline length divided by Spacing, then reduced by Points Density and again by Self Pruning. Halving Spacing doubles the sampled point count on the same spline, so it is the first value to raise when generation slows.

Snapping is the most expensive part of the graph, since the projection fires a trace against the World Ray Hit Query for every point. Setting Snapping to None removes that cost entirely and is worth doing wherever the ground is flat and the spline is already at the correct height. Where snapping is needed, keeping the Snap To Actors list short and using Exclude or Require on Landscape Snapping narrows what each trace has to consider.

Meshes placed by the graph are instanced, so a scatter drawing from a small set of Static Meshes is considerably cheaper to render than the same number of individually placed actors. Adding entries to the Static Meshes array increases the number of draw calls, as each distinct mesh needs its own instanced group, and material overrides.