PRISM Surface

Procedural Rendering & Integrated Surface Materials

User Manual - v1.1.0

Quantum Rift Interactive

Unity 6.3 LTS (6000.3.10f1)
High Definition Render Pipeline and Core RP 17.3.0
Unity UI (uGUI) 2.0.0 for demo labels

Table of contents

Introduction 3

1. Requirements and Quick Start 4

2. Demo Scene Walkthrough 11

3. PRISM Surface Tool 15

4. Sources and Per-Entry Overrides 19

5. Mesh Quad, HDRP Decal, and Mixed Output Workflows 23

6. Placement, Filtering, Masks, and Object Detection 28

7. Preview, Profiles, and Practical Recipes 31

8. PRISM Surface Materials 35

9. PRISM Material Converter 39

10. PRISM Material From Image 43

11. Performance, Troubleshooting & FAQ 46

12. Release Notes 50

13. PRISM Surface AI Content Notice 51

Introduction

PRISM Surface is a Unity 6 HDRP toolkit for making environment surfaces feel less repetitive and for placing texture-based detail across mesh geometry. It combines a PRISM material workflow with a deterministic scatter workflow, so artists can author the surface look and place grime, moss, scratches, graffiti, leaks, and similar detail without hand-placing every instance.

PRISM means **Procedural Rendering & Integrated Surface Materials**. It is published by **Quantum Rift Interactive**.

This page is the entry point for the PRISM Surface v1.1.0 artist documentation. Read the pages in order for a first project, or use the reference links for a specific task.

What PRISM Surface solves

PRISM Surface has three connected artist workflows:

- **PRISM Surface materials** use fixed triplanar mapping, UV variation, anti-tiling, detail, emission, and macro variation to reduce obvious texture repetition on large or multi-directional surfaces.
- **PRISM Surface Tool** samples a MeshFilter deterministically and generates Mesh Quads, HDRP Decals, or both from weighted source textures and placement rules.
- **Material From Image** turns a readable image into PRISM-compatible maps and material assets, with optional scatter bridge assets.

The systems are complementary, not interchangeable: material controls change how a receiver looks; scatter controls decide where separate surface details are placed.

Mesh Quads or HDRP Decals?

Choose	Best when	Main consideration
Mesh Quads	You need explicit card geometry, alpha-cutout detail, or a projection-free result.	Use the supplied alpha-cutout Mesh Quad template; inspect fitting at hard edges.
HDRP Decals	You want projected detail that participates in HDRP decal channels.	Keep Projection Depth tight and inspect corners, thin geometry, and nearby receivers.
Mixed output	Different source textures need different output types on the same receiver.	Configure routing per source; Generate and Clear affect both groups.

Product scope

PRISM Surface v1.1.0 is an **HDRP-focused Unity 6** workflow. It is not a URP tool. The product-facing component is named `PRISM Surface Tool`; older projects can still display legacy component names for compatibility.

For package notices, see PRISM Surface AI Content Notice and `Third-Party Notices.txt` in this Documentation folder.

1. Requirements and Quick Start

Requirements and installation

Use PRISM Surface in a Unity 6 project using the High Definition Render Pipeline (HDRP). The supported configuration is **Unity 6000.3.10f1** with **HDRP/Core RP 17.3.0**. Import the package into an HDRP project, then allow Unity to finish importing shaders and assets before judging results.

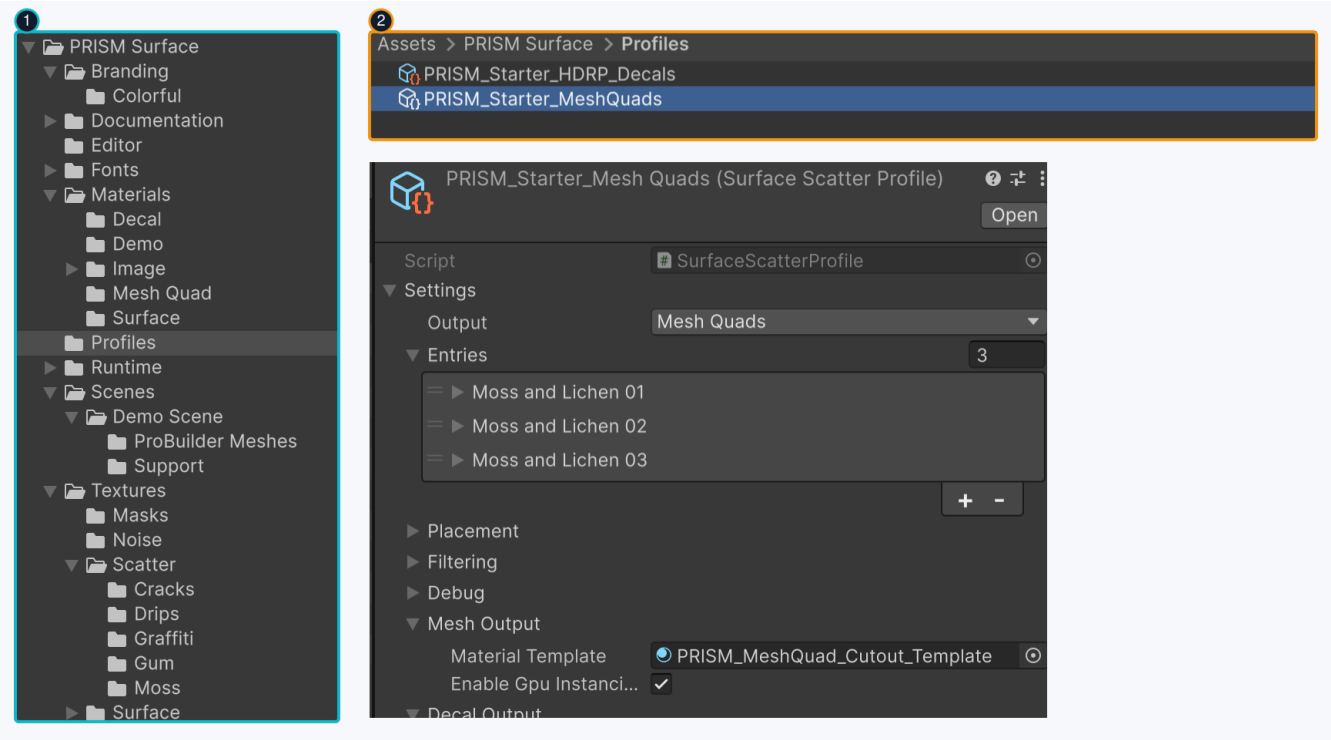
The package's validated project also includes uGUI 2.0.0 for TextMesh Pro labels in the demo scene. ProBuilder is not required for the shipped workflows or baked demo meshes.

The scatter receiver needs a `MeshFilter` with a valid shared mesh. PRISM does not alter that source mesh; it samples it to create generated child output. Ensure imported meshes are readable and valid when Unity or the source asset requires that for mesh access.

Install into a new HDRP project

1. In Unity Hub, create a project using the **High Definition 3D** template with Unity **6000.3.10f1**. Open the new project and let its initial import finish.
2. Open `Window > Package Manager`. Confirm **High Definition RP 17.3.0**, **Core RP Library 17.3.0**, and **Unity UI (uGUI) 2.0.0** for the demo labels. The HDRP template supplies pipeline setup; PRISM is not a pipeline converter.
3. Open `Window > Rendering > HDRP Wizard` and resolve the required project-configuration items. In an existing HDRP project, also check its assigned HDRP pipeline assets and camera/frame settings before importing PRISM.
4. Import PRISM Surface from Package Manager's **My Assets** view, or import the supplied `.unitypackage` using `Assets > Import Package > Custom Package`. Keep the shipping `Assets/PRISM Surface/` folder together. Internal development assets are not needed.
5. Wait for import and shader compilation to finish. Open `Window > General > Console`; resolve import or pipeline errors before continuing. Find `Assets/PRISM Surface/Scenes/Demo Scene.unity` in Project and double-click it.
6. Follow the demo walkthrough. If surfaces are pink, stop and use installation troubleshooting before generating anything.

Checkpoint: the PRISM folder, demo scene, two starter profiles, and material templates are present in Project. Seeing them does not replace checking the demo in your HDRP project.



Find the imported PRISM Surface folders (1) and both starter profiles (2).

Terms used in this guide

Term	Meaning
Receiver	The GameObject whose MeshFilter mesh is sampled for placement. Its Mesh Renderer material controls the underlying surface appearance.
Source texture	Artwork used for a scattered detail, such as a moss card or graffiti decal.
Material template	The starting material used for generated detail. It is separate from the receiver material.
Mesh Quad	A generated rectangular card with texture artwork; alpha cutout removes transparent portions.
Decal Projector	An HDRP component that projects a material through a volume onto receiving surfaces.
Profile	A saved settings asset; assigning it does not load its settings until you click `Load From Profile`.
Seed	A number that selects a repeatable placement arrangement for unchanged inputs.
Mask	A rule or texture that marks allowed and blocked placement regions.

Texture import expectations

PRISM needs **Read/Write** enabled only when it must inspect texture pixels in the editor:

- Custom placement masks.
- Material Base Map textures used for placement filtering.
- Source images in Material From Image.
- Textures used with alpha-bounds alignment for drip streaks.

If the Inspector displays an `Enable Read/Write` action, using it changes the texture import settings and triggers a Unity reimport. It is not required for an ordinary scatter source texture unless a workflow above needs pixel sampling.

For sampled PRISM material textures, use normal HDRP-appropriate import settings and inspect the material at its intended view distance. Texture filtering and mip selection affect the whole material stack, including Base, Mask, Normal, and Detail maps.

Open the tools

- Add **PRISM Surface Tool** to a GameObject with a MeshFilter for scene-object scatter.
- Open `Tools > PRISM Surface > Material Tool` for Surface and Decal material authoring.
- Open `Tools > PRISM Surface > Material From Image` to create PRISM materials from readable images.

Warning: PRISM Surface is HDRP-focused. Do not expect its PRISM Surface shaders, HDRP Decal output, or material authoring workflow to work in URP.

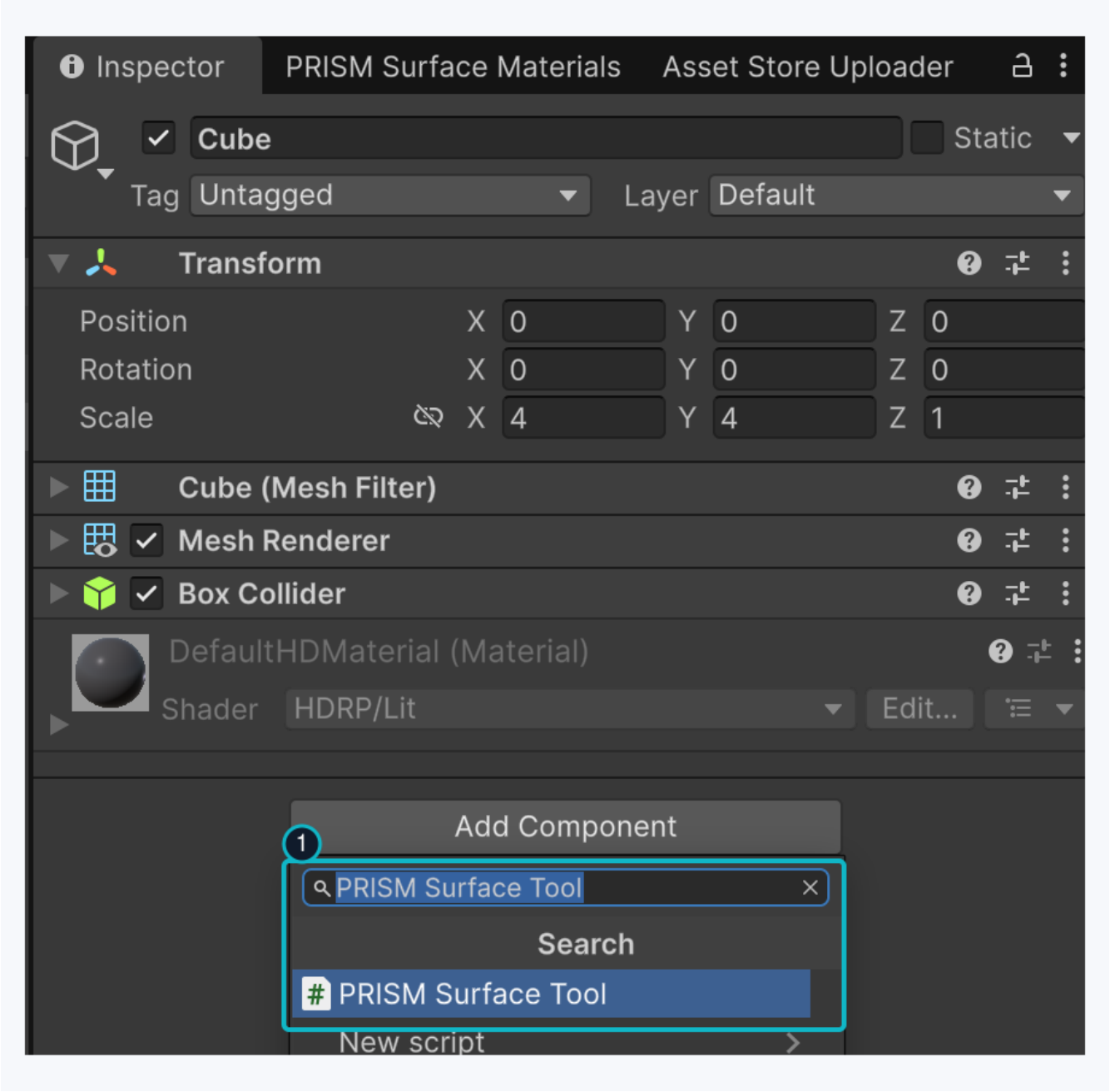
Quick start

Use a new practice scene so `Generate` and `Clear` do not replace the saved demo output. These settings are a concrete starting point derived from the shipping profile; accepted counts depend on the receiver and must be checked in your project.

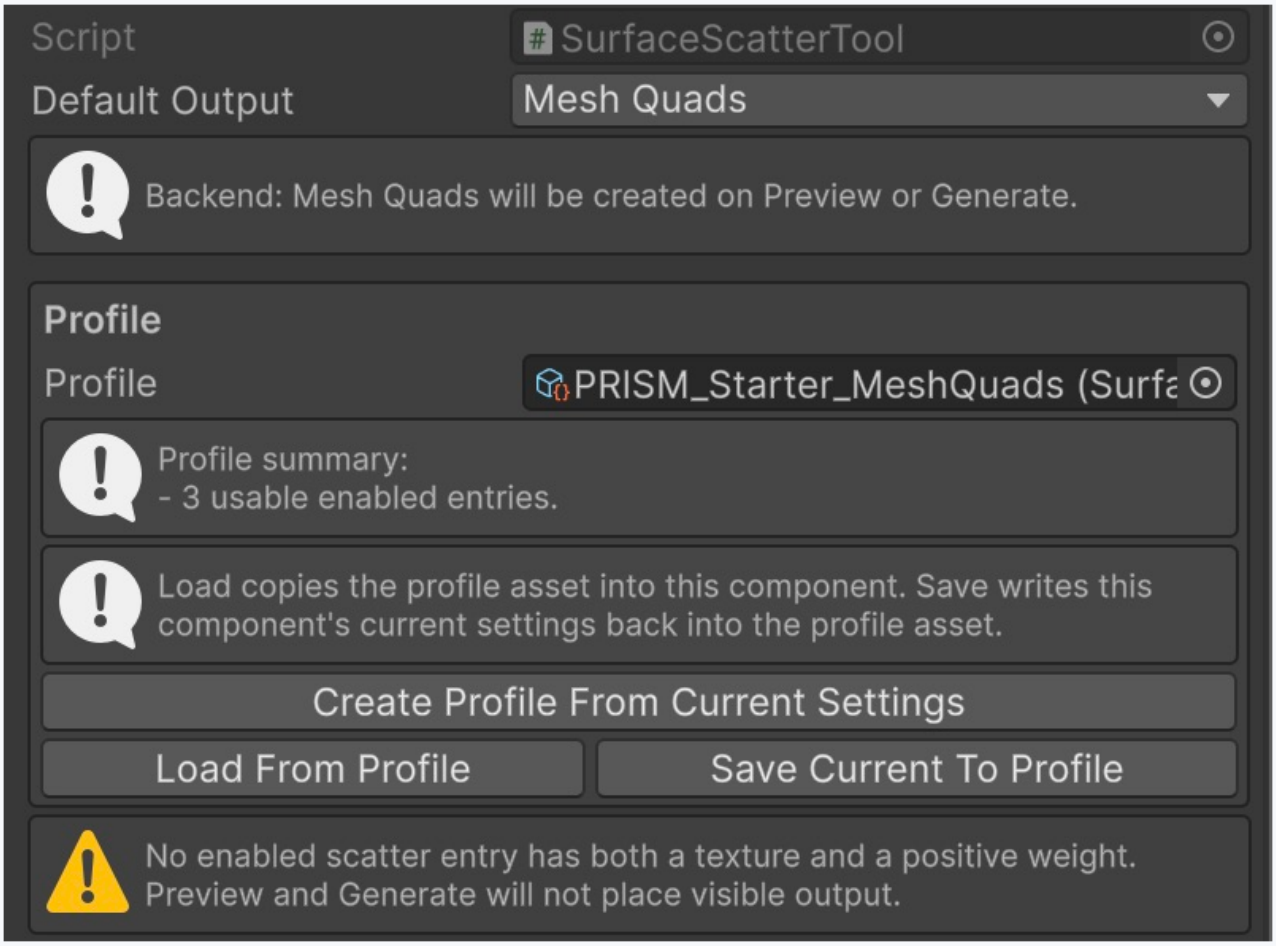
1. Choose `File > New Scene` and use your project's HDRP scene template with a camera, light, and environment/volume setup. Save it under your own `Assets/PRISM Practice/` folder. If no HDRP scene template is available, save a copy of the default scene created by Unity Hub's HDRP project template. Choose `GameObject > 3D Object > Cube`. Rename it `PRISM Practice Receiver`; set Position `(0, 0, 0)`, Rotation `(0, 0, 0)`, and Scale `(4, 4, 1)`. This built-in cube already has a MeshFilter and Mesh Renderer.
2. Select the cube. In Inspector, choose `Add Component`, search for **PRISM Surface Tool**, and add it. Keep just this receiver selected.
3. Drag `Assets/PRISM Surface/Profiles/PRISM_Starter_MeshQuads.asset` from Project into the tool's `Profile` field. Click `Load From Profile` and confirm loading. Do not click `Save Current To Profile`: that overwrites the supplied starter asset.
4. In `Sources`, inspect the loaded moss/lichen entries: they must be enabled, have textures, and have positive `Chance Weight`. Supplied artwork is in `Assets/PRISM Surface/Textures/Scatter/Moss/`.
5. Confirm `Default Output` is **Mesh Quads**. In `Output`, confirm `Material Template` is `Assets/PRISM Surface/Materials/Mesh Quad/PRISM_MeshQuad_Cutout_Template.mat`.
6. In `Placement`, begin with `Density` **0.65**, `Size Variation` **0.3-0.7**, and `Minimum Spacing` **0.4**. In `Fine Tuning`, keep `Surface Lift` **0.015**, `Close Mesh To Surface` on, `Keep Inside Source Face` on, and `Placement Attempts` **24**. The loaded sources have individual size overrides, which take precedence over global Size Variation. Leave masks and Object Detection off for this first result.

7. With the cube selected, press **F** over Scene view to frame it and enable **Gizmos**. Click `Preview Placement`. Accepted stamps should appear on the receiver; rejected stamps identify constraints. Preview is temporary and does not create saved child geometry.
8. Click `Generate`. Expand the cube in Hierarchy: find `_PRISM Surface Mesh Quads` and inspect the moss cards in Scene view. Expect separate alpha-cutout detail against the cube, rather than a change to its underlying material. A fixed output count is not guaranteed.
9. Click `Clear` on this practice receiver. Its generated Mesh Quad and HDRP Decal groups are removed; the receiver mesh, source textures, and profile assets remain. Click `Generate` again to recreate the result. Save the practice scene when satisfied.

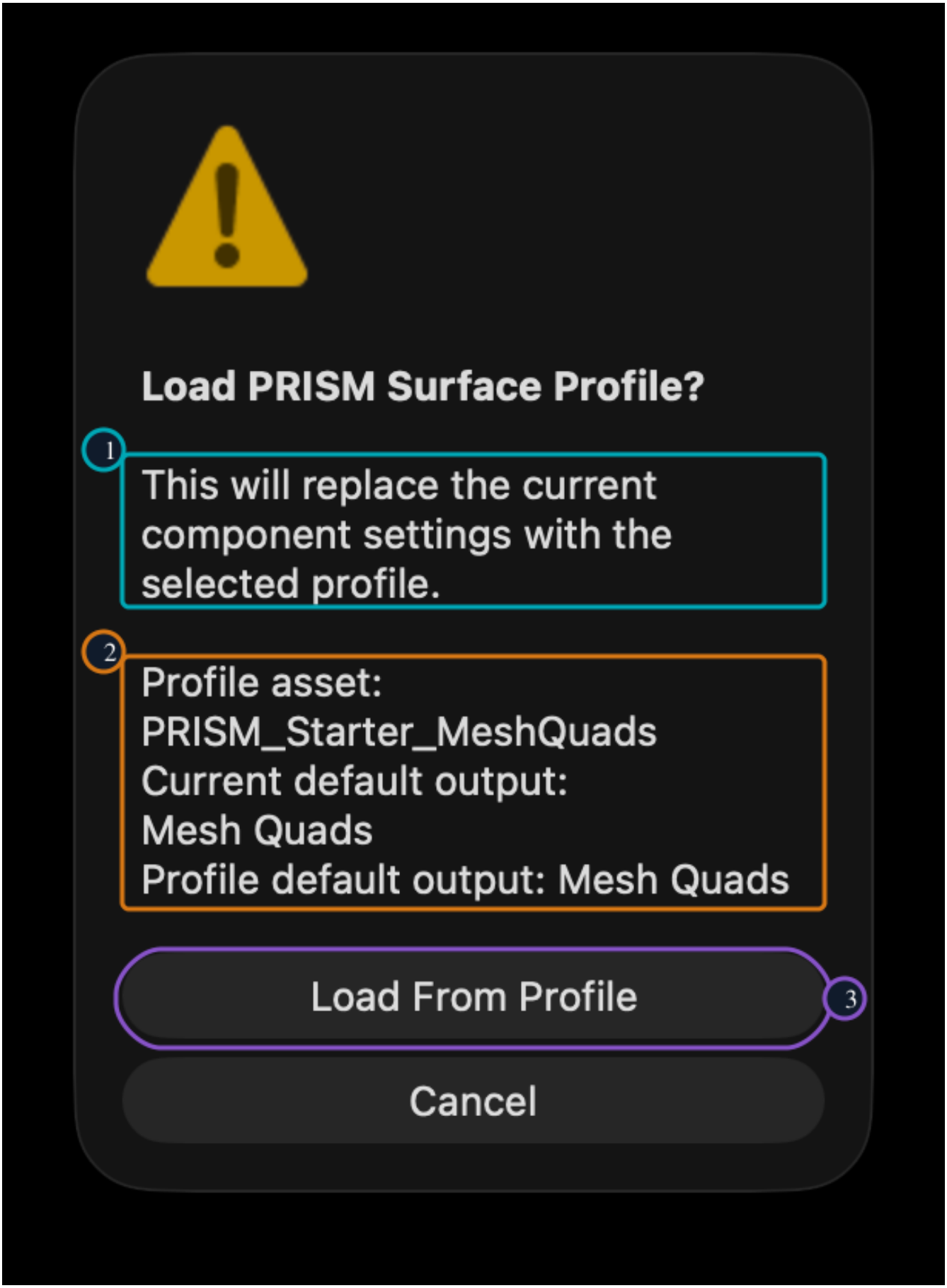
Success checkpoint: preview shows accepted locations, Generate creates a child output group, and textured cards are visible. If you see solid rectangles, check the cutout template. If you see no output, use the checklist below before raising Density.



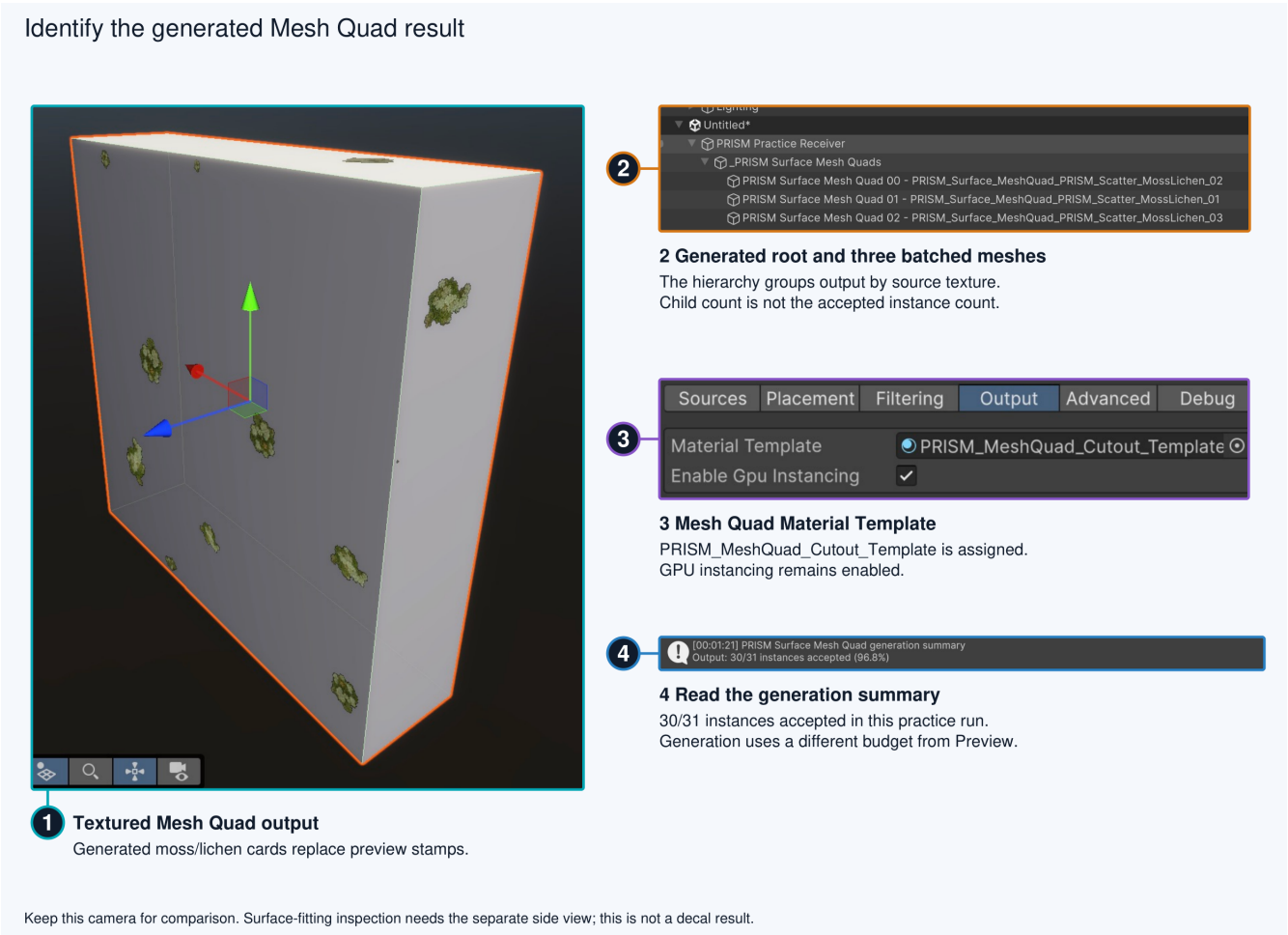
Find PRISM Surface Tool in Add Component on a practice cube with a MeshFilter. The capture shows the cube before renaming.



Assign the starter profile before loading its settings.



Confirm loading: replacement notice (1), selected profile and output (2), and Load From Profile (3).



Inspect the generated Mesh Quad result and summary.

For a projected first result, continue with the HDRP Decal exercise.

If nothing appears

Confirm that the receiver has a valid MeshFilter, the source entry has a texture and positive Chance Weight, a suitable material template is assigned, and Density/Placement Attempts are not too low. Then temporarily disable masks, restrictive slope limits, Object Detection, and wide Minimum Spacing, and run `Preview Placement` again.

Next: Demo scene walkthrough.

2. Demo Scene Walkthrough

Starting view — selected tour stations



Numbers match the chapter 2 tour; names are Hierarchy search targets.

See the mapping comparison and the card-fitting tour in this chapter.

Starting view and selected demo tour stations.

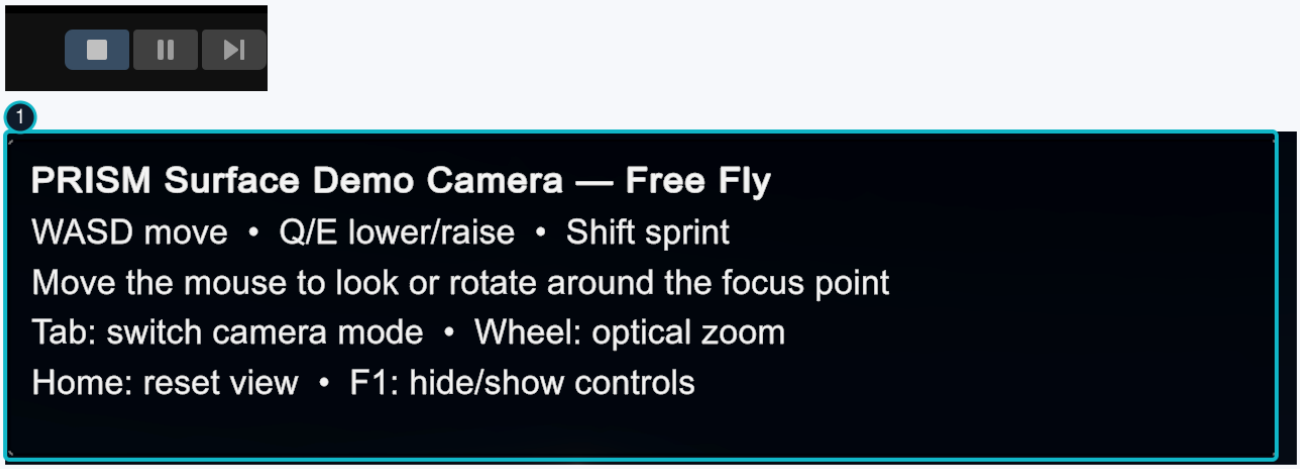
Open the supplied scene

1. Finish installation, then open `Assets/PRISM Surface/Scenes/Demo Scene.unity` from Project.
2. Let shaders finish compiling. Check Console and inspect the scene for pink surfaces or missing references before entering Play Mode.
3. Press Play, then click Game view to give it keyboard and mouse focus. The demo camera locks and hides the cursor while active. Stop Play Mode to release it and return to editing.
4. Use the controls below. The tour uses the saved scene's object names; it does not require renaming the scene or regenerating its demonstrations.

Camera controls

Input	Action
W / A / S / D	Move forward / left / backward / right; pan the focus in orbit mode.
Q / E	Lower / raise the camera or orbit focus.
Shift	Move faster.
Mouse movement	Look in Free Fly; rotate around the focus in Third-Person Orbit.
Tab	Switch Free Fly / Third-Person Orbit.
Mouse wheel	Optical zoom in Free Fly; closer/farther distance in orbit.
Home	Reset to the saved starting view.
F1	Hide/show the controls overlay.

Orbit mode uses a calculated focus when no target is assigned; it does not automatically orbit the selected Inspector object. If you lose your bearings, press Home. On a compact Mac keyboard, Home may require Fn + Left Arrow. In Edit Mode, select an object and press F in Scene view to frame it.



The active Play/Stop toolbar and native camera-help overlay. Press Stop to return to editing.

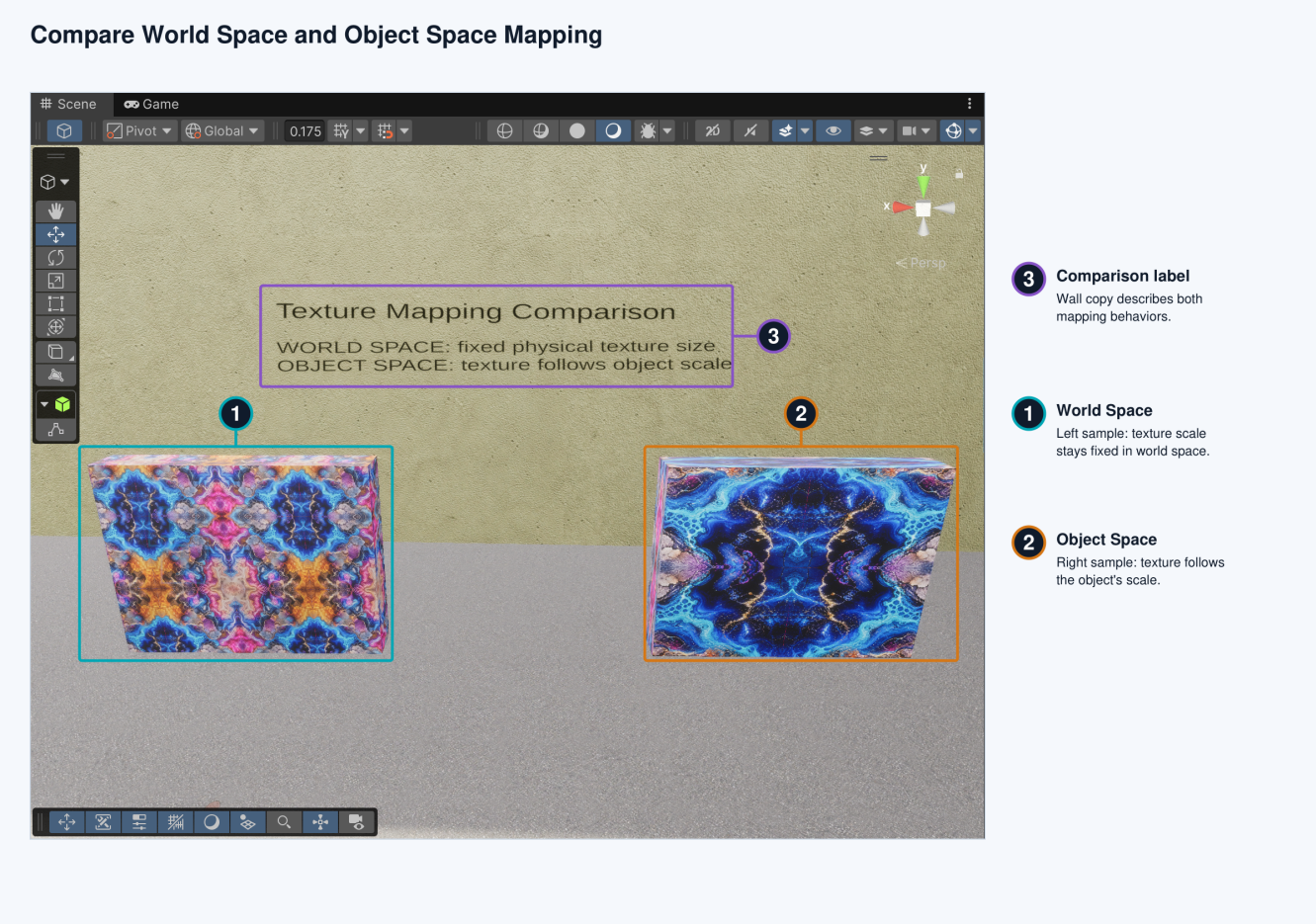
Suggested station tour

Stop Play Mode to use the Hierarchy search field for each exact name below. Select the receiver or expand its group, move the pointer over Scene view, and press F. In Play Mode, navigate to the same visible station labels. Numbered `Wall` objects and `PolyShape` are saved demo names, not additional tools or required ProBuilder components.

Stop	Hierarchy search	What to inspect
1. Mapping	`PRISM Demo - Mapping and Mesh Quad Comparisons`; `World Space Mapping Block`; `Object Space Mapping Block`	Compare the world/object mapping examples. Material Mapping Space changes texture anchoring; it does not change scatter placement.

Stop	Hierarchy search	What to inspect
2. Card fitting	`Close Mesh To Surface Receiver`; `Raised Surface Lift Receiver`	Inspect from the side to compare cards close to the surface with raised geometry.
3. Building scatter	`BigBuilding`	Inspect moss/detail on the building. Select the receiver's PRISM Surface Tool to read its stored settings.
4. Wall decals	`Walls`; `WallShowcaseTitle`	Expand the wall group and inspect graffiti/crack sources and HDRP projector output. Different numbered walls store distinct examples; select a wall receiver, rather than its text label.
5. Ground detail	`Ground`; `GroundMossShowcaseTitle`	Inspect ground cards and stains at close and normal viewing distances.
6. Angled geometry	`PolyShape`; `PolyShapeShowcaseTitle`	Inspect how generated details orient to an angled receiver. The shipped mesh is baked.
7. Materials and emission	`DoorShowcaseTitle`; `TreeGroupShowcaseTitle`; `FuturisticMonumentShowcaseTitle`	Inspect wood/bark material variation, surface repetition, and animated emission. Watch emission in Play Mode under the saved lighting/exposure. Some title names occur more than once.

The scene's saved tools store settings directly and have no assigned profile. An empty Profile field on these demonstrations is expected. For reusable starter settings, use the two supplied profiles in a practice scene.



Compare World Space and Object Space texture mapping.

Safe Edit Mode exercise

1. Stop Play Mode. Save a copy of the demo under `Assets/PRISM Practice/` with `File > Save As`, or create the fresh receiver in chapter 1. Keep the packaged demo unchanged.
2. Select one copied receiver with a PRISM Surface Tool. Click `Preview Placement`; inspect accepted/rejected stamps with Scene view Gizmos on. This evaluates its current settings without making output.
3. Inspect `Sources`, `Placement`, `Filtering`, and `Output`. Select each source to see its routing and override summary. `Preview Mask` shows a mask region, not a promise of final accepted placement.
4. On a disposable receiver, assign `PRISM_Starter_MeshQuads.asset`, click `Load From Profile`, then Preview, Generate, and Clear as in chapter 1. Repeat with `PRISM_Starter_HDRP_Decals.asset` using the chapter 5 exercise.
5. Expand generated child groups to distinguish Mesh Quad cards from Decal Projectors. Clear affects both groups owned by the selected tool; it does not clear every tool in the scene.
6. Close the practice copy without saving if you want to discard the experiment. Keep your working scene only when the result is useful.

Checkpoint: you can reset the camera, locate the comparison receivers, preview safely, and identify both output types. If navigation or appearance differs, see troubleshooting.

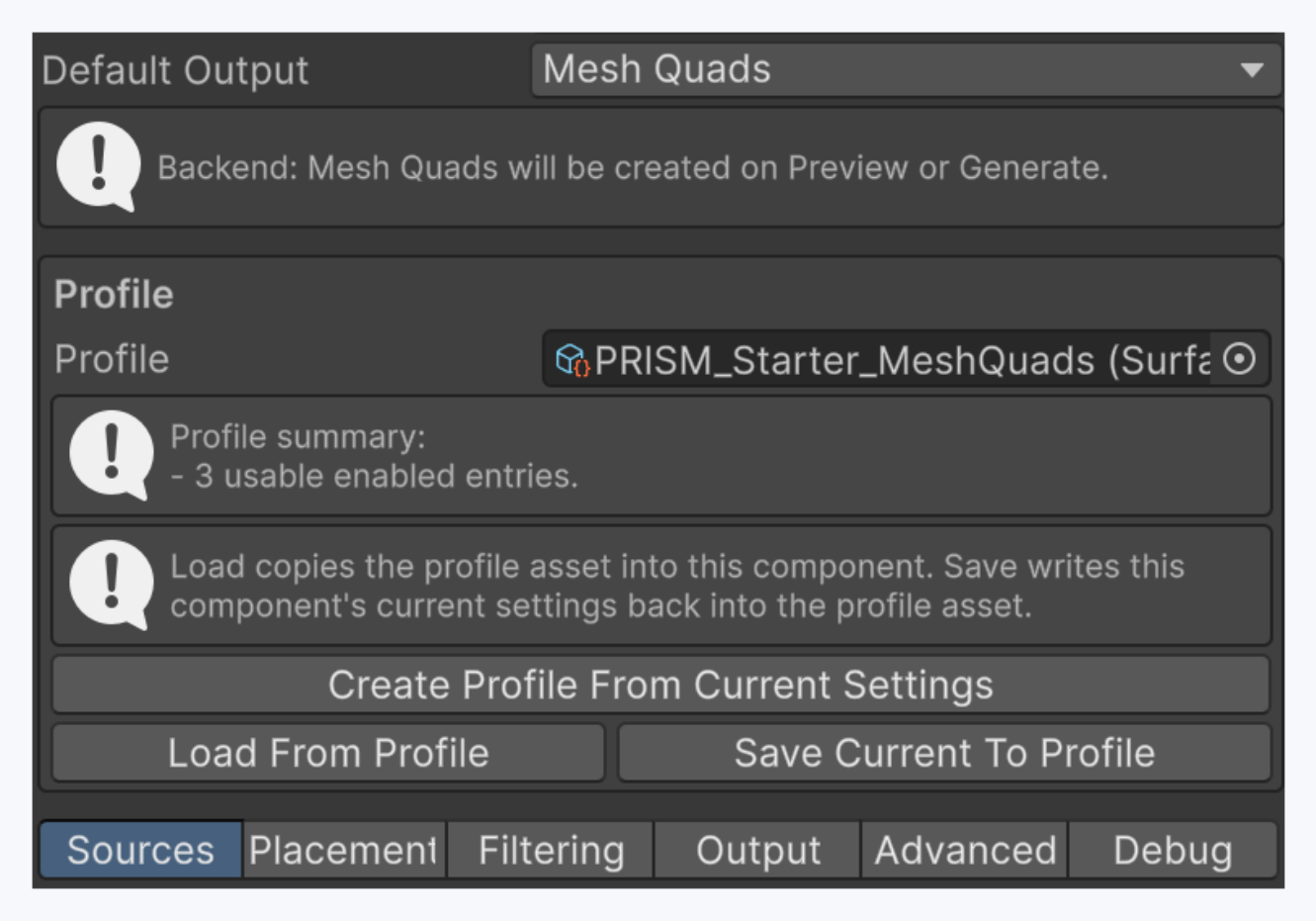
Next: PRISM Surface Tool.

3. PRISM Surface Tool

The **PRISM Surface Tool** is the unified scatter component. It creates Mesh Quads and HDRP Decals from the same receiver mesh and preserves repeatable results when the receiver, settings, and `Seed` are unchanged.

For definitions of receiver, source texture, material template, seed, and mask, see the beginner glossary. Start with a single practice receiver and a loaded starter profile before changing individual controls.

The top of the Inspector contains `Default Output`, backend status, profile actions, validation messages, and the main tabs:



Identify the active output, assigned profile, and main Inspector tabs.

- `Sources` - textures, weights, routing, and per-entry overrides.
- `Placement` - density, size, rotation, offsets, spacing, face fitting, and attempts.
- `Filtering` - masks, Object Detection, slope, and density filtering.
- `Output` - Mesh Quad or HDRP Decal settings used by active output routes.
- `Advanced` - `Seed` and `Show Help Text`.
- `Debug` - preview rays, overlays, and diagnostic colors.

The bottom action buttons have distinct jobs:

Button	What it does
`Preview Placement`	Tests the full placement process and shows accepted/rejected attempt results.
`Preview Mask`	Shows only the active mask's accepted/blocked regions for mask tuning.
`Generate`	Builds every active output group.
`Clear`	Removes generated Mesh Quad and HDRP Decal output for this tool.

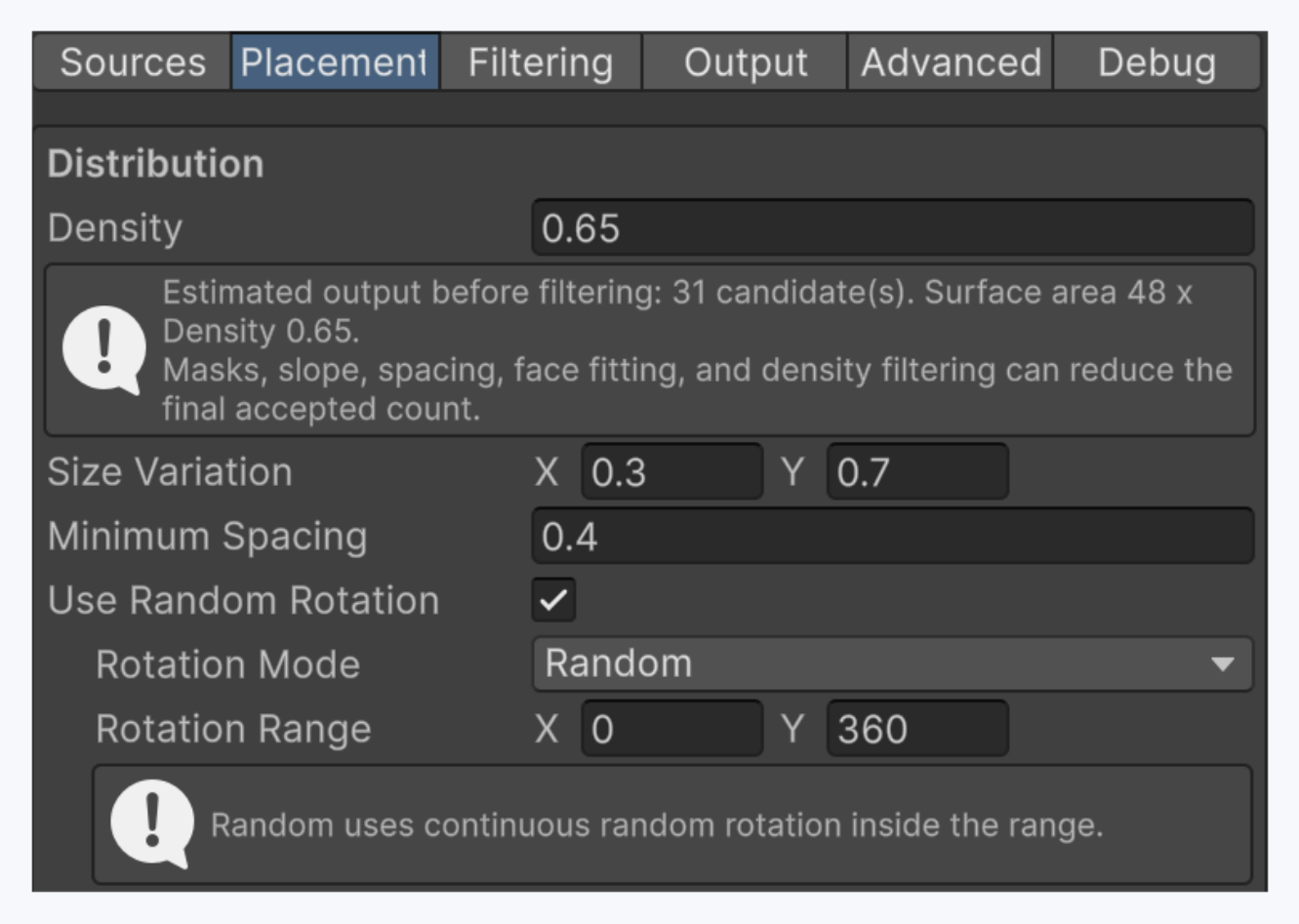
When several objects are selected, backend status is less specific. Inspect a single object when diagnosing output configuration.

Placement controls

`Density` is the shared candidate budget for entries that do not override density. Increase it gradually; actual accepted count can be lower after masks, spacing, slope, face constraints, and output checks.

`Size Variation` controls randomized size. In `Fine Tuning`, `Surface Offset Variation` moves an item sideways on the sampled surface. `Surface Lift` moves the result away from the receiver to reduce z-fighting. For Mesh Quads, `Close Mesh To Surface` is useful for wall-attached details. For HDRP Decals, keep Surface Lift lower than Projection Depth so the source surface remains inside the projection volume.

Rotation can be `Random`, `Stepped Random`, or `Align To World Down On Surface`. Use stepped rotation for deliberately repeated card orientations; use world-down alignment for details such as drips that need a consistent downward direction. `Minimum Spacing` rejects placements that are too close together.



Read global density, size variation, minimum spacing, and rotation.

`Placement Attempts` limits how many attempts PRISM uses to find valid placement. Raising it can help a constrained setup fill more of the allowed area, but it is not a substitute for making impossible constraints possible.

`Keep Inside Source Face` applies to both Mesh Quad card footprints and HDRP Decal projector footprints. It fits the final footprint inside the sampled coplanar source-face group. Curved or finely triangulated receivers can have small face groups, so fitting may reduce the final generated size; placements with no meaningful fitted size are rejected. For HDRP Decals, this shared fitting is separate from `Edge Bleed Guard`, which rejects unsafe projector footprints rather than fitting them. Use Object Face filtering per source when you need a source only on a local Front, Back, Left, Right, Top, or Bottom direction.

Filtering controls

Filtering runs after candidate sampling. A placement can be rejected by a mask, slope range, random density filter, object constraint, edge safety rule, face fitting, or spacing.

`Surface Slope` compares the sampled surface orientation to your allowed range. `Random Density Filter` uses world-space noise to thin otherwise valid placement; use **Noise Patches** in Placement Mask when you need visible patch-shaped allowed regions instead.

See Placement and Filtering for the full filtering workflow.

Advanced and Debug

`Seed` makes a setup repeatable. Change it to get a different deterministic arrangement without changing the rest of the rules. `Show Help Text` keeps explanatory Inspector text visible; disable it once the workflow is familiar.

Debug controls are optional. `Draw Preview Rays` enables ray/stamp diagnostics, `Preview Sample Count` controls their amount, and `Mask Preview Entry` selects a source for mask visualization. The rejection-color controls are diagnostics only; they do not change material channels or placement behavior.

Next: Sources and per-entry overrides.

4. Sources and Per-Entry Overrides

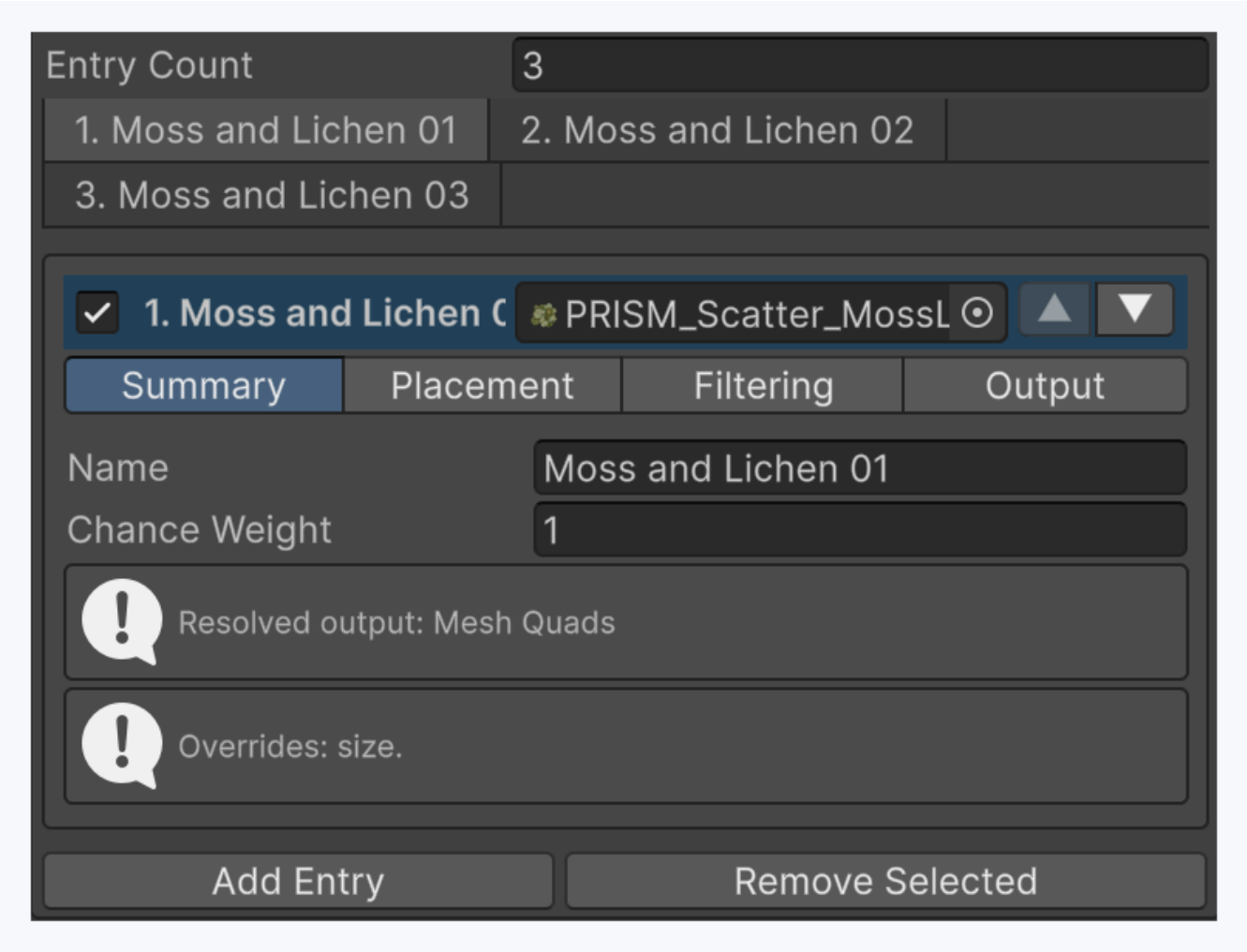
Each item in `Sources` is a scatter entry: one source texture plus the choices that determine where and how it appears. Entries are selected by their dynamic source tabs. A tab uses the entry name, then its texture name, then a numbered fallback name. Use `Add Entry` to create a source and `Remove Selected` to remove the active source after confirmation.

Every selected entry has four nested tabs:

- `Summary` shows the name, enabled state, `Chance Weight`, resolved output, validation, active mask state, and an override summary.
- `Placement` contains local Density, Minimum Spacing, Soft Limit, Scale, Planar Offset, and Rotation overrides.
- `Filtering` contains Object Face, mask, Object Detection, slope, and density-filter overrides.
- `Output` chooses output routing and an optional HDRP Decal Draw Order override.

Read one selected entry

1. Select a source tab and open `Summary`. Check Enabled, its texture, positive Chance Weight, and resolved output.
2. Open the entry's `Output` tab. `Use Default` follows the tool's Default Output; choose HDRP Decals explicitly only when this entry needs a different route.
3. Open the entry's `Placement` tab. Enable one override, such as Minimum Spacing, and compare it with the global value. Disable the override to inherit again.
4. Return to Summary and read the override summary, then Preview Placement. A higher Chance Weight changes relative selection, not a guaranteed number of instances.



Read an enabled source entry, its weight, output route, and overrides.

Inheritance: global first, local only when needed

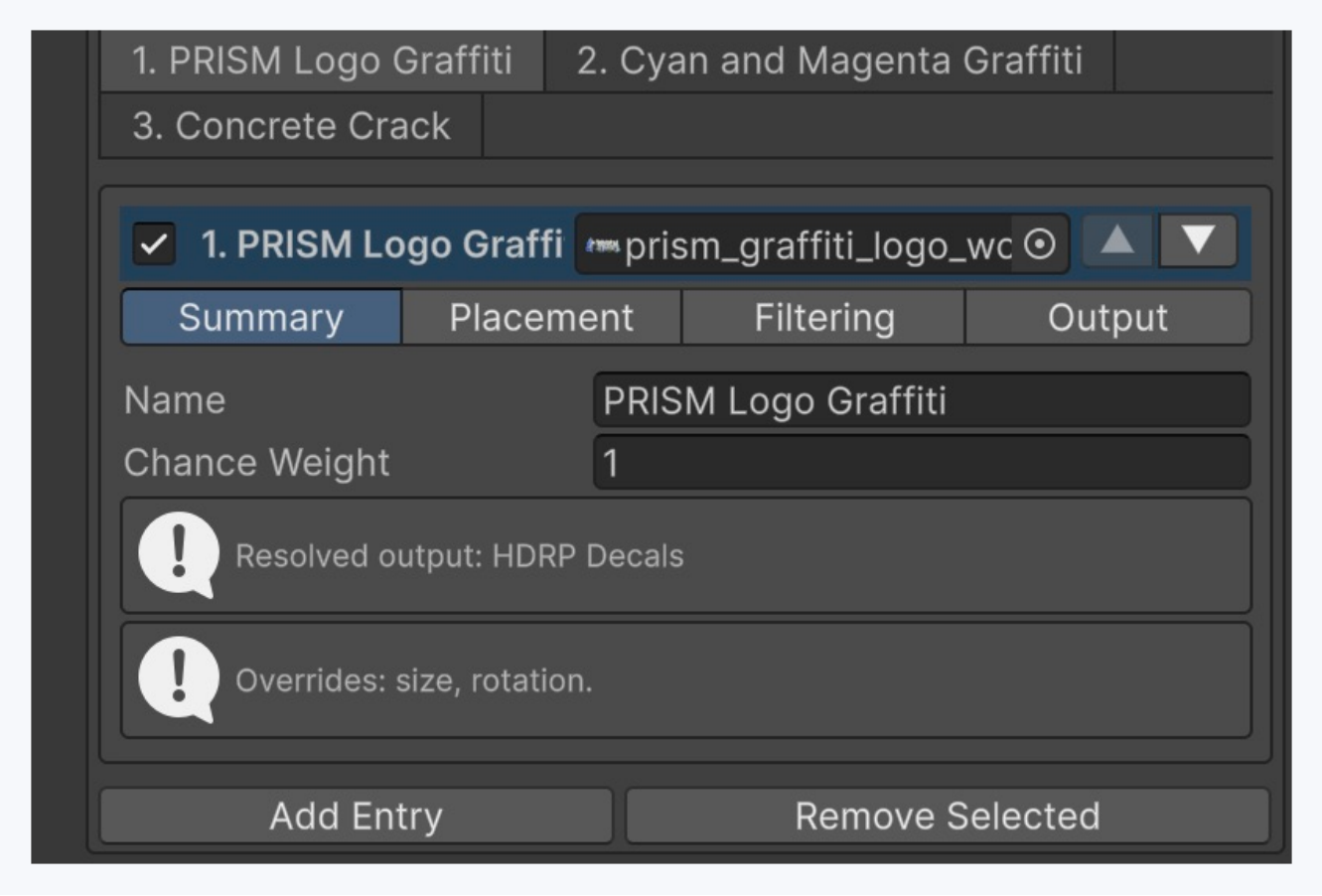
An entry uses the tool's global value until its matching `Override ...` control is enabled. This keeps a multi-source setup compact: change a global rule to update most entries, then override only the source that needs different behavior.

For example, a moss source can use `Override Minimum Spacing` for closer placement while a crack source uses the global spacing. A graffiti source can route to HDRP Decals while dirt sources keep the default Mesh Quad output.

Core source controls

`Enabled` removes an entry from selection without deleting its setup. `Chance Weight` controls the relative likelihood of eligible entries that share a candidate budget; it is not a guaranteed count. A texture must be assigned and its chance weight must be positive for an entry to be usable.

`Output` offers `Use Default`, `Mesh Quads`, and `HDRP Decals`. `Use Default` follows the component's `Default Output` and is the safest option for sources that should change with the overall setup.



Example of an HDRP Decal source with its entry settings.

Placement overrides

Override	Use it when	Important behavior
`Density`	One source needs more or fewer candidates than the shared setup.	It receives its own candidates-per-area budget; it adds to, rather than shares, the global budget.
`Minimum Spacing`	Dense moss or sparse hero marks need different gaps.	In a shared pass, the larger spacing wins where entries meet.
`Soft Limit`	A source must not exceed a maximum accepted count.	It is a cap, not an exact-count promise.
`Scale Range` / `Planar Offset Range`	A source needs a different size or sideways placement character.	Keep scale realistic for the texture and output type.
`Rotation`	A source needs random, stepped, or world-down alignment.	World-down alignment is useful for directional marks.

`Soft Limit = 1` means at most one accepted placement for that entry. Masks, slope, face rules, spacing, Object Detection, and decal safety can still reduce the accepted count to zero.

Filtering overrides

`Override Object Face` restricts a source to a local object direction. `Front` is local `+Z`, `Back` is local `-Z`, and the remaining choices use the object's local axes. On curved or angled geometry, PRISM classifies the sampled surface by its strongest local normal direction. If an imported model's visual front differs from local `+Z`, choose the matching direction or correct the object's orientation.

Per-entry Placement Mask, Mask Cutoff, Object Detection, slope, and random density filtering work the same way as global filtering but only for that source. This makes it practical to place moss around a prop while keeping a gum or debris source away from it.

Output override

The Output tab can also enable `Override Decal Draw Order` for HDRP Decal entries. `Decal Draw Order` is an integer from **-50 to 50**; higher values appear in front when overlapping decals are drawn. Use a local override only when a particular decal needs a deliberate overlap priority.

Next: Output workflows.

5. Mesh Quad, HDRP Decal, and Mixed Output Workflows

Mesh Quad output

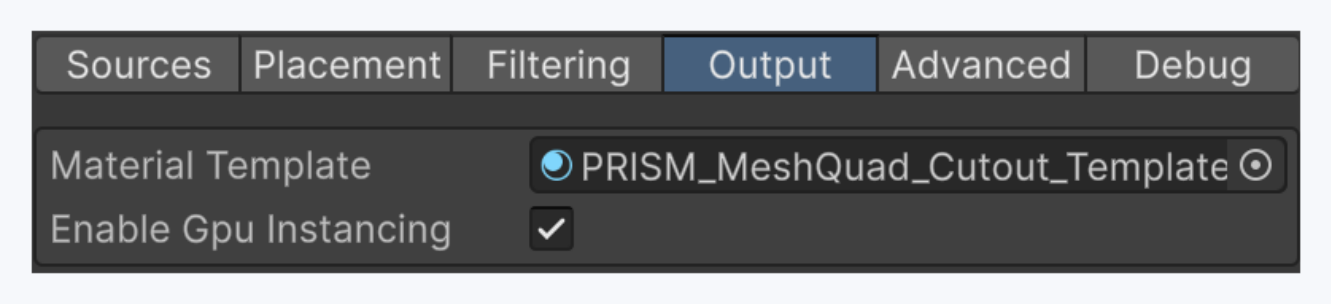
Mesh Quad output creates generated card geometry attached to the source surface. Choose it for surface details that need explicit geometry, alpha-cutout shapes, or a result that does not rely on HDRP decal projection.

Assign a cutout-capable `Material Template`. The shipping starting point is `Materials/Mesh Quad/PRISM_MeshQuad_Cutout_Template.mat`, an HDRP/Unlit double-sided alpha-cutout material. Do not use a receiver-oriented PRISM triplanar surface material as the card template for transparent source artwork.

Useful controls:

- `Surface Lift` keeps cards from z-fighting with the receiver.
- `Close Mesh To Surface` brings wall-attached or thin details closer to the receiver.
- `Keep Inside Source Face` fits Mesh Quad card footprints inside the sampled coplanar source-face group.
- `Enable GPU Instancing` is appropriate for repeated generated cards using compatible material setup.

Start with a small Surface Lift and inspect at normal gameplay distance. Too much lift makes cards visibly float; too little can flicker against the receiver. On sharp corners, reduce card size, enable face fitting, or use a more suitable output type.



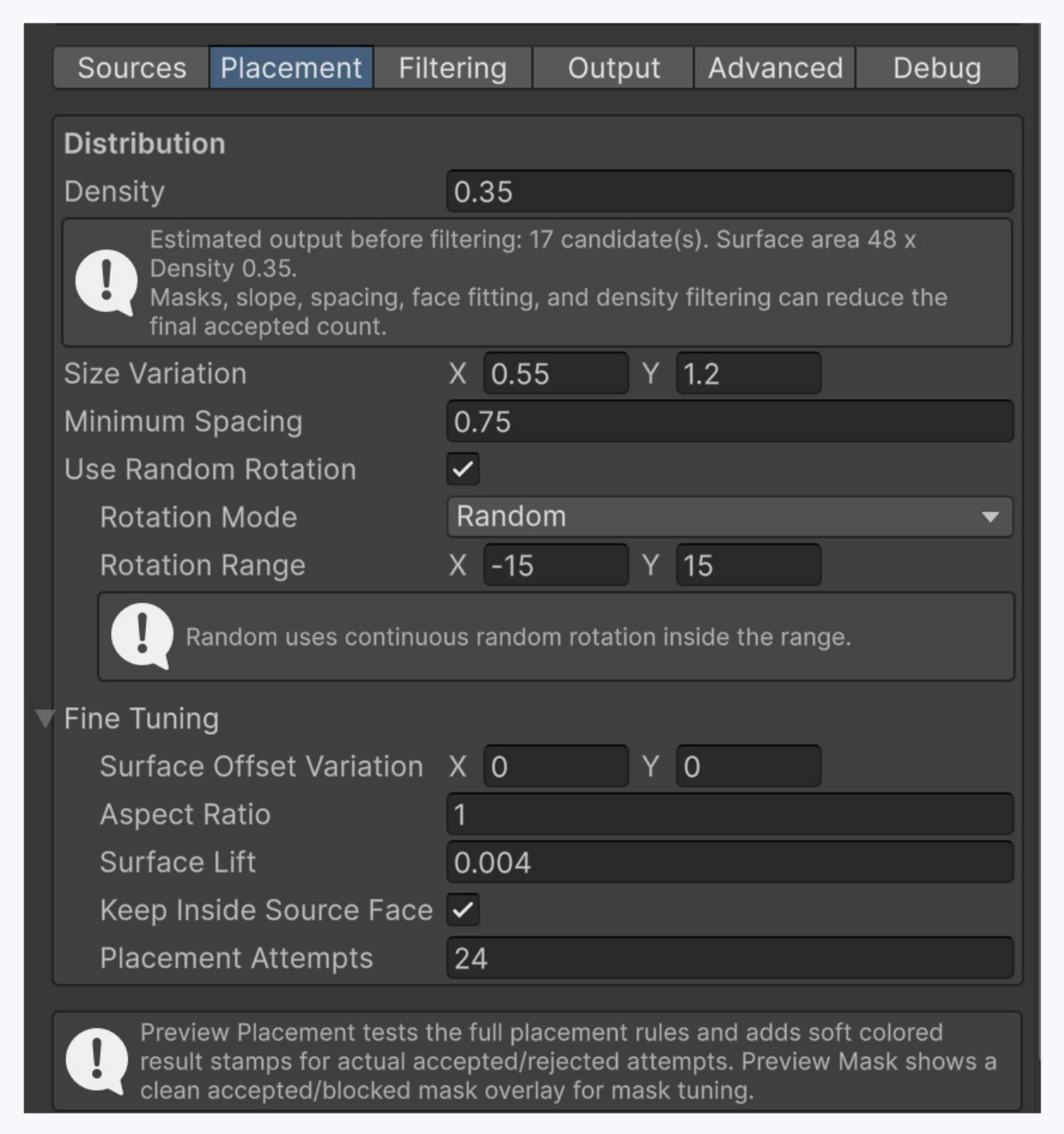
Set the Mesh Quad material template and GPU instancing.

First HDRP Decal result

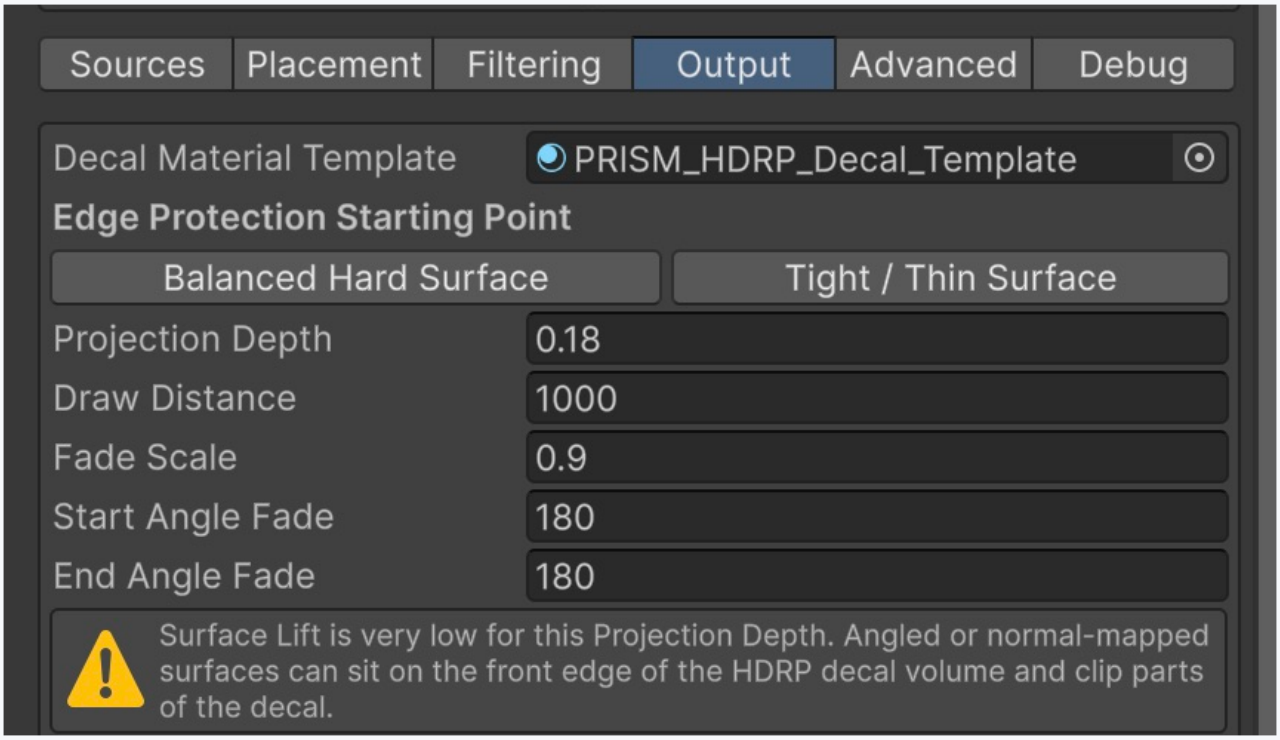
1. Use a second copy of the chapter 1 practice cube; clear its generated output before copying, or create a new cube with Scale `(4, 4, 1)` and add PRISM Surface Tool. Keep the saved demo untouched.
2. Assign `Assets/PRISM Surface/Profiles/PRISM_Starter_HDRP_Decals.asset` to `Profile`, then click `Load From Profile`. Confirm **HDRP Decals** as Default Output and inspect the loaded graffiti/crack entries.
3. In `Output`, confirm `Decal Material Template` is `Assets/PRISM Surface/Materials/Decal/PRISM_HDRP_Decal_Template.mat`. The profile starts at `Projection Depth` **0.18**; keep `Surface Lift` **0.004** below that depth.
4. Keep the profile's `Density` **0.35**, `Size Variation` **0.55-1.2**, `Minimum Spacing` **0.75**, and `Placement Attempts` **24** for the first preview. Source size overrides can supersede the global range.
5. Confirm HDRP decals are enabled in the project's pipeline and camera/frame settings, and the receiver material accepts decals. Use a normal opaque HDRP receiver for this first exercise.

6. Click `Preview Placement`, then `Generate`. Expand `_PRISM Surface HDRP Decals_<receiver name>` under the receiver and select a generated child: it should have a material-backed **Decal Projector**. Inspect graffiti/cracks on the cube and check the sides for unwanted projection.
7. Click `Clear` to remove this tool's output, then Generate again. If projectors exist but the artwork is invisible, check HDRP decal receiving and the material/depth configuration in troubleshooting.

Checkpoint: textured projected marks are visible and generated children contain Decal Projectors. This is a profile-based starting exercise; final appearance and accepted count must be verified in your project.

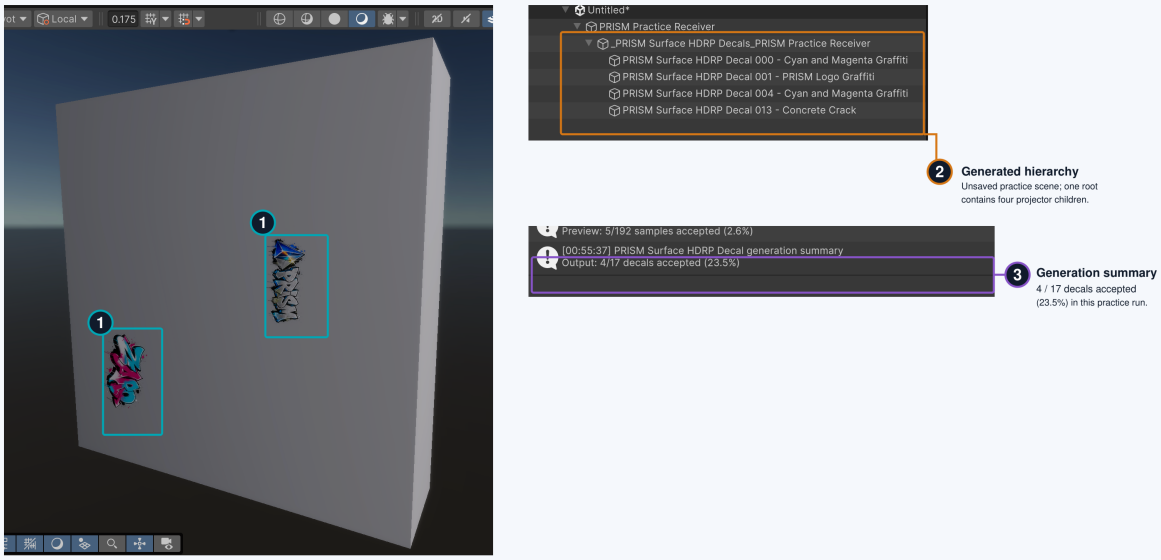


Configure decal placement and surface fitting.

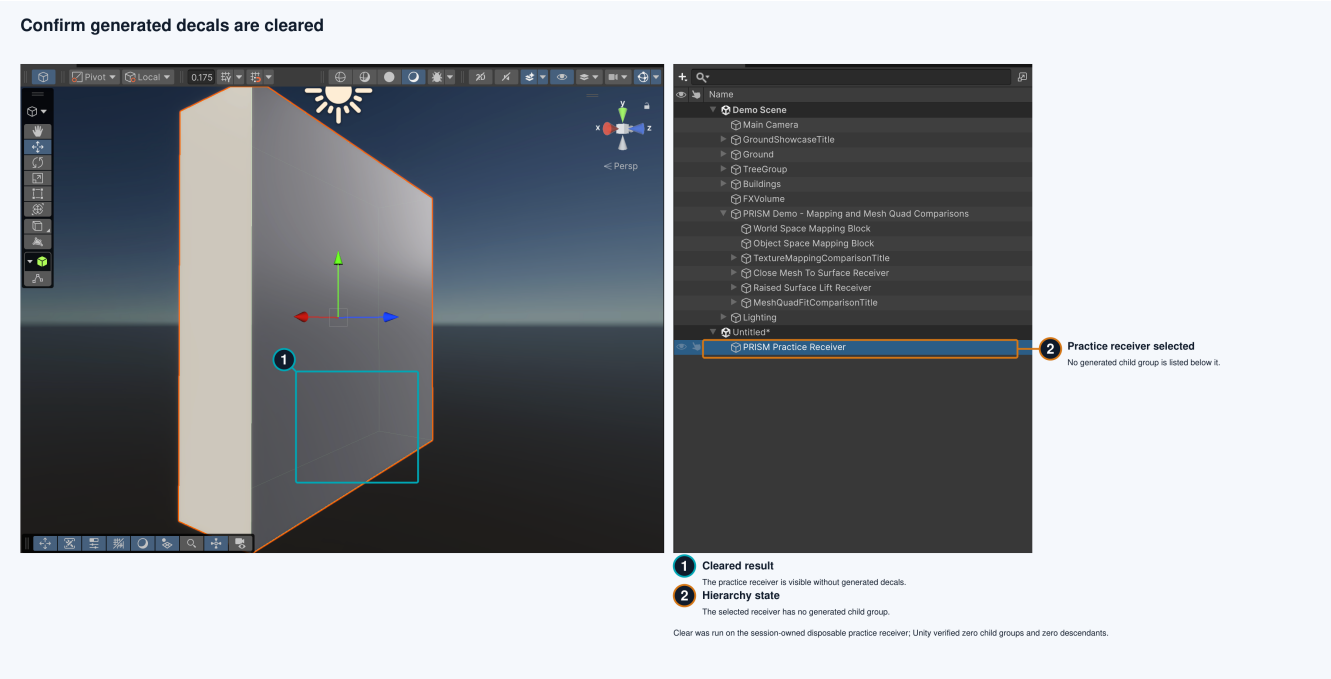


Review the HDRP Decal material template and projection depth.

Inspect the generated HDRP Decal result



Inspect generated Decal Projectors and the generation summary.



Confirm Clear removed the generated decal group.

HDRP Decal output

HDRP Decal output creates HDRP Decal Projectors. Choose it when projected detail should participate in HDRP decal channels such as Base Color, Normal, AO, smoothness, metallic, or emission.

Assign a suitable `Decal Material Template`. `Projection Depth` determines the projector volume depth. Use the smallest depth that reliably includes the intended receiver surface. `Surface Lift` offsets the projector from the source surface; it must remain lower than Projection Depth.

`Keep Inside Source Face` also applies to HDRP Decal projector footprints. It fits the final footprint inside the sampled coplanar source-face group; curved or finely triangulated receivers can make those groups small, reducing the final size or rejecting a placement when no meaningful fit remains. This shared fitting is separate from `Edge Bleed Guard`, which rejects unsafe projector footprints rather than fitting them.

`Decal Draw Order` is an integer from **-50 to 50**. Higher values are drawn in front where decals overlap. Other HDRP output controls include draw distance, angle fades, fade factor, and whether the decal affects transparency.

Preventing edge bleed

An HDRP projector volume can reach nearby or intersecting receiver geometry. `Edge Bleed Guard` rejects decals whose final footprint is too close to a source mesh boundary, including concave boundaries and holes. It protects the source boundary; it cannot guarantee that nearby geometry outside the source mesh will not receive a deep projection.

Use the `Balanced Hard Surface` or `Tight / Thin Surface` edge-protection starting points, then inspect the result. `Edge Padding` increases the border excluded around source-face boundaries. `Depth-Aware Padding` adds Projection Depth multiplied by `Depth Padding Scale` to that safety margin.

For a tight or thin receiver, reduce Projection Depth first, use a practical Surface Lift, enable Edge Bleed Guard, and inspect corners and intersections. Angle fade defaults may be intentionally disabled for compatibility with mirrored or negatively scaled meshes; enable and test them only after checking receiver-normal behavior.

Mixed output

One PRISM Surface Tool can generate Mesh Quads and HDRP Decals together. Set `Default Output` to the type most entries should use, then choose `Use Default`, `Mesh Quads`, or `HDRP Decals` per source. When both routes are active, the Output tab shows both output groups.

Generate once to create both groups; Clear removes both. `Preview Placement` uses the currently selected Source entry's output rules. `Preview Mask` uses `Mask Preview Entry` when selected, otherwise the current source entry, so output-specific fitting and safety rules stay clear.

Global Density is a shared candidate budget. In a mixed setup it is divided between enabled, usable output groups by their combined Chance Weight. A source with `Override Density` has an independent budget and is not reduced by Chance Weight; independent budgets add to the global work, so apply them deliberately and pair them with Soft Limits where appropriate.

Next: Placement and filtering.

6. Placement, Filtering, Masks, and Object Detection

PRISM samples the receiver mesh, selects an eligible source, resolves its size/rotation/offset, and then applies the active placement rules. A useful tuning order is: make an unmasked result at the right density and scale; add spacing and face rules; add one filter at a time; use Preview Placement to check the final result.

Placement masks

Enable `Placement Mask` in `Filtering` to limit where placement is allowed. The global mask applies to entries that do not override it. A source can enable `Override Placement Mask` in its Filtering tab for a different local rule.

`Mask Cutoff` controls the value at which a mask accepts a location. `Invert Mask` reverses the result where available. `Mask Validation` has two modes:

- `Center Point` checks the resolved placement center. It is the default and fastest choice.
- `Footprint` checks the resolved center, corners, and edge midpoints after size, rotation, planar offset, and face fitting. It is stricter and slower, and helps prevent a large detail from extending beyond a masked area.

Mask patterns

Pattern	When to use it
`Material Base Map`	Place in bright or dark areas of the receiver material's base map.
`Radial Center` / `Radial Edge`	Concentrate detail in or around a circular area.
`Corners`	Add wear or detail near object-space corners.
`Horizontal Band` / `Vertical Band`	Limit placement to a horizontal or vertical object-space strip.
`Edge Frame`	Add detail around an object's object-space outer frame.
`Noise Patches`	Create procedural, visible islands of allowed/blocked placement.
`Under Anchor / Drip Streaks`	Generate directed streak placement beneath assigned anchors.
`Custom Texture`	Use a readable texture mask sampled from mesh UV0.
`Custom`	Expose the underlying source choices for specialized setups.

Object-space masks use `Object Plane` to choose their working plane; `Auto From Normal` is useful when the sampled receiver changes direction. Procedural masks show a swatch where available, and `Preview Mask` is the best way to tune their cutoff and falloff.

Material Base Map masks

`Material Base Map` samples the receiver renderer's base texture. Use `Texture Mapping` / sampling mode `Auto` for PRISM triplanar materials, or choose `UV0`, `Triplanar Object`, or `Triplanar World` explicitly when needed. `Read From` selects Luminance, Red, Green, Blue, or Alpha; `Place On` chooses Bright Parts or Dark Parts.

The selected base map must be a readable Texture2D. If the result seems different from the visible material, check the receiver material, mapping mode, selected channel, Bright/Dark choice, and Mask Cutoff before changing other placement rules.

First mask comparison

1. Begin with the unmasked chapter 1 receiver. In `Filtering`, enable Placement Mask and choose `Mask Pattern` **Noise Patches**. Keep `Mask Validation` **Center Point**.
2. Set `Mask Cutoff` **0.5** and click `Preview Mask`. Adjust Patch Size until distinct allowed/blocked patches are visible; Patch Seed reshuffles the patch pattern.
3. Click `Preview Placement` to see the additional effects of spacing, size, and fitting, then Generate on the practice receiver.
4. Switch to Footprint validation and preview again. Large details near a blocked edge may be rejected more often because their corners and edge midpoints are checked. It is not a guaranteed full-area geometry test.
5. Clear the practice output and disable the mask to restore the starter workflow.

Object Detection

Object Detection uses assigned targets to either keep scatter away from a region or place it around one. It can be global or per entry.

- `Avoid` rejects Mesh Quad footprints or HDRP Decal projection volumes that touch a target shape plus `Avoidance Range`.
- `Place Around` accepts output in the band between `Near Range` and `Far Range`. The full footprint must clear Near Range, while at least part must remain within Far Range.

Available target shapes are `Object Bounds`, `Circle`, `Ellipse`, and `Rectangle`. Object Bounds combines enabled child Renderer and Collider bounds. The other shapes use the target Transform and project into the sampled receiver plane; an empty helper object is useful for a clean anchor. Ellipse and Rectangle expose Width / Length and Shape Rotation.

A per-entry `Place Around` source gets a dedicated placement pass, so unrelated entries do not consume its candidate attempts. Give it `Override Density` when the band needs a distinct attempt budget and `Override Soft Limit` when it needs a maximum count.

Practice Avoid and Place Around

1. On the practice cube, turn the Placement Mask off. Create an empty GameObject at the center of the face you are inspecting and name it `PRISM Practice Target`.
2. Select the receiver's `Filtering` tab, enable `Use Object Detection`, and add the helper to `Target Objects`. Choose `Detection Shape` **Circle** with `Radius` **0.5**.
3. Choose `Object Detection Mode` **Avoid**, set `Avoidance Range` **0.1**, and Preview Placement. Footprints touching the target region should be rejected.

4. Switch to **Place Around**, with `Near Range` **0.1** and `Far Range` **1**. Preview again: accepted detail is limited to the outside band. Spacing and card size may leave fewer accepted items; widen Far Range or reduce size if the band cannot fit a footprint.
5. Generate only on the practice receiver to inspect the result. Clear, then turn Object Detection off before another exercise.

Under Anchor / Drip Streaks

Choose `Under Anchor / Drip Streaks` when a stain-like source should originate below one or more anchor transforms. Assign `Anchors`, then choose `Placement Mode`:

- `Edge Guided` distributes streak slots along an anchor's lower edge. It is the practical starting mode for leaks and grime drips.
- `Random Area` uses the wider stain-shaping controls for a less edge-specific region.

For Edge Guided, start with `Streak Count`, `Coverage`, and `Fit Width To Edge`. Add `Width Variation`, `Streak Length Variation`, `Top Gap`, `Random Mirror X`, and `Horizontal Jitter` only after the basic distribution works. `Allow Overflow` deliberately lets a streak extend beyond the clipped anchor edge. Enable `Use Alpha Bounds For Alignment` when the artwork has transparent padding and you need its visible top edge to align; this requires a readable source texture.

`Advanced Drip Controls` contains bounds, candidate, downward jitter, and validation settings. `Use Advanced Drip Mask Validation` checks edge-guided candidates against anchor depth and surface-normal tolerances; enable it only when the straightforward setup needs extra rejection control. Use `Preview Placement` and the optional anchor-drip diagnostics to understand why streaks are accepted or rejected.

Practice one drip anchor

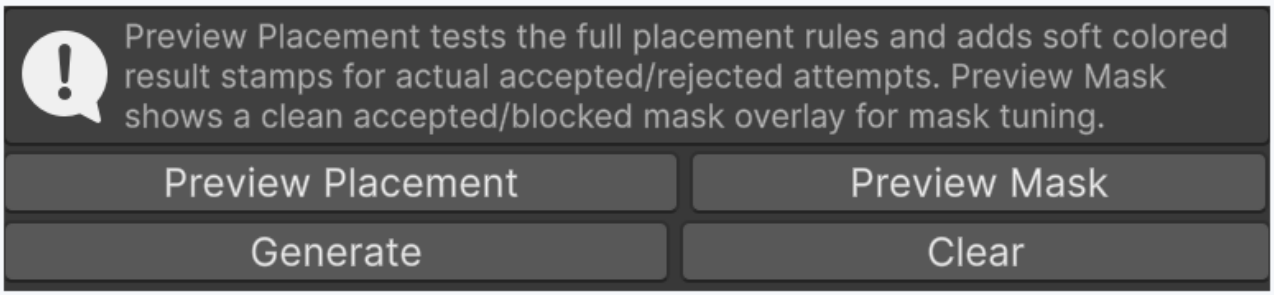
1. Use a fresh practice wall receiver and add `Assets/PRISM Surface/Textures/Scatter/Drips/PRISM_Scatter_Drip_01_Wide.png` as its source. Route it to Mesh Quads with the shipping cutout template; keep other entries disabled.
2. Create an empty helper near the wall's upper edge. In Filtering, enable Placement Mask, choose **Under Anchor / Drip Streaks**, and add the helper to `Anchors`.
3. Choose **Edge Guided**, start with `Streak Count` **3**, `Coverage` **1**, and `Fit Width To Edge` on. Keep advanced validation off initially. The helper position defines the attachment region; adjust it against the wall while previewing.
4. Click Preview Placement. Expect downward streak slots below the anchor; inspect size, attachment, and rejection diagnostics before Generate. For padded artwork, enable Read/Write and Use Alpha Bounds For Alignment before judging the visible top edge.
5. Generate, inspect, and Clear on the practice receiver. If no slots fit, check anchor depth/position and source scale before increasing attempts.

Next: Preview, profiles, and recipes.

7. Preview, Profiles, and Practical Recipes

Preview Placement and Preview Mask

Use the two preview buttons for different questions.

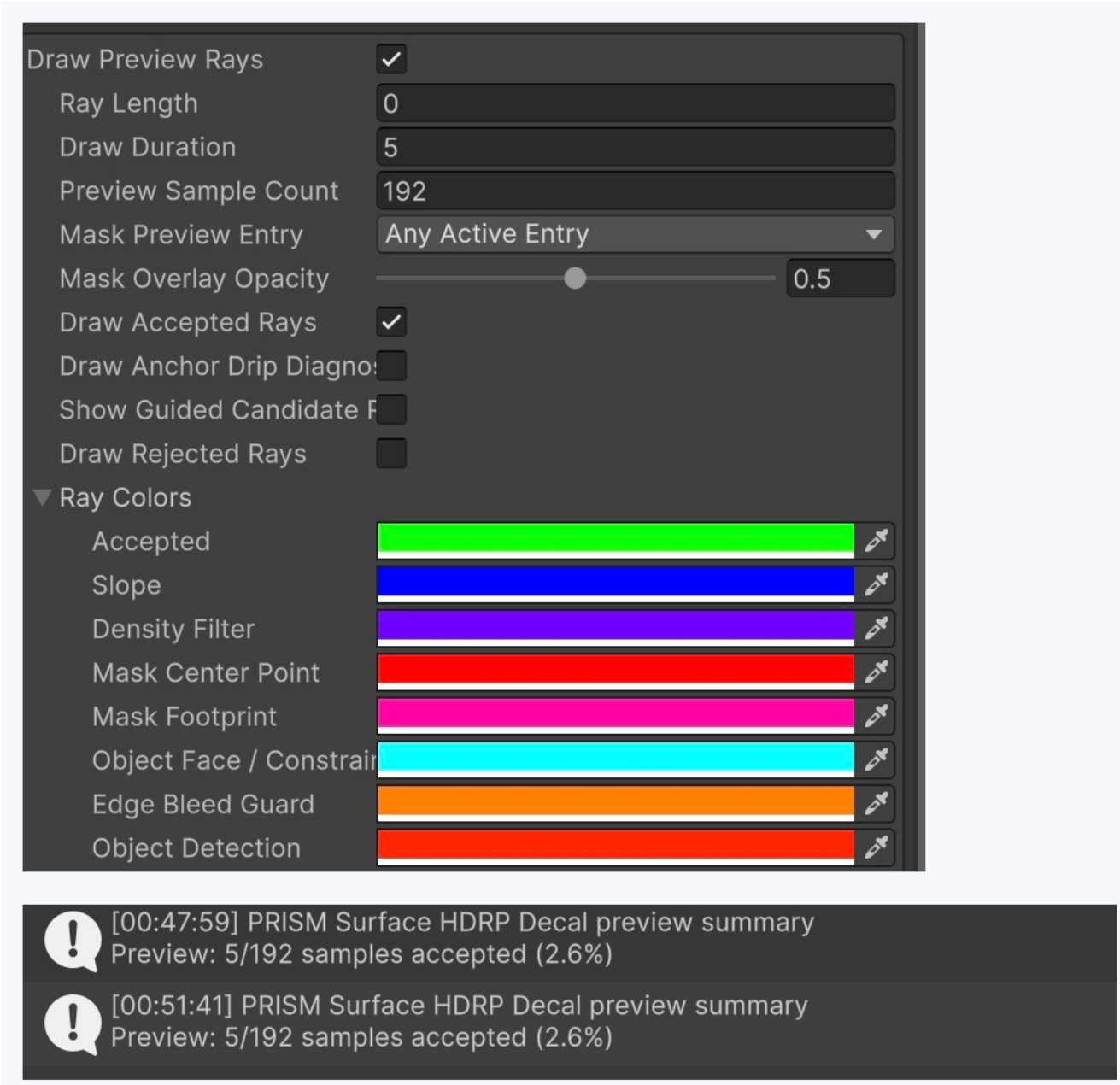


Locate Preview Placement, Preview Mask, Generate, and Clear.

`Preview Placement` evaluates the full generation decision: candidate attempts, source selection, density, local overrides, scale, rotation, planar offset, masks, footprint checks, face fitting, slope, noise thinning, Object Detection, HDRP decal edge safety, and spacing. It shows accepted and rejected result stamps, with optional rays and rejection categories in `Debug`. Use it when the final generated count or location is surprising.

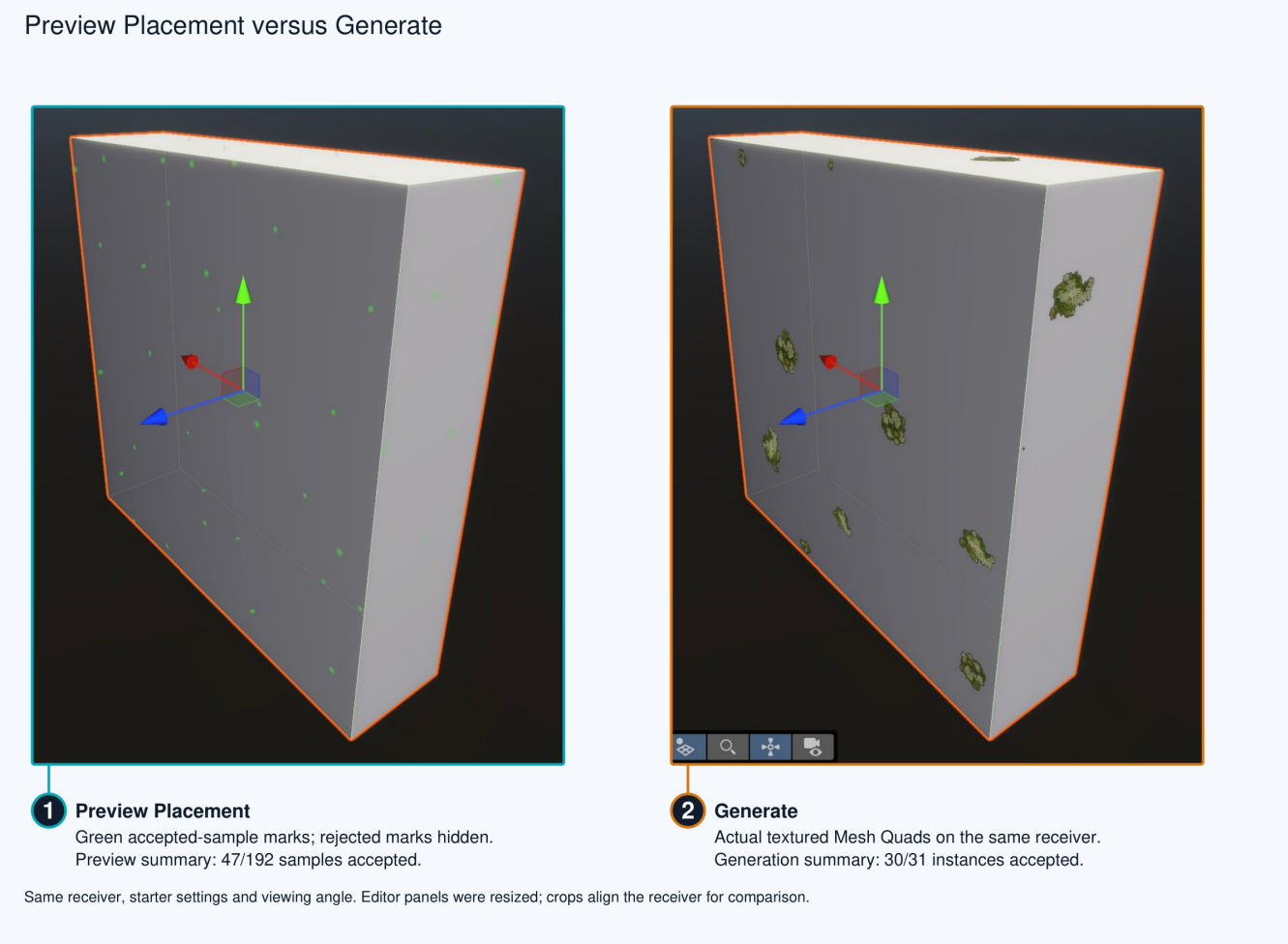
`Preview Mask` shows only the selected mask's accepted and blocked region. It is faster for tuning Material Base Map selection, UV masks, radial/object-space patterns, Noise Patches, and drip-mask regions. A correct mask preview does not guarantee a generated result: other placement rules can still reject it.

When `Mask Preview Entry` is set in Debug, Preview Mask uses that source; otherwise it follows the selected source tab. This is particularly useful when one entry overrides the global mask.



Debug settings for accepted preview stamps: Draw Preview Rays enabled, Ray Length 0, Draw Accepted Rays enabled, Draw Rejected Rays disabled, and green Accepted color. The Console reports 5/192 accepted samples in this example.

Preview Placement is temporary; Generate creates the actual output groups. They use different candidate budgets, so accepted preview samples and generated counts do not have to match.



Preview samples are temporary; Generate creates actual output.

Profiles

`SurfaceScatterProfile` assets store PRISM Surface Tool settings so an artist can reuse a proven workflow. Profiles preserve Default Output and each source's output routing, including mixed Mesh Quad/HDRP Decal setups.

The package includes two starter profiles:

- `Profiles/PRISM_Starter_MeshQuads.asset` - moss and lichen sources sized and spaced for the shipping Mesh Quad cutout template.
- `Profiles/PRISM_Starter_HDRP_Decals.asset` - graffiti and crack sources with wall-oriented decal settings and edge protection.

Select a single receiver, drag a profile from Project into `Profile`, then click `Load From Profile` and confirm. Merely assigning the asset does not apply it. Check Sources and Output after loading, then Preview Placement before Generate. Use a practice receiver when learning; Clear removes both generated output groups for that tool.

Use the profile actions at the top of the PRISM Surface Tool:

Action	Result
`Create Profile From Current Settings`	Creates a new reusable profile asset from this component.
`Load From Profile`	Replaces this component's settings with the selected profile.

Action	Result
`Save Current To Profile`	Overwrites the selected profile with current component settings.

Read the confirmation dialogs: loading changes the scene component, while saving changes the profile asset. A profile is a settings asset, not generated output; load it onto another compatible receiver, then Preview Placement before Generate.

Recipes

Dirt or moss with Mesh Quads

Use a cutout source texture, route it to Mesh Quads, assign the shipping Mesh Quad cutout template, and tune Size Variation plus Minimum Spacing at low density. An ordinary scatter source texture does not need Read/Write enabled; enable it only when a pixel-inspection workflow specifically requires it, such as alpha-bounds alignment. Add Noise Patches or a Material Base Map mask only after the unmasked result reads well. Use Footprint validation if large cards visibly cross a masked edge.

Graffiti or cracks with HDRP Decals

Route the source to HDRP Decals and use a suitable decal template. Begin with the `Balanced Hard Surface` edge-protection setting, then lower Projection Depth until the intended surface remains covered without reaching neighboring geometry. Inspect hard corners at the expected camera distance.

Mix cards and decals on one receiver

Set the majority output as Default Output. Route cutout moss/dirt sources to Mesh Quads and surface-response marks to HDRP Decals. Configure both materials in Output. Keep density conservative first, because the shared candidate budget is divided by active output-group Chance Weight; use independent density only for an entry that genuinely needs it.

Place moss around a prop; keep other detail away

Create an empty helper at the prop, assign it as an Object Detection target, and use a Circle, Ellipse, Rectangle, or Object Bounds shape. On the moss entry, override Object Detection to `Place Around`, set Near/Far Range, and give it a dedicated Density if needed. On the unwanted detail entry, override Object Detection to `Avoid` using the same target.

Make an anchor drip streak

Assign a leak/stain source, choose Under Anchor / Drip Streaks, add an anchor transform, and start in Edge Guided mode. Adjust Streak Count, Coverage, Fit Width To Edge, and Streak Length Variation in that order. Enable alpha-bounds alignment only when transparent source padding makes the visible top edge misalign.

Image to PRISM material to scatter profile

Create a PRISM material from a readable image with Material From Image. Enable `Create Scatter Profiles` during export if you want the optional Mesh Quad and HDRP Decal bridge assets. Inspect the exported result, then load its starter profile onto a receiver and adjust density/output for that receiver.

Next: PRISM Surface materials.

8. PRISM Surface Materials

PRISM Surface materials are HDRP materials with a fixed triplanar and tangent-space-normal contract. They are intended for broad receiver surfaces such as walls, floors, rocks, and modular architecture, not for transparent Mesh Quad cards.

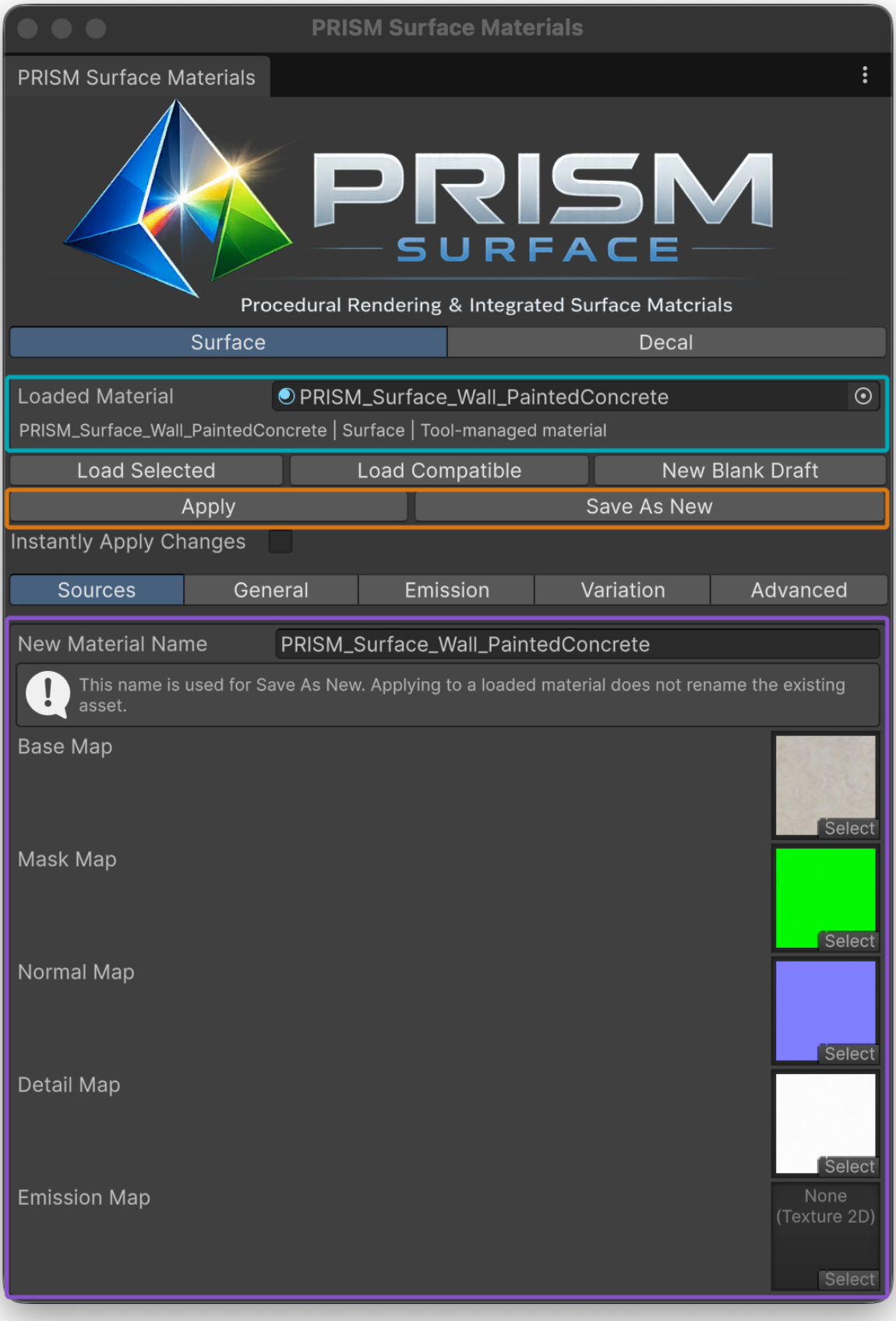
Open `Tools > PRISM Surface > Material Tool` to author materials, or select a PRISM Surface material to use its custom Inspector. The Material Tool has `Surface` and `Decal` tabs. Surface sub-tabs are `Sources`, `General`, `Emission`, `Variation`, and `Advanced`; Decal sub-tabs are `Sources`, `Projection`, `Opacity`, `Blend`, and `Advanced`.

Use `Load Selected` to load the current selection, `Load Compatible` to choose a compatible material, `New Blank Draft` to start a draft, `Apply` to write the loaded material, and `Save As New` to create a new asset. `Instantly Apply Changes` writes supported changes to the loaded material as you edit; use normal Unity Undo to reverse an intentional edit.

First surface material

1. Open Material Tool and choose `Surface`. Start with `New Blank Draft`, or select a compatible PRISM material in Project and click `Load Selected`. For practice, use `Save As New` to work on your own copy.
2. In `Sources`, assign `Base Map`; add Normal and Mask maps only when available. A Normal map must use Unity's Normal map import type. The receiver material and Mesh Quad template have different jobs.
3. In `General`, set Mapping Space and World Scale, then inspect the result on your practice cube. To save a new draft, click `Save As New` and choose an asset path inside your own Assets folder.
4. Assign the saved material to the cube's Mesh Renderer material slot. Saving a material alone does not assign it to a receiver.
5. Load that saved material in Material Tool. With `Instantly Apply Changes` off, edit a value and click `Apply` to write it. With that toggle on, supported edits write to the loaded material as you change them. Check the loaded asset before using either mode.
6. Inspect the receiver at close and normal viewing distances. Use Unity Undo to reverse an applied property edit, then check the material again. Save the scene to retain the renderer assignment.

Checkpoint: Project contains your own material, the receiver uses it, and Apply changes the receiver's appearance. For a decal material, use the `Decal` tab and Save As New, then assign that asset as the scatter tool's Decal Material Template; do not assign it as the receiver surface material.



Surface material workflow: loaded material, Apply and Save As New, and source maps

Surface mapping and maps

`Texture Mapping` reports **Triplanar**. `Mapping Space` selects World Space or Object Space; `World Scale` controls projected texture size; `Blend Sharpness` controls how strongly the dominant triplanar axis wins. PRISM uses a shared sampling space so Base, Mask, Normal, Detail, and Emission remain aligned.

Assign source maps in the Surface Sources tab. The custom PRISM Inspector deliberately exposes the source, mapping, variation, emission, and macro controls implemented by the shader rather than unsupported generic HDRP Lit mapping or tessellation controls. `Projection Bias` is not an artist control in the current PRISM sampling workflow.

UV Variation

Enable `UV Variation`, choose a `Variation Mode`, and set `Variation Seed`.

- `Random Cells` randomly rotates or mirrors whole tile-local coordinates while preserving the original tile footprint. It offers more variety, but non-matching source edges can remain visible.
- `Matched Edges` mirrors neighboring tiles so their shared source-texture borders match. It has more constrained variation, but is preferable when edge continuity matters.

UV Variation happens before anti-tiling. Start with it off while tuning a new anti-tile setup, then add it if the source still looks repetitive. All active material layers use the same transformed coordinates.

Anti-Tile Mode

Mode	Use it when	Cost guidance
`None`	Repetition is already acceptable or material cost is the priority.	Lowest cost.
`Pattern Variation`	You want the established multi-sample pattern approach.	`Fast (4)`, `Quality (9)`, and `Extreme (16)` trade more samples for more variation.
`Stochastic Tiling`	Repetition is obvious over broad walls, floors, or curved surfaces.	Four deterministic candidates per projection; use only where it improves the visible result.

Pattern Variation exposes `Anti-Tile Scale`, `Cell Blend Width`, optional `Stochastic Blend`, `Pattern Samples`, `Pattern Cell Size`, `Pattern Offset Strength`, and `Pattern Scale Strength`. Start with Fast, then move to Quality or Extreme only when the visible improvement justifies the cost.

Stochastic Tiling crossfades four deterministic neighboring candidates. Base Color, Mask, Normal, Detail, and Emission use aligned candidate selection. It uses procedural seeds and **does not require a Blue Noise texture assignment**.

For Stochastic Tiling, tune in this order:

1. `Anti-Tile Scale` controls how often variation regions change; higher values make smaller, more frequent regions.
2. `Cell Blend Width` controls how broadly candidates crossfade. A seam-safe internal transition remains at very low values.
3. `Jitter Strength` offsets candidates. Raise it gradually; distinctive artwork can look ghosted when it is too high.
4. `Blend Sharpness` reshapes the crossfade. Lower values are softer; higher values favor one candidate more strongly and can reveal transitions.

Stochastic Tiling is roughly four times the sampling work of None per active texture layer, while the Pattern modes use their selected multi-sample pattern paths. Treat these as design tradeoffs, not a substitute for profiling the target scene and hardware.

Emission and macro variation

Assign an `Emission Map`, then adjust `Emission Intensity (HDR)`, `Exposure Weight`, tint, threshold/core controls, and base visibility controls as appropriate. Exposure Weight `0` keeps a stylized glow more stable as exposure changes; `1` makes it fully exposure-dependent and can need much larger HDR values in bright daylight. Test emission in the intended exposure setup.

`Macro Variation Texture`, Strength, Scale, Contrast, and optional animation break broad uniformity. Animated macro variation can use `Use Slope Flow` and `Slope Speed Influence`, or a world-space flow direction. Keep this subtle: its purpose is large-scale surface variation, not a visibly moving overlay.

The Decal Material Tool includes source maps, global opacity, Draw Order (`-50..50`), channel-affect toggles, metallic/smoothness/AO controls, and blend/advanced settings. Use it to create the material assigned to HDRP Decal output, not as a replacement for the receiver's PRISM Surface material.

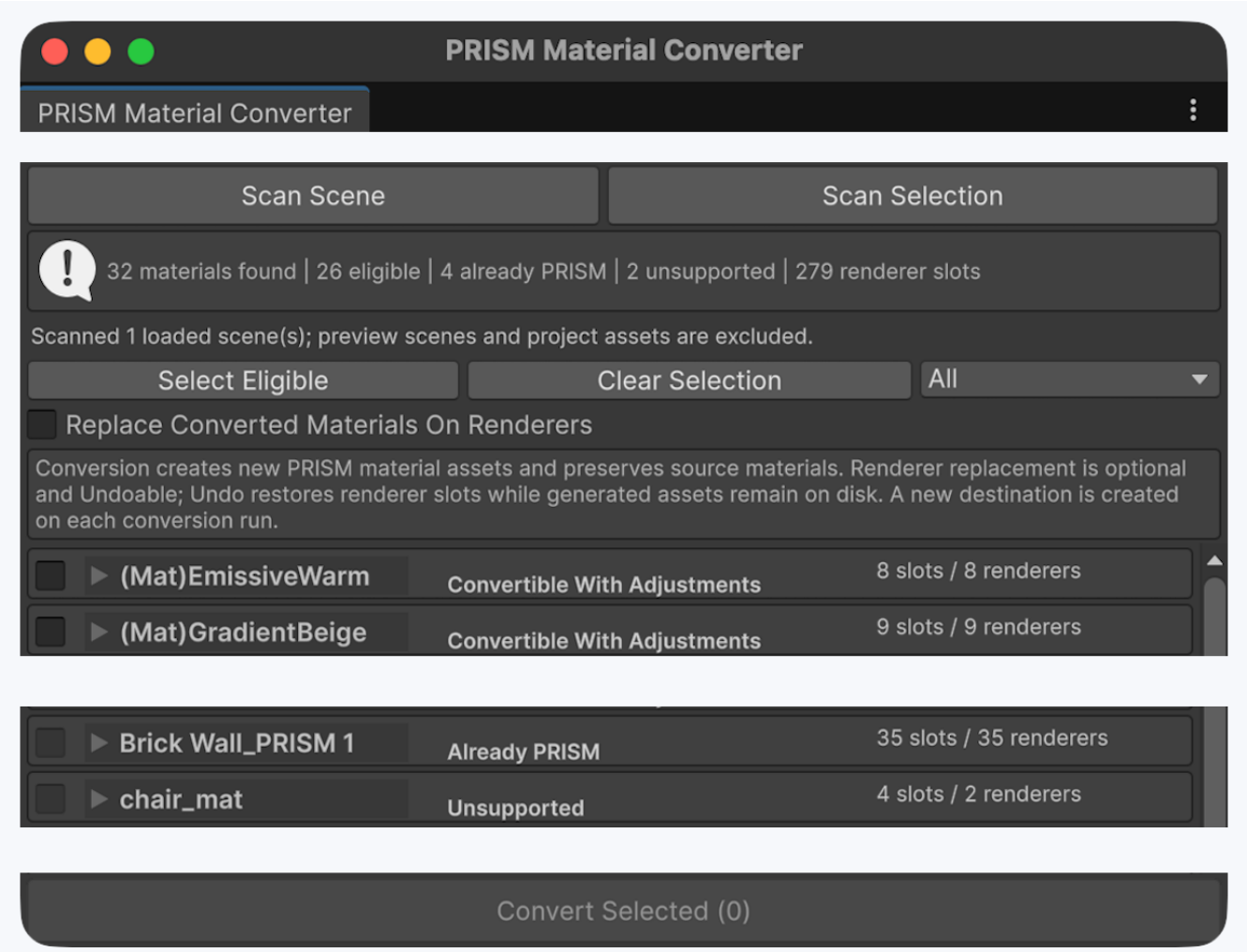
Next: PRISM Material Converter.

9. PRISM Material Converter

Use the PRISM Material Converter to create PRISM Surface materials from supported HDRP/Lit materials. Open it from `Tools > PRISM Surface > Convert Materials`. The workflow is **Scan > Review > Convert > optional renderer replacement > continue editing in PRISM Surface Materials**. Conversion creates new materials and leaves the source materials unchanged.

First conversion on a practice object

1. Select a practice scene receiver using a supported HDRP/Lit material. Open `Tools > PRISM Surface > Convert Materials` and click `Scan Selection`.
2. Expand its material row. Review classification, proposed surface type, mapped properties, warnings, and renderer-slot usage. Existing PRISM and Unsupported rows cannot be converted.
3. Select an eligible row. Keep `Replace Converted Materials On Renderers` **off** for the first pass, then click `Convert Selected`. Read and confirm any adjustment or mapping-risk dialog.
4. Read the converted/skipped/failed summary. Find the new PRISM material beside its source in Project. The original material and texture importer settings are preserved.
5. Assign the new material to your practice receiver manually and inspect texture scale, orientation, transparency, and normal response. Open Material Tool to continue editing it.
6. For a later assignment exercise, scan another eligible source and enable optional renderer replacement. Unity Undo restores changed renderer references, but does not delete generated destination assets. Keep only the practice assets you intend to use.

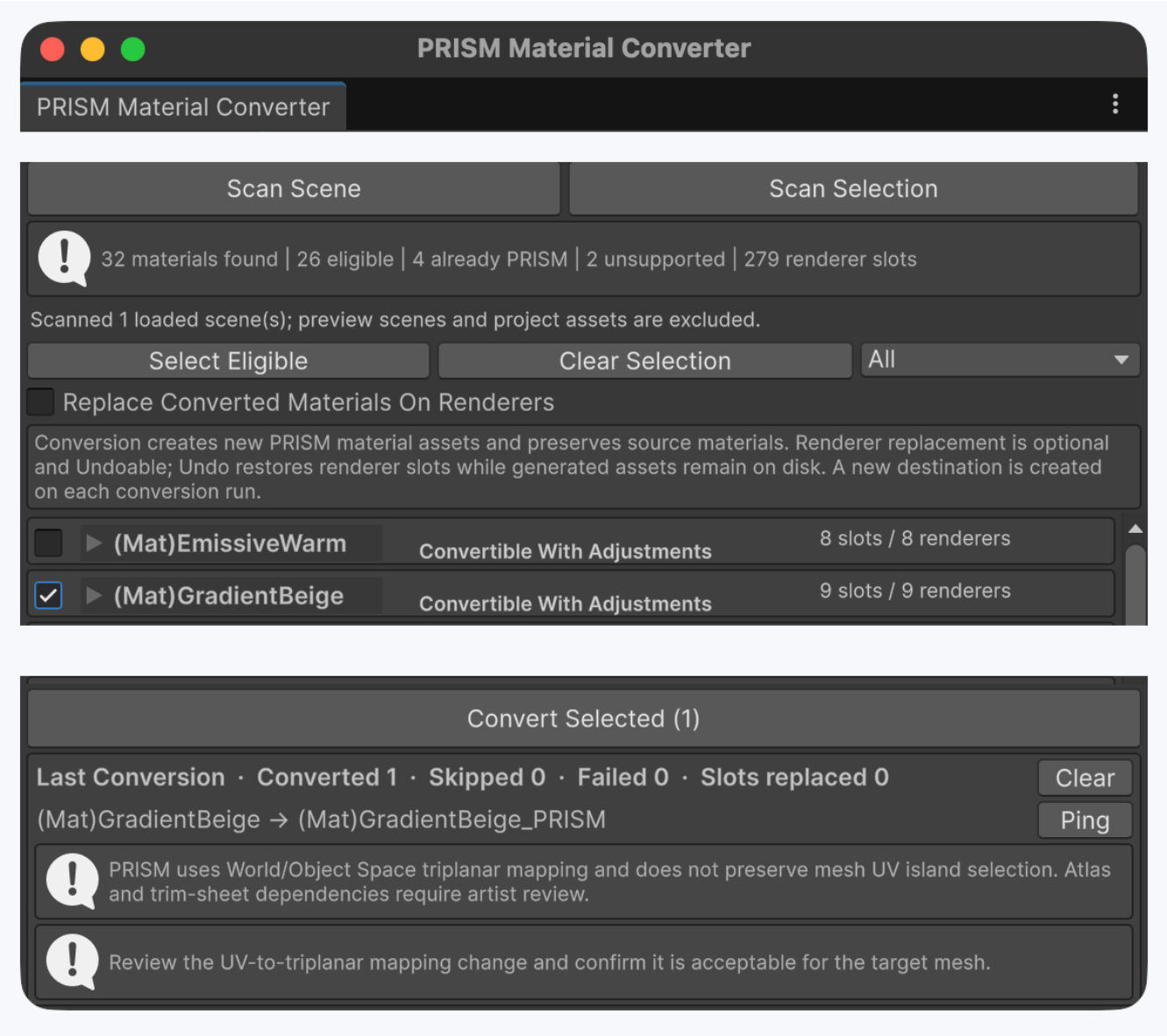


Scan and classify: scan controls, eligibility summary, and candidate materials

Checkpoint: a new material exists, its source is intact, and any changed renderer assignment is understood. Triplanar conversion is not a promise of pixel-identical appearance; atlas/trim-sheet reconstruction is outside v1.1.0.

Scan and review

- Choose `Scan Scene` to inspect renderers in loaded scenes, including inactive objects, or `Scan Selection` to inspect selected scene GameObject hierarchies and their children.
- A material referenced by multiple renderer slots is listed once, with its renderer and slot usages shown under that candidate.
- Review each classification: **Already PRISM**, **Fully Convertible**, **Convertible With Adjustments**, or **Unsupported**. Already PRISM and Unsupported materials remain visible for review but cannot be selected for conversion.
- Select eligible materials with their checkboxes or use `Select Eligible`. Expand a candidate to inspect its source path, proposed surface type, warnings, required adjustments, UV/triplanar risk, unsupported features, and renderer slot usages before converting.



Review an eligible material, conversion selection, and result summary

Convert and continue editing

Choose `Convert Selected` after reviewing the selected candidates. Materials with warnings, adjustments, or triplanar review risks prompt for confirmation. The converter rechecks selected materials, creates new PRISM material assets beside their source materials, and reports converted, skipped, or failed results in the conversion summary. Source materials and their texture import settings are preserved.

`Replace Converted Materials On Renderers` is optional and off by default. When enabled, the converter replaces scanned renderer slots that still reference the source material. Unity Undo restores changed renderer assignments; the newly created PRISM material assets remain in the project after Undo. With replacement off, the original renderer assignments stay in place and you can assign the converted materials when ready.

After conversion, open `Tools > PRISM Surface > Material Tool` to load and continue editing a converted material like any other PRISM Surface material.

Inspect mapping after conversion

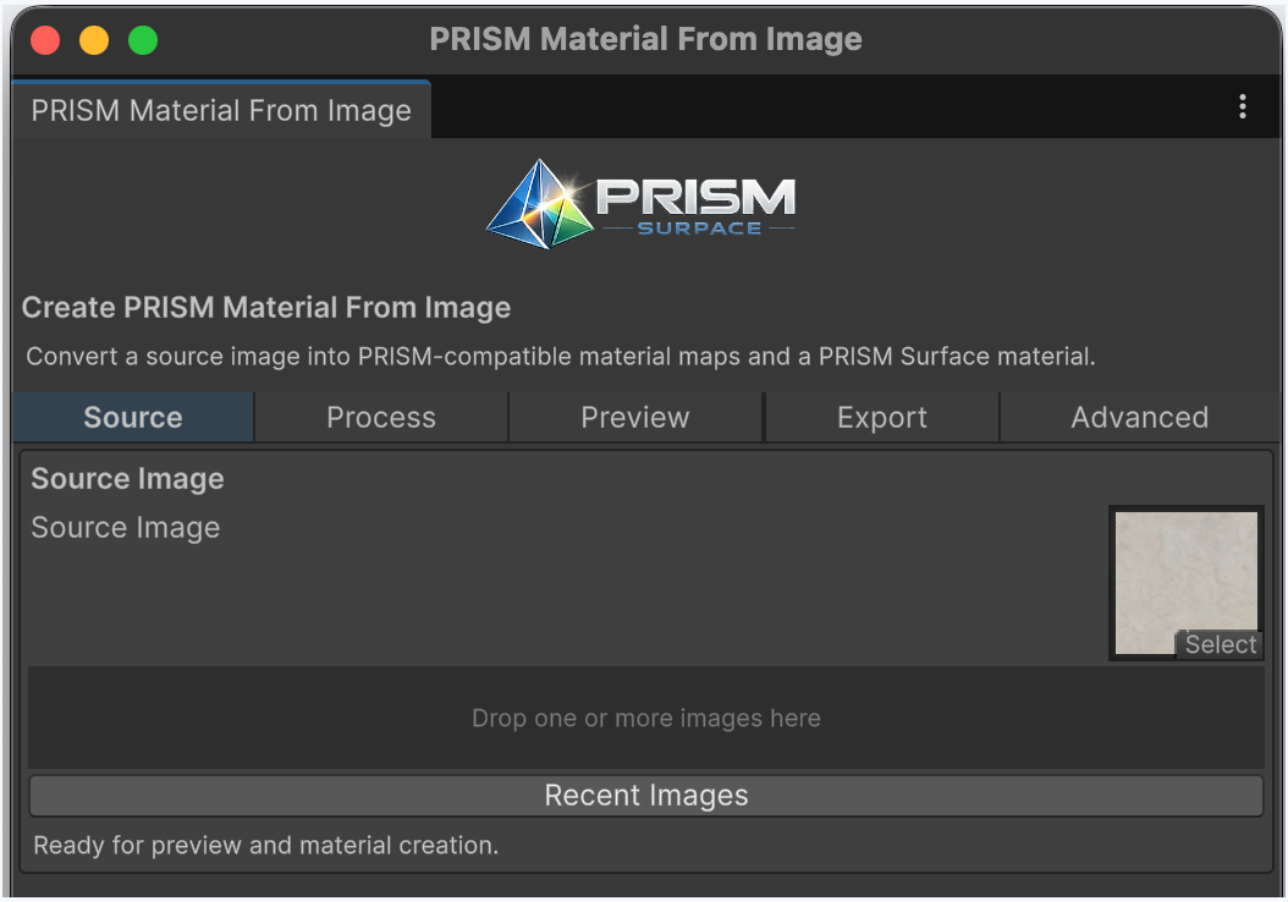
PRISM Surface uses triplanar mapping rather than the source material's mesh UV layout, so texture scale or orientation can change after conversion. Ordinary HDRP materials can often convert successfully, but inspect the result on the intended meshes. Atlas, trim-sheet, baked-layout, and other materials that depend on specific UV regions may need artist review. The converter surfaces mapping warnings to help with that review; v1.1.0 does not include multi-region or atlas-aware conversion.

Next: PRISM Material From Image.

10. PRISM Material From Image

PRISM Material From Image creates PRISM-compatible material maps and a PRISM Surface material from a readable image. The source can be a photograph, illustration, scan, painted texture, or another usable image; it is not limited to photographs. This is a creation workflow, not a third material type beside Surface and Decal.

Open it from `Tools > PRISM Surface > Material From Image`. Its pages are `Source`, `Process`, `Preview`, `Export`, and `Advanced`.



Material From Image source selection and workflow tabs

Workflow

1. On `Source`, assign or drop a readable `Source Image`. You can also use recent images or build a batch.
2. On `Process`, choose a preset and folder template, optionally use Image Cleanup, and tune the Material Look controls: Height, Shape Strength, Roughness, Cavity, and Surface Detail.
3. On `Preview`, inspect Original/Cleaned image views plus generated Height, Normal, Roughness, AO, Detail, Alpha, and Mask maps. These previews are editor-only until export.
4. On `Export`, set Material Name, Save Location, Map Quality, and whether to `Create Scatter Profiles`.
5. Click `Create PRISM Surface Material` to write the final assets.

The default folder template is `PRISM Material From Image`; `Source Image Folder` and `Selected Folder` are available when generated content should live beside project content. The output path must be inside the Unity project's `Assets` folder.

Read/Write requirement

The source must be a readable `Texture2D`. If it is not, the Source page explains the problem and offers an import-setting action where possible. Enable Read/Write, wait for the reimport, then refresh the preview.

First export and both scatter bridges

1. Import an image you own into your practice folder and assign it on `Source`. Click `Enable Read/Write` if offered, wait for reimport, and revisit Preview.
2. Work through Source, Process, and Preview as above. On `Export`, use Material Name **PracticeSurface**, Save Location **Assets/PRISM Practice**, Map Quality **1024 Max**, and enable `Create Scatter Profiles`.
3. Click `Create PRISM Surface Material`. Inspect `Assets/PRISM Practice/PracticeSurface/`: the surface material and bridge materials/profiles are in this folder; generated maps are in its `Textures` subfolder. If that folder already exists, Unity creates a unique output folder rather than overwriting it.
4. Assign the generated surface material to a practice receiver's Mesh Renderer and inspect it. Generated Height, Normal, Roughness, AO, Alpha, and Mask outputs are different map roles, not interchangeable Base Maps.
5. On a disposable receiver with PRISM Surface Tool, assign **PracticeSurface_MeshScatterProfile**, click `Load From Profile`, then Preview Placement and Generate. Inspect the generated cards and Clear them. Full rectangular artwork is expected unless the source/extracted alpha provides a useful cutout.
6. Assign **PracticeSurface_DecalScatterProfile**, click `Load From Profile`, then Preview Placement and Generate. Check HDRP decal receiving and projector depth as in chapter 5. Inspect the projected result, then Clear.

Checkpoint: saved assets exist outside the editor-only preview, the surface material can be assigned, and both bridge profiles can be loaded explicitly. Adjust density and size for each receiver; profiles do not contain generated scene output.

Exported assets and bridge workflow

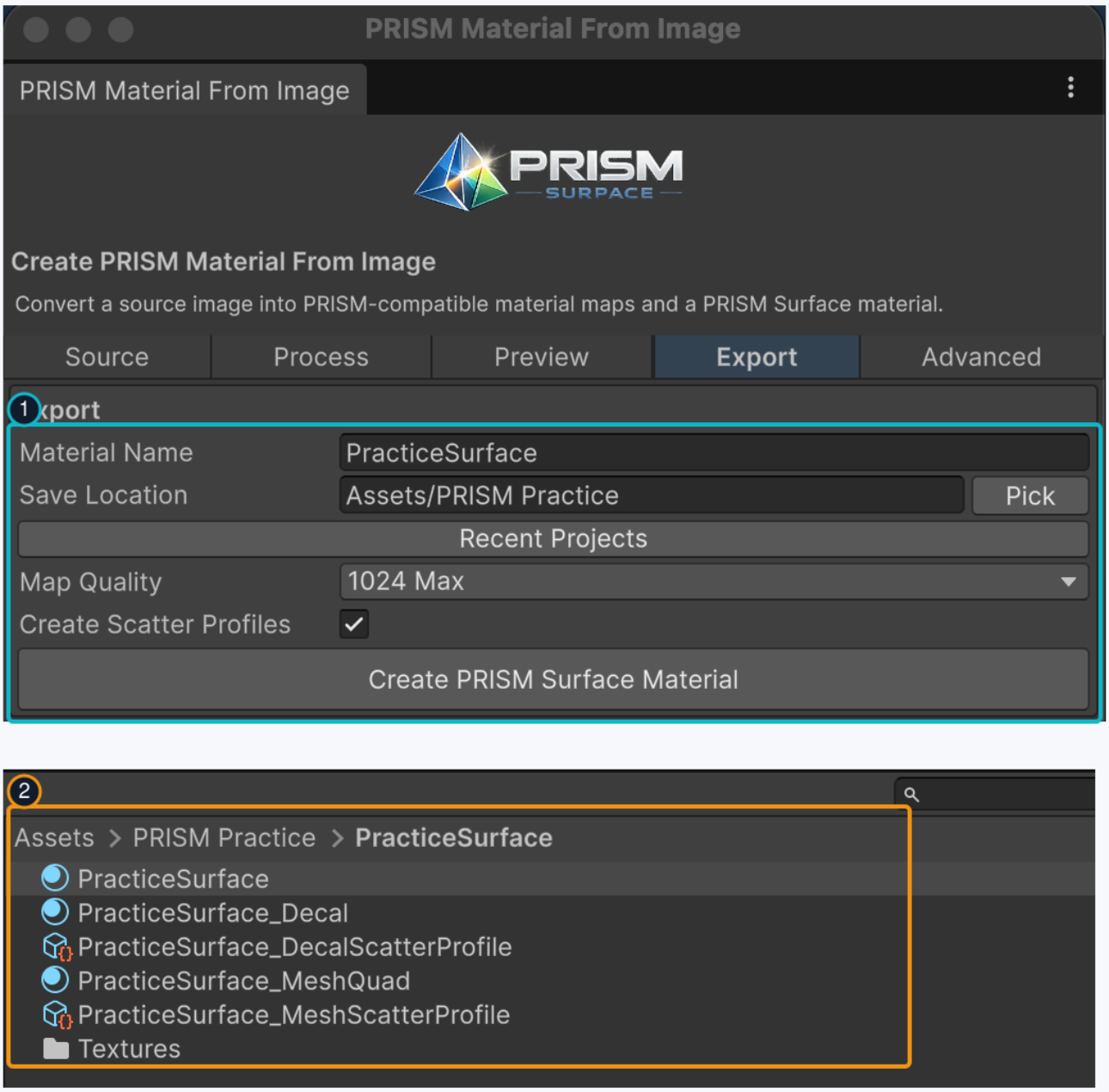
Export generates the PRISM Surface material and its maps. When `Create Scatter Profiles` is enabled, it can also create bridge assets for scatter:

- A managed PRISM Surface material.
- A starter Mesh Quad scatter profile.
- A local HDRP/Unlit alpha-cutout Mesh Quad material template used by that profile.
- A starter HDRP Decal scatter profile.
- A managed HDRP Decal material template.

Surface and Decal materials are validated as part of export so their PRISM/HDRP setup is ready without opening every raw material Inspector first. The bridge assets are starting points: load a profile onto a receiver, inspect source/output choices, and preview before generating.

`Map Quality` offers Source Size, 4096 Max, 2048 Max, 1024 Max, and 512 Max. Choose the smallest size that preserves the material at its intended use distance; high-resolution outputs use more project memory and import time.

`Advanced` contains Roughness Bias, Cavity Blur, Cleanup Contrast, Extract Alpha, and Alpha Cutoff. Use these after the basic material look is established. Extracted alpha is particularly useful when the final artwork needs a cutout-oriented scatter texture, but it does not automatically make every source suitable for Mesh Quads.



Export settings (1) and generated materials, scatter profiles, and textures in the practice folder (2).

Common expectations

- Preview changes are not exported until `Create PRISM Surface Material` is pressed.
- A generated PRISM Surface material is for a receiver surface; use the generated alpha-cutout bridge template for Mesh Quad scatter when appropriate.
- Generated sampled texture maps use mipmaps, Repeat wrapping, and Trilinear filtering while preserving their intended normal-map and sRGB/linear import roles. Do not routinely change this policy; test deliberately different filtering only when the target material requires it.
- If export fails, first check source readability, material name, and that Save Location is under `Assets`.

Next: Performance, troubleshooting, and FAQ.

11. Performance, Troubleshooting & FAQ

Onboarding recovery

Installation or pink materials

Wait for shader import to finish, then check Console for current errors. Confirm Unity 6000.3.10f1 and HDRP/Core 17.3.0, an assigned HDRP pipeline asset, and the required HDRP Wizard configuration. URP and Built-in projects cannot render the PRISM HDRP workflow. Recheck installation before changing materials.

The tools or starter assets are missing

Confirm the full shipping `Assets/PRISM Surface/` folder was imported and compilation has finished. Material tools are under `Tools > PRISM Surface`; the component is added through Add Component on a MeshFilter receiver. Starter profiles are in `Assets/PRISM Surface/Profiles/`. Check Console errors if editor menus are unavailable.

HDRP Decal Projectors exist but are invisible

Confirm HDRP decals are enabled for the pipeline/camera, the receiver material accepts decals, the generated projector has a compatible material, and Surface Lift is below Projection Depth. Use the first HDRP Decal exercise with the supplied template before tuning your own material.

The demo camera does not respond or I am lost

Enter Play Mode and click Game view to focus it. Press Home to reset; F1 restores the help overlay and Tab changes mode. The controller locks the cursor while active; stop Play Mode to release it. In Scene view, select the intended receiver and press F to frame it. See the demo walkthrough.

A texture cannot be read

Select the texture in Project, enable Read/Write in its import settings, and click Apply, or use the tool's Enable Read/Write action. Wait for reimport. Ordinary scatter artwork does not require this unless a mask/image-processing/alpha-bounds workflow reads its pixels.

Performance guidance

Choose the output and material mode that solve the visible problem with the least work.

- Use Mesh Quads for cutout/card details and HDRP Decals when projected HDRP channels are needed. Inspect both at real gameplay distance.
- Raise Density and Placement Attempts gradually. More attempts can improve a constrained scatter result but increase editor work; a high value cannot overcome incompatible filters.
- Use independent entry Density only where a source truly needs a separate budget. It adds to the shared global work.
- Minimum Spacing, Footprint mask validation, face fitting, Object Detection, and edge protection all trade more accurate rejection for more placement evaluation.
- Use Preview Mask for mask tuning and Preview Placement only when checking final rules. Debug rays and large preview counts are diagnostic tools, not an always-on workflow.
- Use Anti-Tile `None` when repetition is not visible. Try Pattern Variation Fast before Quality/Extreme, and use Stochastic Tiling only where broad repetition warrants its extra texture sampling.

Approximate per-active-layer triplanar sample guidance is: None ~3, Stochastic Tiling ~12, Pattern Fast ~15, Pattern Quality ~30, and Pattern Extreme ~51. These values are relative shader-cost guidance, not GPU benchmark numbers; profile the intended scene and hardware.

Avoid unsupported benchmark claims: profile the intended scene, target hardware, and content mix.

Troubleshooting

Generate creates nothing

Confirm the receiver has a valid MeshFilter, an enabled entry has a texture and positive Chance Weight, the active output has an appropriate template, and Density/Placement Attempts are reasonable. Temporarily disable masks, Object Detection, slope restrictions, and wide spacing. Then run Preview Placement and read the rejection categories.

Scatter is too sparse

Increase Density or Placement Attempts in small steps, then check Minimum Spacing, Size Variation, Soft Limit, masks, slope, and Object Detection. A Soft Limit is a maximum accepted count, not a requested exact result.

Cards cross hard edges or float

Reduce scale, use `Keep Inside Source Face`, and use a small practical Surface Lift. For wall details, try Close Mesh To Surface. If a card is unsuitable for the receiver shape, a decal may be a better output choice.

A decal projects onto neighboring surfaces

Reduce Projection Depth first. Enable Edge Bleed Guard, use an edge-protection starting point, and increase only the padding needed. Remember that Edge Bleed Guard evaluates the source mesh boundary, not all geometry intersecting the HDRP projection volume.

HDRP decals look fragmented on a strongly normal-mapped receiver

HDRP decal rendering can appear visually fragmented on a receiver with very strong normal perturbation or detail normals. Reduce the receiver normal scale or detail strength to diagnose the interaction and, where acceptable, as a workaround. PRISM Surface cannot fully correct HDRP's receiver-normal interaction; inspect the result on the intended material and camera distance.

Mask looks ignored or a mask texture cannot be sampled

Ensure Placement Mask is enabled for the relevant global or entry setup, check Mask Cutoff and inversion, and use Preview Mask. Custom Texture masks need a valid receiver UV0 channel and Read/Write enabled. Material Base Map needs the expected readable Texture2D on the receiver material.

Material Base Map filtering differs from the visible material

Verify the receiver material, Texture Mapping/sampling mode, `Read From` channel, `Place On` Bright/Dark choice, and Mask Cutoff. Use `Auto` for PRISM triplanar materials unless an explicit mode is required.

Place Around or drip streaks produces no result

For Place Around, confirm targets, shape, Near/Far ranges, scale, and spacing leave physical room for an item. Use Override Density for a dedicated per-entry budget. For drips, assign at least one Anchor and start with Edge Guided plus modest Streak Count/Coverage before enabling advanced validation.

Texture repetition remains visible or Stochastic Tiling looks too soft

Check that `Anti-Tile Mode` is actually Stochastic Tiling. Tune Anti-Tile Scale first, then use modest Jitter Strength and Cell Blend Width. Reduce Jitter or blend width, or increase Blend Sharpness moderately, if distinctive features ghost. No Blue Noise assignment is required. If a material looks wrong at distance, inspect all active Base, Mask, Normal, and Detail texture filtering/import settings, not only Base Color.

Emission disappears under bright exposure

Increase HDR emission carefully and lower Exposure Weight when a stylized glow should stay visually stable. Test in the intended HDRP exposure configuration.

Material From Image cannot preview or export

Enable Read/Write on the source Texture2D, use a valid material name, and choose a Save Location inside `Assets`. Remember that previews are not saved until Create PRISM Surface Material is pressed.

A loaded profile behaves differently

Profiles restore Default Output and per-entry output choices. Inspect source overrides, templates, receiver scale/orientation, and target scene objects, then use Preview Placement. A profile does not carry generated scene output or change the new receiver's mesh.

A legacy component name appears in the Inspector

PRISM Surface is the product-facing name. Legacy identifiers can remain in older scenes or serialized assets for compatibility. Use PRISM Surface Tool for new setups; do not rename serialized components or asset references as a troubleshooting step.

FAQ

Does PRISM modify my source mesh?

No. The tool samples the MeshFilter's shared mesh and creates generated output. Clear removes that generated output.

Can Mesh Quads and HDRP Decals be mixed?

Yes. Route entries individually and configure both output groups on one PRISM Surface Tool.

Are results deterministic?

Yes, for the same receiver/input data and Seed. Change Seed to obtain a different repeatable arrangement.

Does it work in URP?

No. PRISM Surface v1.1.0 is HDRP-focused.

Does Material From Image require a photograph?

No. It accepts readable images, including photographs, scans, illustrations, and painted textures.

Does Stochastic Tiling require Blue Noise?

No. It uses deterministic procedural cell seeds. The legacy Blue Noise compatibility property is not an artist setup requirement.

Why is PRISM mapping always triplanar?

The PRISM Surface material workflow is built around fixed triplanar mapping with tangent-space normals and shared layer alignment. Mapping Space controls World/Object behavior; it does not switch to generic HDRP mapping modes.

Can I reuse settings on another object?

Yes. Save a SurfaceScatterProfile, load it on another compatible receiver, then preview and adjust for that object's size, orientation, and nearby targets.

Why does a Soft Limit not guarantee an exact count?

It caps accepted placements. Other rules may reject every available candidate before the cap is reached.

When should I use Preview Placement versus Preview Mask?

Use Preview Mask to tune allowed/blocked mask regions. Use Preview Placement when you need the real combination of masks, spacing, slope, fitting, Object Detection, and output safety.

Is DXR supported?

The PRISM shader includes a derivative-safe DXR sampling fallback intended for Windows ray-tracing/path-tracing compilation. Check compatibility with your target project and rendering path before relying on DXR.

Release notes

For current and historical PRISM Surface versions, see Release Notes.

12. Release Notes

PRISM Surface v1.1.0

PRISM Surface v1.1.0 expands the material workflow with the new PRISM Material Converter and broader HDRP material support.

- Scan loaded scenes or selected GameObject hierarchies and review referenced materials before conversion.
- Review compatibility classifications, proposed surface settings, mapped properties, and warnings before converting.
- Create new PRISM materials while leaving source materials and texture import settings unchanged.
- Optionally replace renderer material references after conversion; Unity Undo restores changed references.
- Convert supported HDRP/Lit Opaque, Alpha Clipped, and Alpha Transparent materials. Unsupported modes and features are identified before conversion.
- Configure expanded surface controls, including surface type and culling options.
- Enable transparent decal receiving where supported by HDRP. Supported decal channels are Base Color, Normal, and Smoothness.
- Preserve supported Mask Map remapping for Metallic, AO, and Smoothness.
- Detect invalid normal-map import settings and report when a normal map cannot be safely transferred.
- Exclude existing PRISM materials from conversion candidates.
- Improve Material Tool persistence and responsiveness.
- Update documentation with converter workflows, compatibility guidance, and illustrated examples.

HDRP materials that rely on mesh UV layout, texture atlases, trim sheets, or baked region selection may require manual adjustment after conversion because PRISM uses triplanar sampling. Appearance-preserving atlas-aware workflows are planned for a future major release.

Publisher: **Quantum Rift Interactive**

Version: **1.1.0**

Supported Unity/HDRP configuration: **Unity 6000.3.10f1 / HDRP 17.3.0**

Return to the PRISM Surface User Manual.

13. PRISM Surface AI Content Notice

Quantum Rift Interactive, publisher of PRISM Surface, has confirmed that the following packaged demo assets are PRISM-owned, AI-generated content created with OpenAI image generation through Codex and approved for commercial distribution with the product:

- `Textures/Surface/`: ten material-source textures: painted concrete, asphalt, bark, a dense foliage-canopy surface, and three matched sci-fi base/emission pairs in cyan, amber, and magenta
- `Textures/Scatter/Graffiti/`: eight graffiti source textures
- `Textures/Scatter/Drips/`: eight transparent drip source textures
- `Textures/Scatter/Gum/`: nine transparent gum-stain scatter textures
- `Textures/Scatter/Moss/`: nine transparent moss-and-lichen scatter textures
- `Textures/Scatter/Cracks/`: one transparent branching concrete-crack scatter/decal texture
- `Textures/Masks/`: one high-contrast placement-mask texture

These assets are supplemental demonstration and workflow examples for PRISM Surface. They are not third-party package dependencies.

How the demo images were created

OpenAI image generation through Codex was used to create ten surface-material source textures-including three matched sci-fi base/emission pairs-eight graffiti textures, eight transparent drip textures, nine transparent gum-stain textures, nine transparent moss-and-lichen textures, one transparent branching concrete-crack texture, and one high-contrast placement-mask texture. The publisher selected and named the generated images, removed chroma-key backgrounds and separated the gum and moss sheets into individual alpha textures, configured their Unity import settings, and integrated the content into PRISM Surface demo and validation workflows.

First-Party Image-Derived Example

Quantum Rift Interactive has confirmed that the PRISM-owned source image used to create the abstract material example is approved for commercial distribution with the product. The curated material and generated maps under `Materials/Image/PRISM_Surface_Abstract/` are approved derivatives created through the PRISM Surface Material From Image workflow and may ship with PRISM Surface.