# Krita PBR Pipeline Roadmap

This roadmap outlines tasks to enable Krita to produce PBR-ready assets from painterly workflows. The goal is to allow artists with no knowledge of PBR to paint with familiar tools and automatically generate material channels ready for use in game engines, renderers, or painting printers.

## Stage 1 — Foundation

* **Define Material Groups**
* Add a group type/tag in .kra metadata (e.g., <materialGroup>).
* Each Material Group contains sublayers for BaseColor, Height, Normal, Roughness and Metallic.
* Ensure consistent color spaces (BaseColor uses sRGB; other channels use linear).
* **Channel Matrix for Brushes**
* Extend brush engine so each preset has checkboxes and sliders indicating which channels it affects (Color, Height, Normal, Roughness, Metallic) and opacity per channel.
* Provide sensible defaults for common painterly brushes (e.g., Oil Flat affects Color and Height, automatically derives Normal, uses mid Roughness, Metallic zero).
* **Stroke Routing**
* On stroke events, clone the dab into each enabled channel and apply channel-appropriate compositing:
  + Color: usual painting operations (in linear space).
  + Height: derive relief from pressure and brush alpha; apply zen‑rake logic for smear vs carve.
  + Normal: compute from Height (via gradients and RNM) or stamp a normal imprint.
  + Roughness: map from pressure/tilt or constant.
  + Metallic: usually zero except for special brushes.

## Stage 2 — Export Pipeline

* **Exporter Plugin**
* Walk each Material Group, composite visible sublayers and write channel outputs as separate images:
  + \*\_BaseColor.png (sRGB 8/16-bit).
  + \*\_Height.exr or .png (linear 16-bit).
  + \*\_Normal.png (tangent-space; OpenGL by default with optional DirectX flip).
  + \*\_Roughness.png (linear 8/16-bit).
  + \*\_Metallic.png (linear 8-bit).
* Preserve color management: convert BaseColor to sRGB only on export; keep other channels linear.
* **Channel Packing (Optional)**
* Support packing roughness, metallic (and occlusion if added) into a single RGB texture (e.g., ORM) for engine use.
* **Export Profiles**
* Provide presets for common targets: game engines (Godot, Unreal, Unity) and painting printers (mapping channels to pigment deposition, varnish thickness, etc.).

## Stage 3 — Artist Usability

* **Default Brush Pack**
* Provide a bundle of brushes preconfigured for PBR painting: Oil Flat, Palette Knife, Dry Brush, Gold Leaf, Glaze, etc. Each brush uses the channel matrix with appropriate defaults.
* **Quick Toggles**
* Add UI controls for “Color‑only” and “Texture‑only” modes.
* Allow locking or soloing individual channels.
* **Preview Helpers**
* Offer an optional relief preview shader in the viewport that applies a simple directional light to Height/Normal so artists can see brushstroke relief as they paint.

## Stage 4 — Nice‑to‑Haves (Future)

* **Height→Normal filter layer** baked on export or live preview using RNM blending.
* **Procedural Roughness from stroke slope** to simulate glossier ridges and matte valleys.
* **Per‑tip stamp maps** allowing brush tips to supply their own micro height/normal textures.
* **Hooks for UDIM/3D painting** enabling projection onto 3D surfaces and proper UDIM export.