VANGUARDFX

Vanguard Tornado

QUICK START GUIDE · VERSION 1.1

From creating a tornado to destroying a city and rendering a cinematic shot — step by step.

Vanguard Tornado 1.1 · 3ds Max 2024–2027 · Destruction powered by NVIDIA PhysX 5

vanguardfx.pro · support@vanguardfx.pro

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1. What Is Tornado?

Vanguard Tornado creates a complete tornado on the graphics card, including a funnel, dust and debris, storm clouds, lightning, thunder, and rain. Everything responds to a physically varying wind field that can be sampled at any point in the scene.

The wind can damage a city: buildings tilt and detach from their foundations, glass breaks, and debris is lifted and carried away. Destruction is simulated with NVIDIA PhysX 5. With a supported NVIDIA GPU, simulation runs on the graphics card, helping keep the workflow fast.

The basic workflow

• Create and animate the tornado path.

• Prepare the city.

• Click BUILD DESTRUCTION.

• Press Play and review the result.

• Adjust lighting and render.

In one sentence: Create a tornado, animate its path through the city, click **BUILD DESTRUCTION**, and press Play. The rest of this guide covers better quality, faster simulation, and companion-plugin workflows.

2. Requirements and Companion Plugins

System	Minimum	Recommended
3ds Max	2024	2024–2027
Graphics card	NVIDIA GPU with 12 GB VRAM or more	RTX 30 / 40 / 50 series
System memory	16 GB	32–64 GB for large cities
Driver	Latest NVIDIA driver (required for GPU physics)	Latest stable NVIDIA driver

Required vs. optional plugins

Plugin	Role in a tornado scene	Status
Vanguard Tornado	Tornado, wind, destruction, rain, lightning, and thunder	Required
VanguardCity	Buildings, cars, trees, street props, and power poles that can be destroyed. Tornado can also break individual objects without City.	Recommended
Vanguard Render	Fast GPU volumetric rendering for tornadoes and clouds with storm lighting	Recommended
Vanguard Shatter	More cinematic, fine-scale breakage for hero buildings close to the camera	Optional
VanguardFire	Fire and sparks where debris collides or power poles fall	Optional
Vanguard Cables	Power lines that sway in the wind and snap when walls fall	Optional
Vanguard Crowd	People who flee or are lifted into the air	Optional
Vanguard Weather	Scene-wide rain and snow that help sell the tornado's wind	Optional
VanguardCloud	Clouds surrounding the storm	Optional
Corona or V-Ray	Alternative render engines	Optional

Note: Tornado works without any companion plugin. If a companion plugin is not installed, only that plugin-specific feature is unavailable.

3. Installation

• Close all running instances of 3ds Max.

• Download and run **VanguardFX_Tornado_Setup** from the website, then select the installed versions of 3ds Max. The installer also places the GPU module for PhysX in `Program Files\VanguardFX\PhysX`. This folder is shared by Tornado and Shatter.

• Open 3ds Max. Find **VanguardTornado** under **Create** → **Geometry** → **VanguardFX**.

• Enter your license in the **Licence and plans** rollout. The 7-day trial exposes the available trial features. VDB and PRT export require a license.

• Click in the viewport to create **VanguardTornado**. The click location defines the tornado's base on the ground.

4. Creating and Animating a Tornado

Animate the tornado path

• Enable **Auto Key** and move the tornado at the final frame. The tornado follows this path precisely. Add keys at intermediate frames to make the path curve.

• Press Play. Particles are simulated on the GPU and each frame is cached in memory, allowing quick scrubbing backward and forward.

• If you change the path keys later, Tornado starts the simulation again. If you had already built destruction, 3ds Max will show a reminder in the status bar to run **BUILD DESTRUCTION** again.

BUILD SHOT — everything in one click

In the Render Look rollout, **BUILD SHOT** creates a starting cinematic setup for you: camera, destruction setup, and render settings. You can manually adjust everything afterward.

5. Preparing a City (VanguardCity)

Tornado identifies city pieces along its path and separates them for destruction. Make sure the city features you want destroyed are enabled in VanguardCity.

Important: cars and trees are disabled by default. If you create a city without selecting a preset, cars, lights, power poles, and trees may be disabled. Presets such as Miami, NeoTokyo, and Tehran enable these features.

Enable city features with one MAXScript command

```
VanguardCityTool.citySetParam $VanguardCity001
"treesOn=1;polesOn=1;lightsOn=1;signalsOn=1;trafficOn=1;trafficAnimate=0" 0
```

City setting	What Tornado does with it
treesOn	Trees can snap or be uprooted.
polesOn / cablesOn	Power poles and cables can fall, with sparks where supported.
lightsOn / signalsOn	Streetlights and traffic lights can be knocked down.
trafficOn (with trafficAnimate=0)	Parked cars can be lifted according to their assigned weight.

Lifting objects according to weight

VanguardCity assigns realistic weights to its pieces, and Tornado uses those weights. Examples include a 1.4-ton car, a 9-ton truck, a 15-ton fire engine, a 300 kg power pole, and an 18 kg trash bin. A light bin is lifted before a car; a fire engine is harder to lift than a car.

Using your own city without VanguardCity

Tornado can break any object along its path. Small objects (under 7 m) may fly away as a single piece and can be replaced with another model. Tall, narrow objects can break like trees; other objects are fractured. You can also add custom objects to the target list at the top of the panel.

6. Step-by-Step City Destruction

What happens during destruction?

• **Gradual build-up:** The tornado ramps up over the number of seconds set in Build-up (s).

• **Light objects first:** Glass and lightweight props are affected before buildings.

• **Buildings resist at first:** Lower floors and structural frames are stronger. A building may detach where the tornado grips it and fall onto a neighboring building.

• **Debris swirls in the air:** Wind carries fragments so they tumble and hover instead of simply sliding along the ground.

• **Only the required frames:** From frame = -1 means automatic; frames before the tornado arrives are not processed. To frame sets the end of the simulation range.

Workflow

1. Save the scene. The destruction cache and companion files are written next to the 3ds Max file in a folder named `<scene>_tornado`.

2. In the **City and Collision** rollout, set **Destruction physics: Solver** to **PhysX (cinematic)**.

3. Select **Surface** to destroy only objects lighter than 2 tons (glass, trees, cars, furniture, etc.). Select **From the root** to destroy buildings as well.

4. In **What the tornado takes**, check the types of objects to destroy (see the next page).

5. Click **BUILD DESTRUCTION**. Prepared fragments appear in the viewport every few frames. Press **Esc** to stop; already generated frames remain available.

6. When the process finishes, a results window appears. Click **Go to the first break** to jump to the first moment of destruction, then press Play.

7. To restore the scene and remove the generated destruction, click **CLEAR DESTRUCTION**.

7. Destruction Settings and Scene Performance

Scene complexity is under your control. Turn off anything you do not need; disabled categories are not simulated.

What the tornado takes	Options
Glass breaks	Whether glass breaks
Walls / buildings break	Whether facades, roofs, floors, and structural parts are destroyed
Cars lift off	Whether cars are lifted
Street props go	Signs, bins, benches, and similar props
Trees	Stay (snap), Uproot, or Snap or uproot (combined)
Power poles	Stay, Fall, or Fall + sparks

Destruction physics

Setting	Meaning
Max pieces (0 = auto)	At 0, Tornado measures system performance and chooses a fragment count. A weaker computer takes longer per frame and should use fewer fragments; a stronger one can handle more.
Seconds a frame	Target processing time per frame; default is 2.5 seconds.
Debris size (m)	Smaller fragments produce finer, heavier-looking debris.
Structure strength	Higher values make buildings more resistant; primarily the tornado core can destroy them.
Build-up (s)	How many seconds the tornado takes to reach full strength.
From frame / To frame	Simulation range. -1 means automatic.
Hero bldgs (Shatter)	Number of nearby hero buildings that receive fine Shatter breakage, if Vanguard Shatter is installed.

For weaker computers

Set **Max pieces** manually to 5,000–15,000, reduce **Reach**, and disable objects that will not be visible in the shot.

8. Connecting Other Plugins

All integrations are available in the **City and Collision** rollout. Each button reports the result after it runs. If a file is created, an **Open folder** button is available.

Button / command	Plugin(s)	What it does
CREATE WIND	Fire, Particle Flow, tyFlow	Creates a tornado wind Space Warp and connects it to the scene. For Particle Flow and tyFlow, add it as a Force.
WRITE EVENTS (Fire)	VanguardFire	Writes `eventa.txt` with collisions and sparks. Select this file in Fire so collisions can ignite and sparks can flash.
LINK WEATHER + CABLES	Weather, Cables	Synchronizes wind and cable motion with the tornado.
exportpieces	Vanguard Cables	Writes city-piece motion for Cables so wires attached to a wall can fall and snap with it. The Cables "Follow the tornado" option triggers this automatically.
exportwind	Shatter, Crowd, Weather, Cables	Writes the complete tornado wind field to a `.vtw` file. Other plugins read the field at each frame and sample wind at each point.
LINK SHATTER	Vanguard Shatter	Breaks glass assigned to Shatter when the tornado reaches it.
CREATE WET MAP	Any renderer	Creates a rain-wetness map and opens the Material Editor.

MAXScript examples

```
tornadoCommand $VanguardTornado001 "exportwind" @"D:\shot\wind.vtw"
tornadoCommand $VanguardTornado001 "writeevents"
tornadoCommand $VanguardTornado001 "exportpieces" @"D:\shot\pieces.vtp"
```

Crowd

In Vanguard Crowd, add the tornado to the hazards list and set the response to **Flee from**. People run away from the core and may be lifted into the air.

9. Rendering: Vanguard Render, Corona, and V-Ray

In the Render Look rollout, **BUILD RENDER SETUP** prepares settings for all three render engines, switches the viewport to the render camera, and offers a preview render.

Vanguard Render (recommended)

The tornado is rendered as a true GPU volume. The setup places the sun low behind the funnel and creates a stormy sky. Deep shadows are configured automatically. Rendering is fast because the volume is built once and reused for each frame.

Set **Draw as: Volume** or **Volume + particles**.

Corona / V-Ray

Destruction fragments render as geometry with their original materials. The tornado funnel and clouds are read from VDB files alongside the scene. Use **Add sun + sky** to create storm lighting.

Current limitation

In the current version, Vanguard Render does not yet display destruction fragments; only the tornado and clouds are visible. To render buildings while they are breaking apart, use Corona or V-Ray until a future Render version adds this support.

Test renders

For tests, use low quality (6–12 passes and half resolution). Render at final quality only after the motion and lighting are correct.

Step by step

• Create a camera and look through it in the viewport.

• Choose the render engine in Render Setup.

• Click BUILD RENDER SETUP, then Render a preview to inspect the result.

• For a cinematic shot, use Volume cells = 320, Draw as = Volume, and a storm cloud enabled; try 512 for more detail if performance allows.

• To export to other software, use EXPORT VOLUME (.vdb) and EXPORT PARTICLES (.prt).

10. Performance, Memory, and Troubleshooting

Performance and memory

Area	Recommendation
GPU physics	With an NVIDIA card and current driver, GPU physics is enabled automatically. The destruction result should report "PhysX CUDA." A city corridor may take roughly 0.2–0.5 seconds per frame, depending on scene complexity and hardware.
Viewport cache	Cache (MB) defaults to 3000 MB. Reduce it on systems with limited memory.
Multiple 3ds Max sessions	Avoid running several heavy 3ds Max scenes at once. Each city scene can consume several gigabytes of memory.
Large cities	Reduce Reach so only buildings near the tornado path are broken.

Troubleshooting

Problem	Solution
No cars or trees are destroyed	They may be disabled in VanguardCity. See Section 5.
Destruction disappears after changing the path	This is intentional. Click BUILD DESTRUCTION again.
A building disappears but its fragments are not visible	If reopening the scene, make sure the `<scene>_tornado` folder is next to the scene file. If it is missing, click CLEAR DESTRUCTION and build again.
Each frame is very slow	Set Max pieces to 0 (automatic) or use a lower value. Increase Seconds a frame to allow more time per frame.
Fragments are not visible in Vanguard Render	This is a current limitation. Render with V-Ray or Corona.

Support

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