

# Virtual Afghanistan Village for Coalition Operations



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*Real-time scenes in VRSG of MetaVR's virtual Afghanistan village: aerial view of the village, a JTAC team at an overwatch position, and a simulated scope view of two insurgent snipers in position on a rooftop.*

To meet the needs of training NATO soldiers for coalition operations in Afghanistan, MetaVR™ has built 3D geospecific terrain covering 9,600 square km, featuring a high-resolution virtual village with over 500 buildings in the Afghan province of Kabul. This virtual terrain is available in both MetaVR's round-earth and flat-earth formats for visualizing in the company's Virtual Reality Scene Generator™ (VRSG™). The terrain is also delivered with correlated SAF databases in CTDB and OTF formats.

Using MetaVR Terrain Tools for ESRI ArcGIS, the 2 x 2 km terrain patch of the village was compiled in OpenFlight format. Terrain regions (such as fields, roads, and buildings) were cut out and marked by material type. Modeling artists imported this terrain patch into third-party modeling tools, built 3D content into the terrain, and modified the elevation to simulate higher resolution. The resulting modeled terrain patch was exported to a single model in MetaVR's model format. Using the Terrain Tools' feature-cutting capability, the surrounding area was generated in MetaVR's 3D terrain formats with the inset patch region cut out of the terrain. The modeled terrain patch is referenced by the terrain's cultural feature file and rendered by VRSG at run time as part of the terrain.



*Insurgents burying a Mark 84 bomb fitted with a cell phone detonator. The dust created is visible to a patrolling UAV. The digging animation is one of many animations that are delivered with VRSG.*

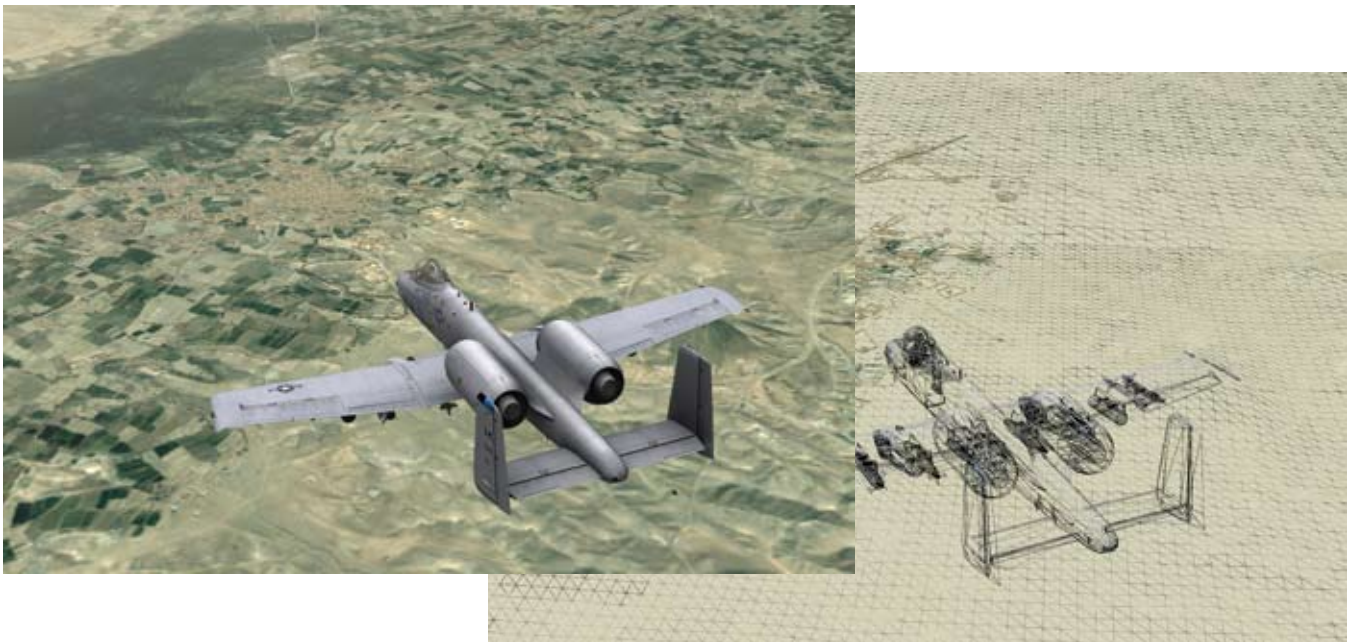
As a significant percentage of Afghanistan's population lives in mountainous terrain, training warfighters in a simulated environment that accurately represents mountainous regions with small population centers is critical. Unlike the simplified, flattened terrain used in urban environments in most image generators and video games, MetaVR's Afghan village is set among mountains and complex terrain features, enabling realistic training scenarios for mission planning and rehearsal of operations in mountain villages. The virtual terrain of this area was built from geospecific high-resolution elevation and imagery source data; it was augmented with finer level terrain details derived from the imagery to add to the realism near ground level.



*Simulated MRAP convoy (above) and groups of civilians and insurgents (below). The vehicles are among the full set of production MRAP vehicles in MetaVR's library of military models.*



*Images on the cover: Real-time scenes in VRSG of MetaVR's virtual Afghanistan terrain: an insurgent compound in the village, a close-up of a village elder character, a Talon UGV, and a US JTAC team.*



*Simulated A-10 aircraft flying over the virtual Afghanistan terrain. The model is part of MetaVR's 3D content library of military models that is delivered with VRSG. Behind the textured view is a portion of a wireframe view of the same scene that reveals the scene complexity.*

This Afghanistan virtual terrain provides the opportunity for users to conduct challenging exercises within its tunnel and cave network, as is demonstrated in the example insurgent stronghold. Accurately simulating typical below-ground entrances is another important part of preparing soldiers for Afghanistan and other mountainous regions.



*Insurgent stronghold in the mountains overlooking the built-up village area.*

This virtual terrain, built with MetaVR Terrain Tools for ArcGIS, includes 1,120 square km of 60 cm Digital Globe commercial satellite source imagery and 90 meter elevation posts and features a highly detailed 2 x 2 km inset terrain patch of a geospecific Afghan village. This terrain was made entirely from commercial, non-export controlled source data.

Enhancing the overall SRTM3 elevation data are higher resolution areas within the inset terrain patch of the village. These high-resolution areas define features such as berms,

ditches, and a tunnel network, all of which were modeled in 3D Studio Max. The village area has approximately 520 custom-built 3D structures that match the building footprints as seen in the source imagery. Many of the buildings are multi-level and have modeled interiors. Open doorways, translucent windows, and stairways contribute to making the virtual village suitable for tactical scenarios. The textures of many cultural features are derived from publicly available photos found on the Internet. Geospecific agricultural fields are also modeled and can be tailored to represent various crop types over different seasons.

The modeled village is based on the small village of Khairabad in the southern part of the Kabul province. Khairabad, situated at an altitude of 1,843 meters, is located approximately 10-15 kilometers south of Kabul city center, next to Qalai Naeem in the Char Asiab district.



*One of the technical vehicle models in MetaVR's 3D content library of military models, which is delivered with VRSG.*

This virtual village and its surrounding mountainous terrain give users the ability to conduct ground combat simulations, such as sniper exercises, with a high degree of realism. For example, the high-resolution terrain and models appear accurately, without visual artifacts, while being rendered as simulated magnified scope views and laser designator optics. A sniper scenario that is delivered with the terrain shows an overwatch position on a ridge approximately 200 meters from an insurgent stronghold. The 3D vehicle entities on the ridge behind the sniper and JTAC teams, such as the military Land Rover, are representative of the types of vehicles that are actually used to transport soldiers in these mountainous regions.

The sniper scenario is one of the scenarios delivered with the terrain that feature a number of new technical military

vehicle models and Mine Resistant Ambush Protected (MRAP) models representative of combat vehicles used in the area. The vehicles, characters, and other models used in the scenarios are all from MetaVR's robust 3D content libraries, which are bundled with MetaVR's image generator.

The tunnel and cave complex in this virtual terrain has an entry point in one of the buildings that is linked to a cave and tunnel position in the courtyard, which could be used as a mortar position. The tunnel exits some distance away in a heavily wooded area behind the building complex and courtyard. The tunnel network is modeled with geometry and textures much like the above-ground terrain. It can support the underground traversal of small entities such as small unmanned ground vehicles (SUGVs) or characters.



Three views in VRSG of a tunnel complex on MetaVR's Afghanistan virtual terrain: the entrance and exit and a cross-section view of the tunnel from below the terrain.

MetaVR's Afghanistan database, built in collaboration with SimthetiQ and VR Group, is available free of charge in MetaVR's terrain formats and SAF formats to MetaVR customers who are on active software maintenance and are US Government and NATO agency and contractors (for official use only). The terrain requires a license of VRSG version 5.5 or higher.



For more product information, pricing, and ordering, see MetaVR's web site at [www.metavr.com](http://www.metavr.com) or send email to [sales@metavr.com](mailto:sales@metavr.com).

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