VBS World Server

VBS World Server 24.1.1

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Contents

1. VBS World Server Overview

VBS World Server reduces the administrative overhead of managing a VBS4 classroom by centralizing terrain data and also the storage of Battlespaces.

VBS World Server is designed from first principles with cutting-edge networking, cloud deployment, procedural enhancement capabilities, and open standards compliance to facilitate easy enhancement with future technology advancements.

VBS World Server includes global geospatial data, including curated elevation and bathymetric data, buildings and roads, water bodies, regional specific vegetation and surface materials. The terrain data processing pipeline handles sub-centimeter resolution data sources, or it can procedurally generate realistic, geotypical, high-resolution data from low-resolution sources.

Services provided by the VBS World Server include:

- A user interface for monitoring and managing all VBS World Server services
- VBS Blue Terrain Server
- Geospatial data server
- File server
- Place name lookup service
- VBS4 Dedicated Server

  > **NOTE**
  >
  > For most use cases, Scenario Executions are hosted on a separate Dedicated Server or on a VBS4 Admin Client. For more information, see Scenario Execution in the Introduction to VBS4 Guide.

- VBS4 Terrain Inset Manager

To setup and use VBS World Server, review the following topics:

- Deploy VBS World Server (on page 25)
- Managing VBS World Server (on page 37)
- Managing the Whole-Earth Terrain (on page 73)
- Connecting Clients (on page 118)
- Troubleshooting VBS World Server (on page 122)

1.1 VBS World Server Improvements 24.1

VBS World Server 24.1 contains the following improvements:

1.1.1 General

- Cybersecurity improvements have been made, reducing vulnerabilities in VBS World Server.
- The GeoServer used by VBS World Server has been updated from version 2.13.2 to version 2.24.1.
- A Debug Mode has been added to VBS World Server for troubleshooting failed actions. For more information, see Debug Mode in VBS World Server (on page 123).
- User-created insets can now be downloaded as a zip for use in other VBS World Server or VBS4 instances. For more information on downloading terrain insets, see Data Management (on page 60). For more information on using the terrain insets with VBS World Server or VBS4, see Using Downloaded VBS World Server Insets (on page 116).
- Improvements were made to the **Updater.exe** to more reliably install updates while VBS World Server is configured.
- Models now immediately stream following the conclusion of an import process.
- If an inset is created with the same name as an existing inset, the inset name will automatically increment (e.g., *Hohenfels_2*).
- Inset content data is now organized into subfolders as follows: `<Installation>\Services\VBS4\myData\Blue\content\<insetname_content>`.
- A bug was fixed with `vws_stop.exe` that prevented a VBS World Server executable from stopping as expected.

1.1.2 VBS World Server User Interface

- The VBS World Server **Toolbar** now has a **Help** button that links to the VBS World Server User's Manual in the default web browser.
- The **Information Panel** now displays the VBS World Server build version installed on the server.
- The **Status Panel** now displays the remaining disk space for the drive on which VBS World Server is installed.
- The **Inset List Sorting** menu in the **Data Management** tab now has **Ascending** and **Descending** options for sorting.
- The `_VBS3hgt.tif` data layer now appears in the **Terrain Layers Panel**.
- The **Clear Caches** function now restores all services to their state before the cache clearing was initiated.
- A limit was added to the **Globe View** in the **Data Management** tab for zooming out on the globe.
- A bug was fixed that caused the browser version of the VWS Management page to become unresponsive after a period of inactivity.
- A bug was fixed that caused display issues with inset labels in the **Globe View** of the **Data Management** tab.
- Improvements were made to the information reported by the VWS management executables.

1.1.3 Terrain Conversion Tool

- The Terrain Conversion Tool now uses the correct server port numbers.
- Buildings generated by the Terrain Conversion Tool should now draw farther out in VBS runtimes.

1.1.4 Terrain Insets

- A new terrain inset, Beale Air Force Base, California, was added as a baseline terrain inset. This airfield inset contains high-resolution representations of airfield surfaces, markings, signage, lighting, and custom airfield structures, and contains a high-resolution surface mask and imagery. For more information, see Beale Air Force Base Inset (on page 113).

1.1.5 World Data

- The World Data now includes an optional global airfields package consisting of over 9,000 regional and international airfields scattered throughout the world. The airfields contain paved surfaces, accurate paint markings, realistic navigational light models, and updated heightmaps and surface masks for each inset. For more information, see Download VBS4 (on page 27) and World Airfields (on page 79).

1.2 VBS World Server Improvements 23.2

This section discusses the improvements included in all major and minor versions of VBS World Server 23.2.

- VBS World Server Improvements 23.2 (above)

1.2.1 VBS World Server Improvements 23.2.0

VBS World Server 23.2.0 contains the following improvements:

- General Improvements (below)
- VBS World Server User Interface (below)
- Terrain Conversion Tool (on page 14)

1.2.1.1 General Improvements

- French localization support has been added.
- The VBS World Server **Server Management Dashboard** now launches in the same language as the VBS4 localization. (Only English or French are currently supported.)
- VBS4 Clients now include a status check of the VBS World Server WPS Server service to confirm that the connected VBS World Server is online.
- VBS Geo's **Data Import** functionality has been updated to use the new road textures introduced in VBS4 23.2.
- A bug was fixed that prevented VBS Geo-added water from being exported.
- A bug was fixed that caused VBS World Server insets to not be generated if non-SQLite files were present in the inset folder.
- A bug was fixed that caused the VBS Geo Data Import process to freeze.
- Improvements were made to the inset deletion processes.

1.2.1.2 VBS World Server User Interface

- The VBS World Server **Server Management** tab now displays the VBS4 version number and the full file path to the VBS World Server installation.
- The **Clear Caches** button has been added to the **Server Management** tab's **Services Panel**.
- The VBS World Server **Server Management** tab's **Services Panel** now consistently sorts entries in a case insensitive manner regardless if they are sorted by first or last.
- The VBS World Server **Globe View** in the **Data Management** tab contains new backdrop map feeds: VBS Albedo and VBS Shaded Relief.

- A new **Map Extent** option has been added to the **Inset List Filter**. This option filters the inset list based on the extent of the map visible in the **Globe View**.
- The **Map Settings Menu** can now control map display preferences in the **Globe View**. This menu includes options for clustering inset labels, toggling political boundaries and place names, and enabling the display of Latitude / Longitude gridlines.
- The **Preset Inset Configuration** option on the **Data Management** tab has been renamed to **Preset**.
- The **Data Management** tab's **Insets Management** panel's sorting and filtering system now saves into the **Preset** configuration when using the **Commit Configuration** button.
- The **Data Management** tab's **Insets Management** panel now displays a **(Filtered)** label next to the number of insets to easily show if the results are being filtered.
- Saved **Presets** can now be updated with inset configuration changes using the **Update Preset** button.
- The **Generate New Insets** and **Resync Insets** buttons have been added to the **Inset List Options**.
- The **Insets** panel now saves the scroll position after a page refresh.
- The **Insets** and **Layers** panels now ensure that a row stays in view when it is expanded or set to **Edit** mode.
- The bounds input in the **New Process** panel has been restyled.
- The **Terrain Layers Panel** now fully recognizes and supports the `mapVec` layer and displays the correct data type.
- Improvements were made to inset bounding box rendering and appearance in the **Data Management** tab.
- Improvements were made to the **Data Management** tab display when the window is resized.
- A bug was fixed that prevented the default appearance features for mapping surface features for OpenFlight (FLT) and MetaFlight (MFT) exports from loading properly.
- A bug was fixed that caused rendering issues when switching between the **Imagery** and **3D Tiles** view in the **Globe View** panel.
- A bug was fixed that caused VBS World Server **Terrain Layers** to have their names hidden if they contained a plus sign ("+").
- A bug was fixed that caused rendering issues when zooming in on the terrain in the **Globe View** panel.
- A bug was fixed with specifying negative values in the **Load Priority** field.

- A bug was fixed that caused holes to appear in terrain insets created by the **Import Generic Data** process whenever the provided bounds file exceeded the extent of the imported elevation data.

1.2.1.3 Terrain Conversion Tool

- The Terrain Conversion Tool now produces road data using the new road textures added in VBS4 23.2.

1.3 VBS World Server Improvements 23.1

VBS World Server 23.1 contains the following improvements:

- General Improvements (below)
- VBS World Server User Interface (below)

1.3.1 General Improvements

- Improvements have been made to more accurately show the state of battlespaces synced between VBS World Server and connected clients.
- Multiple cyber security vulnerabilities have been addressed associated with VBS World Server services and the VBS World Server UI.
- Improvements have been made to the configure and shutdown processes to make them more reliable.
- A new WPS service has been added to improve the server's WPS request infrastructure.
- The `vws_configure.exe` executable now checks for existing VBS World Server services that are running. If they exist, they will be properly shut down by the executable prior to reconfiguring the services. This may increase the time it takes for `vws_configure.exe` to finish configuring services.
- An issue was fixed that caused the Inset Server to not function properly when the server installation path contained a space.

1.3.2 VBS World Server User Interface

- Performance metric graphs for the VBS World Server machine and services have been added to the **Server Management** tab of the **VWS Dashboard**.
- The VBS World Server web UI is now compatible with legacy versions of Google Chrome dating back to version 68.
- Tile artifacts have been removed from the VBS Imagery display in the **Data Management** tab.
- The **Insets Management** panel can now load on multiple browser tabs simultaneously.
- An issue was fixed where the **Insets Management** panel would not display the list of insets if there was a space in the name of the `\Installation\` folder.

1.4 VBS World Server Improvements 22.2

VBS World Server 22.2 contains the following improvements:

1.4.1 General Improvements

- The VBS World Server file server has been upgraded. The new system removes file size transfer limitations, improves file transfer capabilities and speeds, and allows for cloud-scaling.
- The newly-added Inset DB Server automatically creates insets in the VBS World Server User Interface as layers are imported via **Data Import**.
- The newly-added Proxy Server consolidates service endpoints through a reverse proxy server.
- The Terrain Conversion Tool process was improved to remove typos and erroneous folder creation.
- VBS Geo Data Import now uses the new building extrusion system, which includes improved building textures. See Vegetation and Building Texture Repathing in the VBS4 Release Notes for more information.

1.4.2 VBS World Server User Interface

- The VBS World Server user interface now uses a green color palette instead of a blue one.
- The VBS World Server Management UI now includes the **Data Management** tab which is an interface to monitor and manage terrain insets and other data, accessible in a web browser or from the VBS4 Toolbar.

  For more information, see VBS World Server Management UI Improvements (on the next page).
- The **Logs** page has been added to the **Server Management** tab. This page gives information on the VBS World Server server log files found in `\VBS World Server\Logs\`. For more information, see Logs (on page 57).
- The VBS World Server VBSBlueServer Service now reports accurate network usage values.
- The VBS World Server fileserver service now returns appropriate network usage values for outbound network activity, e.g., when downloading an AAR file from the VBS World Server to a client.
- A **Stopping Services** warning dialog will now appear any time a service is being stopped with the VBS World Server UI.

1.4.3 VBS World Server Executables

- The Updater Tool for VBS World Server is renamed from `VBS_WorldServerUpdater.exe` to `Updater.exe`.
- The `vws_status.exe` and `vws_nanny.exe` have been removed from the VBS World Server installation. Service status, as well as other server operations, can now be accessed via the VBS World Server User Interface (on page 48).

1.4.4 Terrain Conversion Tool

- The vegetation model references in VBS4 have been repathed. As a result, the vegetation script for the VBS3 to VBS4 Terrain Conversion Tool has been updated accordingly. Users can still use the tool exactly as before; however, any archived version of the `Xtract_VBS3toBlue_vegobj_attr_remap.txt` script with custom vegetation changes will need to be updated to use the new paths.

1.4.5 World Data

- The World Buildings and World Roads data has been updated to version 22.2. For more information, see Download VBS4 (on page 27).

1.4.6 VBS World Server Management UI Improvements

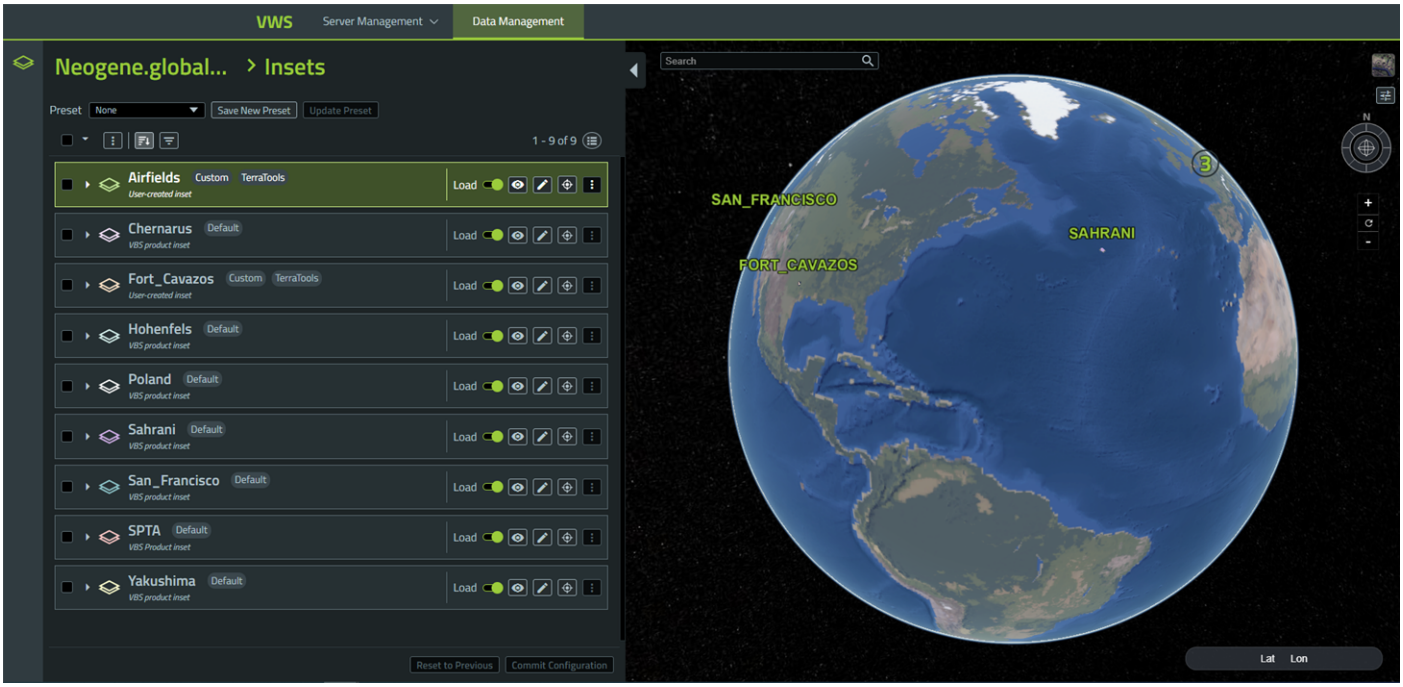
VBS World Server includes a new tab that provides an overview of the data on the server. The VBS World Server UI is accessible in a web browser or from a VBS4 Admin Client.

In this release, the VBS World Server UI monitors the overall VBS World Server status, enables the management of VBS World Server Services, allows for tracking of server logs from the new **Logs** tab, and enables the data management of terrain insets from the **Data Management** tab. It also includes a map interface for previewing terrain insets (see Globe View (on page 70)).

Access the VBS World Server UI:

- From your web browser: `Server Machine IP Address:6606/#/dashboard`
- From the **World Server Status** dialog in the VBS4 Toolbar.

For more information, see VBS World Server User Interface (on page 48).



1.5 VBS World Server Improvements 22.1

VBS World Server 22.1 contains the following improvements:

- VBS World Server Management (below)
- VBS World Server System Requirements (below)
- VBS World Server User Interface (below)

1.5.1 VBS World Server Management

- The VBS World Server Management UI provides an interface to monitor and manage VWS Services, accessible in a web browser or from the VBS4 Toolbar.

  For more information, see VBS World Server Management UI (on the next page).

- Symbolic links in the `\Installation\data\` folder to other nested VBS World Server folders were removed to simplify navigation.

1.5.2 VBS World Server System Requirements

- VBS World Server is no longer required to be installed on an NTFS-formatted drive.

1.5.3 VBS World Server User Interface

- The location results returned by the geolocation search bar were improved.

1.5.4 VBS World Server Management UI

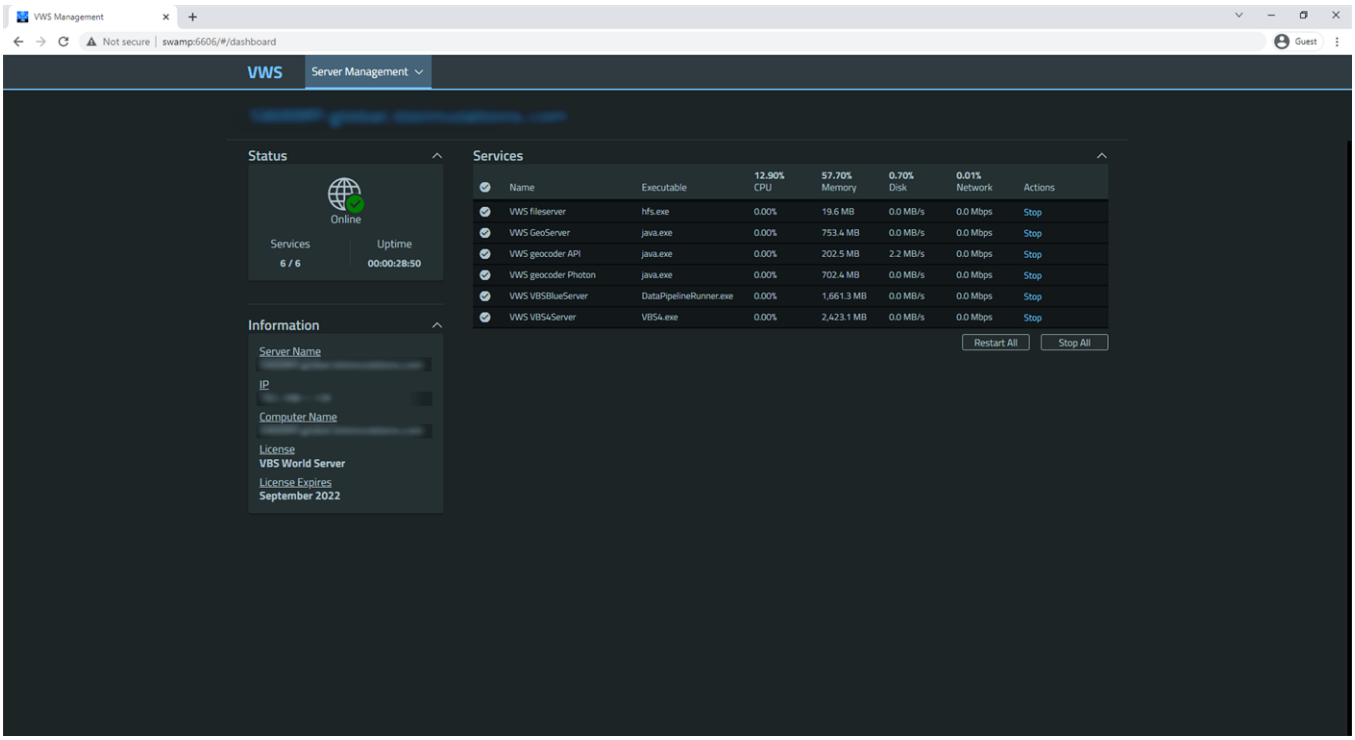
VBS World Server includes a new management interface accessible in a web browser or from a VBS4 Admin Client.

In this release, the VBS World Server UI monitors the overall VBS World Server status and enables the management of VBS World Server Services.

Access the VBS World Server UI:

- From your web browser: `Server Machine IP Address:6606/#/dashboard`
- From the World Server Status Dialog in the VBS4 Toolbar.

For more information, see Managing VBS World Server (on page 37).



1.6 VBS World Server Improvements 21.1

VBS World Server 21.1 contains the following improvements:

1.6.1 Battlespaces and Battlespace Management

- A bug was fixed which caused Battlespace uploads and downloads to sometimes fail.
- The folder size limit for downloading Battlespaces from the server to the client was raised to 7 GB. Battlespaces will download properly to the client up to this limit.
- Several training and demonstration Battlespaces have been added to the VBS World Server, which can be accessed and managed by VBS4 clients connected to the VBS World Server. These samples can be found in the `\Installation\Data\Battlespaces` folder.

  For more information on these Battlespaces, see the following topics:

  - Training Battlespace in the VBS4 Trainee Manual
  - VBS Use Cases Documentation in the Introduction to VBS4 Guide

1.6.2 Data Import

- A bug was fixed that prevented color-paletted surface mask data (generated by TerraSim's MaterialMAP™) from being properly displayed when imported to the VBS World Server.

1.6.3 Data Removal

- A bug was fixed with the Data Removal process which prevented layers with spaces in their file name from being properly deleted. These layers can now be removed from the VBS World Server using the Data Layer Management tool.

1.6.4 Terrain Conversion Tool

- Terrains with 25 characters or more will now have their name truncated with an underscore (previously was a tilde).
- An issue was fixed that caused some models to not receive proper light configurations in VBS4 after the Terrain Conversion process.
- An issue was fixed that caused instability with the connection to the VBS World Server from the VBS3 Terrain Conversion Tool interface.
- An issue was fixed that caused extracted phototexture data to be improperly named during the conversion process for multimap terrains.

1.6.5 Terrain Insets

- The streetlights in the Hohenfels terrain inset were improved so that ground features and surfaces are more realistically illuminated at night.
- Airfield lighting has been added to the San Francisco International Airport (SFO), including all real-world taxiway, runway, and approach lights. This lighting is visible throughout the day and follows all FAA specifications.

1.6.6 VBS World Server Management

- Input source files and their output SQLite files are no longer deleted from the temporary file folder after VBS Geo Data Import (on page 86) or running the VBS3 to VBS4 Terrain Conversion Tool (on page 91). These files can be found in the following folder:

  `\Installation\data\Sandbox\PDrive\VWS_temp\`

1.6.7 World Data

- User-imported buildings and roads data added using VBS Geo Data Import (on page 86) or the VBS3 to VBS4 Terrain Conversion Tool (on page 91) automatically override any underlying World Data of the same type.

1.7 VBS World Server Improvements 20.1

VBS World Server 20.1 contains the following improvements:

1.7.1 VBS World Server 20.1.2.1

An update to VBS World Server was released with VBS4 20.1.5 to resolve the following issues:

- Enable the VBS World Server API to accept UTF-8 Battlespace names.
- Update the Geocoder API to return valid values using UTF-8 encoding.

1.7.2 VBS World Server Management

- The VBS World Server management executables were updated to improve the configuration of firewall rules. As a result, VBS World Server is now accessible even when the server's firewalls are enabled.
- VBS World Server file server performance has been greatly improved when a large number of clients are interacting with a server that has a large number of Battlespaces.
- Intermediate folders for VBS World Server processing are no longer written to the root drive.
- For computers without VBS Developer Suite installed and the accompanying `P:` drive, VBS World Server now creates this drive dynamically in the Sandbox area.

1.7.3 World Data

- World data can now be installed onto the VBS World Server using the Updater tool.

1.7.4 Data Import

- The VBS World Server data import process can now be successfully executed from the default VBS World Server installation location.

1.7.5 Terrain Conversion Tool

- The Terrain Conversion Tool can now be successfully executed from the default VBS World Server installation location.

- Converted heightmaps (elevation data) are now automatically streamed to clients in real-time after conversion, meaning that the VBS4 server no longer requires a restart for this data to be loaded.
- Converted heightmap data (`_VBS3hgt.tif`) is now placed inside the terrain inset folder along with other converted VBS4 layers (`.sqlites`).
- More naming schemes for mapping custom road models to VBS4 roads are now supported.
- A bug was fixed where VBS3 terrains with a Predefined AI Road Network would have none of its roads converted.

2. Deploy VBS World Server

VBS World Server is available for download from VBS License Manager as part of the VBS4 product.

WARNING

VBS4 and VBS World Server installations must be the same major version (e.g., 21.1.x) to ensure full compatibility.

To download and install VBS World Server, follow this process:

1. Review the VBS World Server System Requirements (on the next page).
2. Download VBS4 (on page 27) from VBS License Manager.
3. Installing VBS World Server (on page 30).

Your VBS World Server is installed.

To support updates and later download of optional packages, VBS World Server includes an update utility:

- Installing a VBS World Server Patch (on page 35)

VBS4 and VBS World Server provide multiple methods to update the Whole-Earth Terrain:

- See Managing the Whole-Earth Terrain (on page 73)
- See Installing World Data (on page 74)

VBS World Server uses a set of executables to manage its services:

- See Managing VBS World Server (on page 37)

WARNING

If you have an older version of the VBS World Server installed and wish to update to the latest version: Carefully read Installing a Newer VBS World Server Version (on page 33) and Migrating Data to a New VBS World Server Version (on page 33) to avoid losing any user data.

2.1 VBS World Server System Requirements

Bohemia Interactive Simulations recommends thefollowing for VBS World Server:

VBS World Server	Recommended	Optimal
CPU	Intel Core i7-12700K (or better) Ryzen 9 7900X	Intel Core i9-12900K (or better) Ryzen 9 7950X
RAM	64GB DDR4 (or better)	128GB DDR4 (or better)
GPU	Nvidia GeForce GTX 1080 (or better) DirectX 11	Nvidia GeForce GTX 4090 (or better) DirectX 11
	WARNING AMD GPUs are not currently supported.	
Disk	512GB SSD for OS, 4TB SSD for VBS World Server and Global Data (optional)	512GB SSD for OS, 8TB SSD for VBS World Server and Global Data (optional) and space for local processing.
	WARNING VBS World Server cannot be installed on an HDD (hard drive). VBS World Server must be installed on a SSD (solid state drive).	
OS	Windows 10 (v1607+) 64-bit, Windows Server 2016/2019	Windows 10 (v1607+) or Windows 11 64-bit, Windows Server 2016/2019
Network	1 Gbps	10 Gbps

NOTE

The hardware listed is not exclusive. Compare your hardware to the listed items for an indication of performance.

Operational usage can affect performance requirements. Increasing visual fidelity (detail, distance, and / or resolution), as well as scenario complexity, can have a significant impact on performance, and may warrant increasing the system specification to the next performance tier.

For hardware queries, contact us at https://bisimulations.com/company/contact-us.

2.2 Download VBS4

VBS4 is typically accessed and downloaded using VBS License Manager.

> **NOTE**
> Alternate distribution methods are available by contacting support@bisimulations.com.

In each case, the content you require must be copied to the same temporary folder on the machine where you want to install VBS4 or VBS World Server.

Follow these steps:

1. In VBS License Manager, open the **Downloads** page.
2. Select VBS4 from the products panel and **Choose Version:**.
3. Expand **Instructions** to view the help available for product deployment.
4. Expand **Products Available to Download** to display the products available for download.
5. Select **VBS4+VWS** for a default download of VBS4 and VBS World Server packages.
6. Select optional World Data packages to install procedural and generated terrain detail:
   - **World Data (23.2):** Global coverage of procedurally generated buildings and roads.
   - **World Airfields (24.1):** A large set of insets for global airfields.

     For a list of supported airfields (using ICAO airport codes), see Global_Airfield_List.txt.

     > **NOTE**
     > The World Airfields package includes some heightmap changes in the area of each airfield that can conflict with existing World Data buildings when used together. To address this, the World Airfields package contains cutouts of World Data buildings around each airfield to resolve building elevation changes. If using World Airfields without World Data buildings, these extra buildings around airfields may be distracting and can be removed. For more information, see Removing World Airfield Building Data (on page 85).

   > **NOTE**
   > Only download packages if your current World Data is older than the version listed.

WARNING

If World Data is not installed as part of your initial installation, add it to your installation using the Updater Tool.

For more information, see Installing World Data (on page 74).

If you already have a VBS World Server installation, backup your World Data before installing a newer version of VBS World Server.

For more information, see Migrating Data to a New VBS World Server Version (on page 33).

7. Select from the additional products as required, which include:
   - Select **DeveloperSuite** to download the VBS4 Developer Suite.
   - Select **VBS Radio Standalone** to download the separate VBS Radio client application.

     For more information, see VBS Radio Standalone in the Introduction to VBS4 Guide.
   - Select **READ THIS FIRST** to download supplementary PDFs.

   FEATURE NOTICE

   The exact set of products and packages displayed depends on your licensing.
8. Do any of the following for a more selective VBS4 download:
   - For a default VBS4 and VBS World Server download, skip to step 10.
   - For a selective installation, **click** the Configure List icon to display the Configure panel.

9. Deselect **VBS4** to uncheck all items, and then select specific packages to download:
   - **VBS4** is the installer and core packages for VBS4.
   - **VBS World Server** is the installer and core packages for VBS World Server.
   - **VBS4 *KEY*_General** and **VBS World Server - *KEY*_General** contain exclusive content for your licensed version of the products.
   - **VBS4 *Terrain*_Inset** are optional highly detailed terrain insets.

     For more information, see Installing Terrain Insets (on page 109).

     > **NOTE**
     > To deploy Terrain Insets at a later date, download them from VBS License Manager, copy the downloads to the same folder as the VBS4 Installer, and re-run the VBS4 Installation.

   - **Geolocation Lookup Service** is an optional package that provides location search.

   If optional packages are present in the downloads folder when the installer runs, they automatically install.
10. Expand **Save Location**, click **Change**, and select a download folder.
11. Click **Download**.

VBS License Manager downloads the selected packages to the selected location.

Copy the applicable downloads to the required computers and proceed with installation:

- Installing VBS World Server (on the next page)

2.3 Installing VBS World Server

Before getting started:

- If you are installing VBS World Server for the first time, continue to Installing the VBS World Server (below).
- If you are updating VBS World Server from a previous version, follow the instructions in Installing a Newer VBS World Server Version (on page 33).

After you Download VBS4, the VBS World Server installer and the selected download packages are available in the selected download folder.

WARNING

VBS4 and VBS World Server installations must be the same major version (e.g., 21.1.x) to ensure full compatibility.

2.3.1 Installing the VBS World Server

Install VBS World Server on a computer meeting the VBS World Server System Requirements (on page 26).

NOTE

VBS4 and VBS World Server installers must be in the same directory for the VBS World Server installer to automatically detect and install VBS4 in the correct location.

WARNING

The VBS4 installed by the VBS World Server installer is used by the server and should not be used as a VBS4 client. Download and install VBS4 Clients on separate computers.

Copy the downloaded folder containing the VBS World Server installer and the download packages to the required computer and run the installer:

`VBS_World_Server.Core.InstallerX64.version.exe`

The VBS World Server installer starts and leads you through the following installation process:

WARNING

Installation requires Windows Administrator privileges.

1. **Installer Language**

   Select the Installer language to use and click **OK**.

   > **NOTE**
   > Language selection only applies to the installer and does not affect the VBS World Server installation.

2. **Welcome Panel**

   Review the version of VBS World Server and click **Next** to continue.

3. **License Agreement**

   Review the license agreement, and click **I Agree**.

4. **Choose Components**

   Select which components to install, and then click **Next**:

   - The **Core** package is mandatory and pre-selected.
   - Your **License Key** encoded package is mandatory and pre-selected (for example, YYMEA).
   - **Geolocation Lookup Service** is an optional package for location search services.
   - Select **Start Menu Shortcuts** to add VBS World Server to your Start Menu list.
   - Select **Desktop Shortcuts** to add VBS World Server shortcuts to your desktop.
   - Select **Verify Checksum** to validate the download packages prior to installation.
   - Select **VBS4 Server** to silently install VBS4 as a Dedicated Server for Scenario Execution.
   - Select **Installing Drivers** to run install drivers process during VBS World Server installation.

5. **Choose Install Location**

   Input or click **Browse** to select an installation folder, and then click **Next**.

   > **NOTE**
   > Select a location on an SSD drive that meets the VBS World Server System Requirements (on page 26) that is as close to the drive root folder as possible.

   > **WARNING**
   > The installation path can only contain printable ASCII (https://www.w3schools.com/charsets/ref_html_ascii.asp) characters. VBS World Server does not start if installed to a path with characters outside this range.

6. **Choose Start Menu Folder**

   Input a name and optionally select an existing start menu item to place it in.

   Click **Install** to start the installation process.

> **NOTE**
>
> This documentation refers to the VBS World Server installation folder as `\Installation\`.

VBS World Server installs to the selected folder and, if selected, silently installs VBS4 to:

`\Installation\Services\VBS4\`

When installation completes, select from the following options:

- **Open the Installation Folder**

  View the content of the `\Installation\` folder.

Click **Finish** to close the installer.

After installation, run the following executable to finalize the VBS World Server configuration:

- Run `\Installation\vws_configure.exe`

> **NOTE**
>
> The `vws_configure.exe` must be run following the initial installation in order to start using the VBS World Server. For more information about the executable and its functions, see Managing VBS World Server (on page 37).

VBS World Server is ready to start. For more information, see Managing VBS World Server (on page 37).

If you wish to install World Data to your offline VBS4 installation, follow the instructions in Installing World Data.

2.3.2 Installing a Newer VBS World Server Version

If you have an older version of the VBS World Server installed on your computer (for example, 20.1.x) and you wish to install and newer version (for example, 21.1.x), you must manually back up any user data that you wish to carry over to the new version. Otherwise, this user data will be deleted when you perform the update.

2.3.3 Migrating Data to a New VBS World Server Version

To back up your user-generated data (such as Battlespaces and VBS4 inset data) and any installed World Data packages, follow these steps:

1. **Create a New Folder**

   Separate from the VBS World Server installation, create a new folder to act as a repository (for example, `D:\Backup`).

2. **Move User Data**

   Cut the following folders from the VBS World Server installation:

   - `\Installation\data\Battlespaces\`
   - `\Installation\Services\VBS4\myData\`

   If World Data (on page 76) is installed, cut these folders as well:

   - `\Installation\Services\VBS4\data\BlueBase\earth\Global_Geometry\`
   - `\Installation\Services\VBS4\data\BlueBase\earth\Global_Roads\`
   - `\Installation\Services\VBS4\data\BlueBase\earth\Global_Veg_Removal\`

   WARNING

   Once all desired user data has been archived, you must uninstall all older versions of the VBS World Server prior to updating to the newer version.

3. **Uninstall the Older Version**

   Uninstall the older version of the VBS World Server. For more information, see Uninstalling VBS World Server (on page 39).

4. **Install VBS World Server**

   Install the new version of the VBS World Server by following the instructions in the Installing the VBS World Server (on page 30).

5. **Run the Stop Executable**

   After installing the new version of the VBS World Server, stop the service before restoring the user data.

   - Run `\Installation\vws_stop.exe`

6. **Delete the VBS World Server Cache**

   Delete the VBS World Server Cache folder at the following location:

   - `\Installation\Services\VBS4\cache\`

7. **Restore User Data**

   After VBS World Server has been installed, manually restore the archived data by cutting it from the backup repository folder made in **Step 2: Move User Data** to the following locations in the new installation.

   - `\Installation\data\Battlespaces\`
   - `\Installation\Services\VBS4\myData\`
   - `\Installation\Services\VBS4\data\BlueBase\earth\Global_Geometry\`
   - `\Installation\Services\VBS4\data\BlueBase\earth\Global_Roads\`
   - `\Installation\Services\VBS4\data\BlueBase\earth\Global_Veg_Removal\`

8. **Run the Start Executable**

   After restoring user data, run the following executable to finalize the VBS World Server upgrade:

   - Run `\Installation\vws_start.exe`

2.4 Installing a VBS World Server Patch

The Updater Tool included with VBS World Server supports patch updates to VBS World Server.

WARNING

Updates to VBS World Server require an earlier release of the same major version. For example, updating to VBS World Server 20.1.1 requires an earlier version of VBS World Server 20.1.x.

If you have not already installed the same major version of VBS World Server, please perform a full installation instead of using the update process.

For more information, see Installing VBS World Server (on page 30).

Download updates for VBS World Server through VBS License Manager.

NOTE

If you have been delivered a patch, see Installing the Patch (on the next page).

Follow these steps:

1. Open VBS License Manager, and select the **Download** page.
2. Select VBS4 in the products panel, and **Choose Version:**, selecting the applicable major version ***Y.X***.
3. Expand **Products Available to Download**, select **VBS4**, and click the **View** icon.

   The Configure panel opens, displaying all VBS4 and VBS World Server packages available for download.
4. In the **Configure** panel, click **VBS4** to deselect all packages.

   Select the required VBS World Server Updates between your current version and the version your require. For information about the updates, see the Patch Notes for the specific version.

   Update packages use the naming convention: **WS_*x.x.x*_Update_*Customer***. For each update, VBS License Manager displays the update applicable to your specific customer license:

   - **WS_*x.x.x*_Update_General** contains updates for all customers.
   - **WS_*x.x.x*_Update_*Customer*** also contains updates specific to your customer license.

5. Expand **Save Location**, click **Change**, and select a download folder.

> **TIP**
>
> If VBS License Manager is running on the same computer as the VBS World Server installation you want to update, select the VBS World Server Installation folder.

6. Click **Download**.

   VBS License Manager downloads the update packages as a set of `.zip` files in a `\VBS4 version\` folder in the selected location.

Once you have the update packages, use the Updater Tool to deploy the update to your VBS World Server installation.

> **WARNING**
>
> Ensure that VBS World Server is shut down before running the Updater Tool.

2.4.1 Installing the Patch

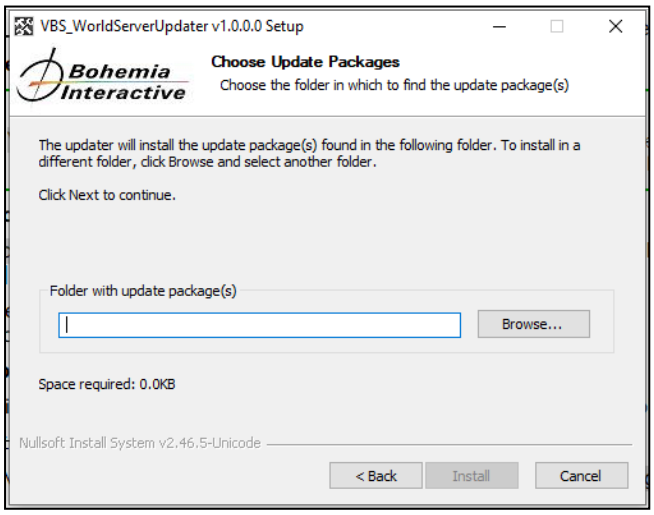
This section describes how to install a patch on an existing VBS World Server installation.

Follow these steps:

1. From your existing VBS World Server installation folder run the Updater Tool:

   `\Installation\Updater.exe`

2. Specify the `\VBS4 version\` folder in your VBS License Manager download location.



3. Click **Install**.

VBS World Server is updated with the changes from the selected download packages.

The Updater Tool can also be used to install World Data for the VBS4 installation on the VBS World Server. For more information, see Installing World Data (on page 74).

3. Managing VBS World Server

VBS World Server is composed of several services that carry out its essential functions. These services can be managed and monitored through the **Server Management Dashboard** in the VBS World Server user interface. For more information, see VBS World Server User Interface (on page 48).

3.1 VBS World Server Services

VBS World Server runs the following services:

- VWS geocoder API - An API that VBS4 uses for location lookup.
- VWS geocoder Photon - A database of addresses and place names that the API references.
- VWS OWS Service - A 2D map for the user interface **Globe View**.
- VWS Data Fileserver -The file server service for VWS data.
- VWS VBS4 Fileserver - The file server service for VBS4 data.
- VWS WPS Fileserver - The file server service for the geospatial data server.
- VWS Proxy - The World Server gateway service.
- VWS GeoServer - The server for managing and distributing geospatial data.
- VWS VBSBlueServer - The VBS Blue engine terrain server streams terrain data to VBS4 clients.
- VWS WPS Server - Facilitates the data processing on the World Server.
- VWS VBS4Server - The VBS4 Dedicated Server.

  NOTE

  For most use cases, Scenario Executions are hosted on a separate Dedicated Server or on a VBS4 Admin Client. For more information, see Scenario Execution in the Introduction to VBS4 Guide.

- VWS InsetDB Server - Used to configure and manage the World Server insets.
- VBS Agent - Configures and manages the World Server services.

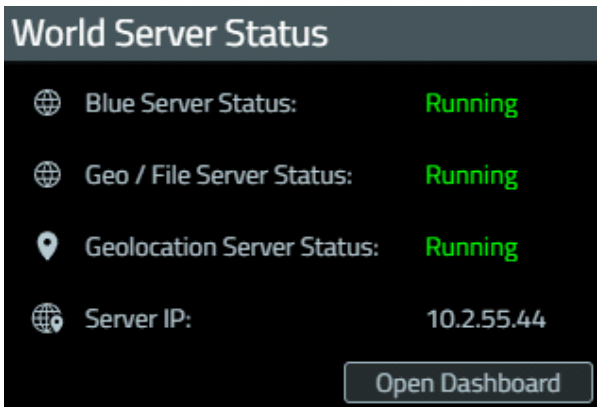
WARNING

Stopping VBS World Server services will disconnect any connected clients. The clients reconnect automatically once the services are started again. Stopping services can also cause certain functions of the VBS World Server to stop working. For descriptions of each service, see VBS World Server Services (above).

3.2 Monitor Services from Clients

You can check the status of most VBS World Server services from VBS4 Clients.

Open the World Server Status on the VBS4 Client by hovering over the **World Server Status** icon (globe) in the VBS4 Toolbar (see VBS4 Toolbar in the Introduction to VBS4 Guide).



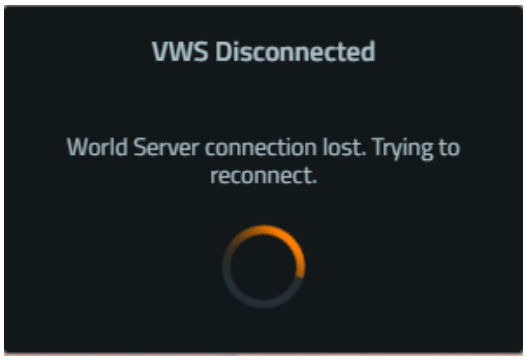
The following information is available:

Status Indicator	Description
Blue Server Status	The status of the server streaming terrain data to clients.
Geo / File Server Status	The status of the server distributing Battlespace data and managing Geo data imports.
Geolocation Server Status	The status of the server providing location search data.
Server IP	The IP address of the VBS World Server installation.

Click the **Open Dashboard** to open the VBS World Server User Interface (on page 48).

VBS4 has the following additional VBS World Server connectivity problem indicators:

If connection to the VBS World Server is lost, the **VWS Disconnected** popup appears:



If the Geo / File Server service is not running the World Server Status icon displays a **red** cross.

3.3 Monitoring VBS World Server Firewall Rules

Inbound and Outbound Firewall rules are created for the following services when VBS World Server is configured:

- VWS geocoder API
- VWS geocoder Photon
- VWS OWS Service
- VWS Data Fileserver
- VWS VBS4 Fileserver
- VWS WPS Fileserver
- VWS Proxy
- VWS GeoServer
- VWS WPS Server
- VWS VBSBlueServer
- VWS VBS4Server
- VWS InsetDB Server
- VBS Agent

These can be found in the Advanced settings under the Windows Defender Firewall control panel.

To access this, use Windows search to open **Windows Defender Firewall**, then click **Advanced settings** in the left pane. This opens the Windows Defender Firewall with Advanced Security panel from which the Inbound and Outbound Rules lists can be accessed. Each rule is named identically to the corresponding service. These rules are removed when VBS World Server is shutdown.

3.4 Uninstalling VBS World Server

VBS World Server includes an uninstall executable to remove the application from your computer.

> **WARNING**
>
> Uninstalling removes all user data from VBS World Server, as well as removing the root `\Installation\` folder. Make sure that important user data is backed up before uninstalling.

Follow these steps:

1. Stop and remove all VBS World Server services:

   Run `\Installation\vws_shutdown.exe`

   Press **Enter** to close the resulting command prompt.

2. Uninstall VBS World Server:

   Run `\Installation\Uninstall.exe`

When the uninstaller finishes running, VBS World Server is removed and the installation directory is deleted.

3.5 Managing VBS World Server with Executables

In addition to the **Server Management Dashboard** described in VBS World Server User Interface (on page 48), the application can also be managed using various management executables.

> **NOTE**
>
> All management executables require Administrator privileges.

The functions of each executable file are described below:

- `Updater.exe` - Apply update patches to VBS World Server. For more information, see Installing a VBS World Server Patch (on page 35).
- `vws_configure.exe` - Configure and initialize VBS World Server services. This is required after installation or if VBS World Server was previously shutdown with `vws_shutdown.exe`. When prompted, press **Enter** to close the resulting command prompt.

  > **NOTE**
  >
  > This may take up to a minute to configure services. After configuring or starting services, allow the services to initialize for at least 5 minutes before accessing the **Data Management** tab described in VBS World Server User Interface (on page 48).

- `vws_shutdown.exe` - Double-click to shut down and remove services and configurations. After running this, run `vws_configure.exe` to properly start VBS World Service again. When prompted, press **Enter** to close the resulting command prompt.

  > **NOTE**
  >
  > Disconnects any connected clients. Clients reconnect automatically once VBS World Server restarts.
  >
  > The resulting shutdown dialog intermittently reports service status as **Unknown** instead of **Stopped**. This is expected and can be safely disregarded.

- `vws_start.exe` - Starts all VBS World Server services. When prompted, press **Enter** to close the resulting command prompt.
- `vws_stop.exe` - Stops all VBS World Server services. Required to deploy new terrain insets. When prompted, press **Enter** to close the resulting command prompt.

  > **NOTE**
  >
  > This disconnects any connected clients. The clients reconnect automatically once VBS World Server starts again.

- `Uninstall.exe`

  Perform a complete Windows uninstallation of VBS World Server.

  > **NOTE**
  >
  > Removes all user data from VBS World Server, and removes the root `\Installation\` folder.

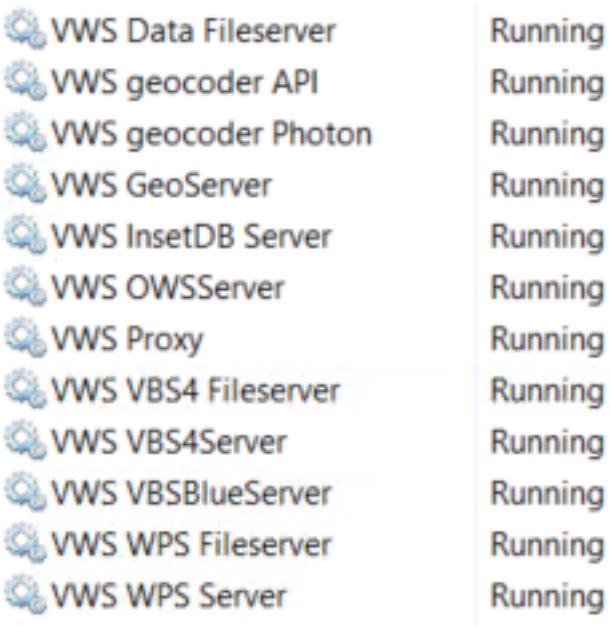
3.5.1 Monitor Services with Task Manager

Monitor the status of VBS World Server services directly on the server using Windows Task Manager.

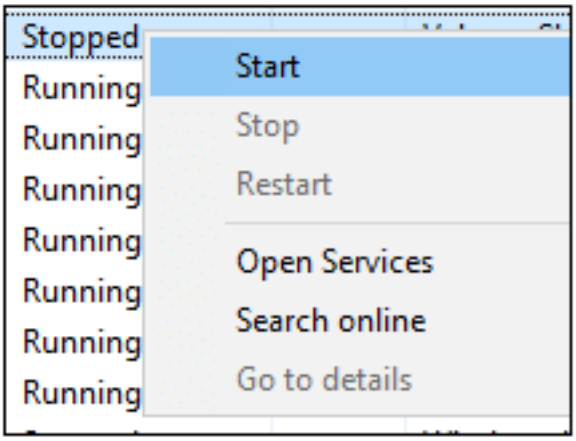
Follow these steps:

1. Start Windows **Task Manager** and select the **Services** tab.

   When VBS World Server is running properly, each service shows a status of **Running** as shown in the following image:



2. To Stop, Start, or Restart a service, right-click the service and select the applicable option as shown in the following image:



NOTE

If services in the Windows Task Manager do not show the expected status after running a server management executable, close the Task Manager and open a new Task Manger instance. Recheck the status reported for the services. Similarly, if services are still listed in Task Manager after running `vws_shutdown.exe`, close and re-open a new Task Manager instance, then recheck for the service listing. If the information in Task Manager remains incorrect, contact support for further assistance.

3.6 Configure Dedicated Server for VBS World Server

VBS World Server automatically runs a Dedicated Server as a service, that is available to use as a Host for Scenario Execution.

> **NOTE**
>
> For most use cases, Scenario Executions are hosted on a separate Dedicated Server or on a VBS4 Admin Client. For more information, see Scenario Execution in the Introduction to VBS4 Guide.

The operation of the Dedicated Server service is configurable by modifying the VBS4 configuration file on the VBS World Server.

Follow these steps:

1. Stop VBS World Server.
   - Run `\Installation\vws_shutdown.exe`

   > **NOTE**
   >
   > Any connected VBS4 Clients are disconnected.

2. Open `\VBS4service.json` in a text editor in the following folder:

   `\Installation\Services\VBSAgent\settings\Default\`

3. Locate the following text:

```
"params": "-vbsradio -server -blue -profiles=profiles -maxmem=15000 -
worldserver=127.0.0.1 -unattended -setNodeAttribute=\"WMS Blue_hgt::Port::7071\" -
setNodeAttribute=\"WMS Blue_shaded_relief::Port::7071\" -setNodeAttribute=\"WMS
Blue_ortho_height::Port::7071\" -setNodeAttribute=\"WMS Blue_alb::Port::7071\" -
setNodeAttribute=\"WMS Blue_ortho_photo::Port::7071\" -setNodeAttribute=\"WMS
Blue_srf::Port::7071\" -setNodeAttribute=\"WFS PointsMapVecData::Port::7071\" -
setNodeAttribute=\"WFS LinesMapVecData::Port::7071\" -setNodeAttribute=\"WFS
LinesRoads::Port::7071\" -setNodeAttribute=\"WFS LinesContours::Port::7071\" -
setNodeAttribute=\"WFS PolygonsMapVecData::Port::7071\" -setNodeAttribute=\"WFS
PolygonsWater::Port::7071\" -setNodeAttribute=\"WFS PolygonsForests::Port::7071\"
-setNodeAttribute=\"WFS PolygonsBuildings::Port::7071\" -setNodeAttribute=\"HTTP
Server::Port::25501\" -setNodeAttribute=\"WorldServer::Prefix to
add::http://localhost:6707/blueserver/\\\"",
```

4. Add parameters as required with the most applicable command line parameters listed below:

   - `-server`

     Specifies a **VBS4 Dedicated Server** running in console mode that VBS4 Clients connect to.

     For more information, see Dedicated Server in the VBS4 Administrator Manual.

   - `-gateway`

     Start VBS4 with VBS Gateway as the HLA / DIS gateway.

     > **WARNING**
     > VBS Gateway is off by default. Use `-gateway` to start VBS4 with VBS Gateway.

   - `-vbsHostNet`

     Enable `VBSExternalNetworking` on VBS4, and run it in broadcast mode with VBS Blue IG.

     For more information, see the VBS Host Overview in the VBS Host Manual, and Start Up Parameters in the VBS Blue IG Manual.

   - `-multicast=ipaddress:port`

     By default, multicast is enabled in VBS4 and network update messages (UpdateMan, UpdatePositionMan, UpdateTank) are multicasted to every client and to the server.

     Use `-multicast=ipaddress` to define a specific multicast IP address to use. Specify `-multicast=ipaddress:port` to define a port to use.

     - Default multicast address 225.6.7.8 is used.
     - If *port* is not specified, the port selected is output to the Dedicated Server Console.
     - Multicast only works over LAN, not over the internet. The error message "Multicast connection rejected" displays when VBS4 attempts to use multicast over the internet.
     - Disable Multicast - specify `multicast=0`.

   - `-port=N`

     Select port number *N* for the Dedicated Server. The default port is 2302.

   - `-config=filename`

     Specify the Server configuration file to use where *filename* is the path to the file.

     For more information, see Server Configuration File in the VBS4 Administrator Manual.

EXAMPLE

Adding parameters to disable Multicast and enable VBS Gateway.

```
"params": "-vbsradio -server -blue -profiles=profiles -maxmem=15000 -
worldserver=127.0.0.1 -multicast=0 -gateway -unattended -
setNodeAttribute=\"WMS Blue_hgt::Port::7071\" -setNodeAttribute=\"WMS Blue_
shaded_relief::Port::7071\" -setNodeAttribute=\"WMS Blue_ortho_
height::Port::7071\" -setNodeAttribute=\"WMS Blue_alb::Port::7071\" -
setNodeAttribute=\"WMS Blue_ortho_photo::Port::7071\" -
setNodeAttribute=\"WMS Blue_srf::Port::7071\" -setNodeAttribute=\"WFS
PointsMapVecData::Port::7071\" -setNodeAttribute=\"WFS
LinesMapVecData::Port::7071\" -setNodeAttribute=\"WFS
LinesRoads::Port::7071\" -setNodeAttribute=\"WFS LinesContours::Port::7071\"
-setNodeAttribute=\"WFS PolygonsMapVecData::Port::7071\" -
setNodeAttribute=\"WFS PolygonsWater::Port::7071\" -setNodeAttribute=\"WFS
PolygonsForests::Port::7071\" -setNodeAttribute=\"WFS
PolygonsBuildings::Port::7071\" -setNodeAttribute=\"HTTP
Server::Port::25501\" -setNodeAttribute=\"WorldServer::Prefix to
add::http://localhost:6707/blueserver/\\\"",
```

5. If VBS Radio uses Pitch Talk Radio Servers running on their own dedicated computers or you want to specify specific multicast settings for VBS Radio, add the applicable VBS Radio launch parameters:

   - `-disableVBSRadio`

     VBS Radio is enabled by default. Select this option to disable VBS Radio.

     > **WARNING**
     >
     > If you edit and save Battlespace with previously configured VBS Radio settings and channels after disabling VBS Radio, all channel configurations / settings are lost unless you save them as Presets first.

   - `-VBSRadioDebug`

     Select to log additional debug information to the VBS Radio log file.

   - `-pitchcustomserverip`

     Enable Custom Server IP - Set this option to enable connection to a Pitch Talk Admin Server running on a different machine than the VBS4 host.

     > **WARNING**
     >
     > Clients starting VBS4 to join a multiplayer session should only select this option if the host has specified a Custom Server IP and their settings should match. By default, with this setting off, clients connect to the host.

   - `-pitchprtiserver=ipaddress:port`

     Federation Address - Input the IP address and port on the Pitch Talk Admin Server to use for the Federation.

     > **NOTE**
     >
     > If the Federation is not specified, VBS Radio uses the default, `127.0.0.1:8992`.

   - `-pitchadminserver=ipaddress:port`

     Admin Server Address - Input the IP address and port on the Pitch Talk Admin Server to use for Pitch Talk Admin access.

     > **NOTE**
     >
     > If the Admin Server is not specified, VBS Radio uses the default, `http://127.0.0.1:9600`.

- `-prtimulticast`

  Enable Multicast - Set this option to enable VBS Radio to use multicast.

  > **NOTE**
  > We strongly recommend Multicast for scenarios with 20 or more users.

  For more information about multicast, see Multicast in the VBS4 Administrator Manual.

- `-prtimulticastaddress=ipaddress`

  Multicast Address - input the IP address to use for multicast.

- `-prtimulticastport=port`

  Multicast Port - input the port to use for multicast.

6. Add any other additional startup parameters as required.

   For information about the full set of available parameters, see Command Line and Launcher Options in the VBS4 Administrator Manual.

7. Save `VBS4service.json`.
8. Apply the changes made to the VBS4 configuration file:
   - Run `\Installation\vws_configure.exe`

When a scenario execution starts VBS World Server runs a Dedicated Server as a service, using the parameters specified in the batch file.

> **NOTE**
> The console is not available when the Dedicated Server is running on VBS World Server. Instead, the console output is written to a `ConsoleLog.txt` file in the following folder:
>
> `/Installation/Services/vbs4/profiles/`

4. VBS World Server User Interface

Access the VBS World Server user interface from a connected VBS4 client or from a web browser.

WARNING

VBS World Server UI officially supports Google Chrome. The UI should also work in Microsoft Edge.

NOTE

All dashboard functions are the same whether accessed in VBS4 or a web browser. However, the web browser is preferred for this release. See the Known Issues (on page 129) for more details.

To access the VBS World Server user interface from a web browser:

1. Open the web browser.
2. In the address bar, enter `Server Machine IP Address:6606`.

   Replace `Server Machine IP Address` with the IP address or DNS name of the server machine, for example, `reach:6606`).

To access the VBS World Server user interface in VBS4:

1. Open the VBS4 launcher.
2. In the **Configuration** section of the **VBS4** tab, select **VBS4 Online** and enter the IP address for the VBS World Server you wish to connect to.
3. **Optional:** Select which options you wish to enable in the **Options** section in the **VBS4** tab.
4. Click **Launch modules** to launch VBS4.
5. When VBS4 finishes loading and the default screen is open, click the **World Server Status** globe icon in the **VBS4 Toolbar** (see VBS4 Toolbar in the Introduction to VBS4 Guide), then click **Open Dashboard**.
6. The **Server Management** tab of the VBS World Server user interface will open.
7. Click the **X** in the top-right corner of the **VBS World Server Dashboard** dialog to close it.

The VBS World Server user interface opens on the **Server Management Dashboard** page containing the following UI elements:

Image-1: VBS World Server User Interface

1. **VBS World Server Toolbar**- Provides access to various VBS World Server UI pages, including the **Server Management** tab, **Data Management** tab, and **Help** button. See VBS World Server Toolbar (on the next page) for more information.
2. **Server Title** - Displays the title of the connected VBS World Server. See Server Title (on the next page) for more information.
3. **Status Panel** - A panel for reporting the current status of the connected VBS World Server. Status Panel (on page 51) for more information.
4. **Information Panel** - A panel for reporting details of the connected VBS World Server. See Information Panel (on page 52) for more information.
5. **Services Panel** - A panel for displaying and controlling the various services running on the connected VBS World Server. See Services Panel (on page 53) for more information.
6. **Performance Panel** - Displays performance metrics for the server machine and VBS World Server services.

4.1 Supported Languages

VBS World Server supports English and French localizations. By default, English localization is enabled in the web browser version of VBS World Server. If launched from a VBS4 client, VBS World Server will launch with the same localization as the client if VBS World Server supports the localization.

To enable French localization in a web browser, change the `lang=en` to `lang=fr` in the URL of the page.

EXAMPLE

`http://VBS World Server:6606/#/dashboard?lang=fr`

French translations are currently limited in the user interface and will default to English when no French translation exists.

4.2 VBS World Server Toolbar

The **VBS World Server Toolbar** allows navigation to the VBS World Server user interface pages.

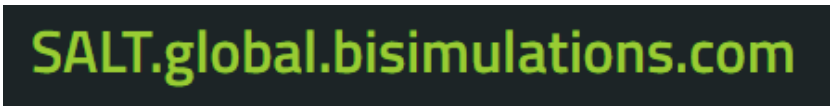
Use the **Help** button to load the Mantle User's Manual in a new tab in your default web browser.

4.3 Server Management

Use the **Server Management** tab to control the connected VBS World Server server.

4.3.1 Server Title

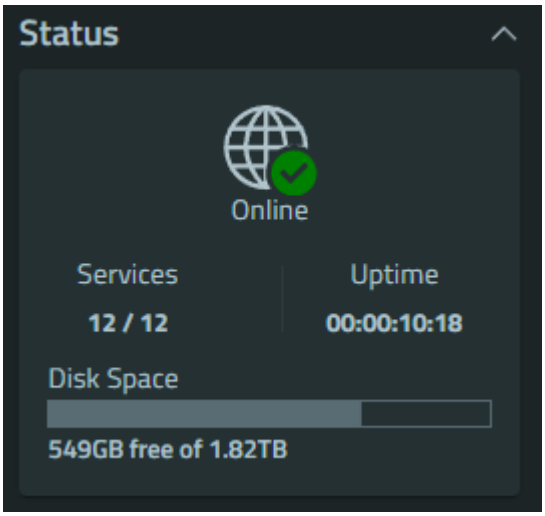
The title of the connected VBS World Server is displayed in the upper-left corner of the page.



The server name will match the DNS name of the server machine.

4.3.2 Status Panel

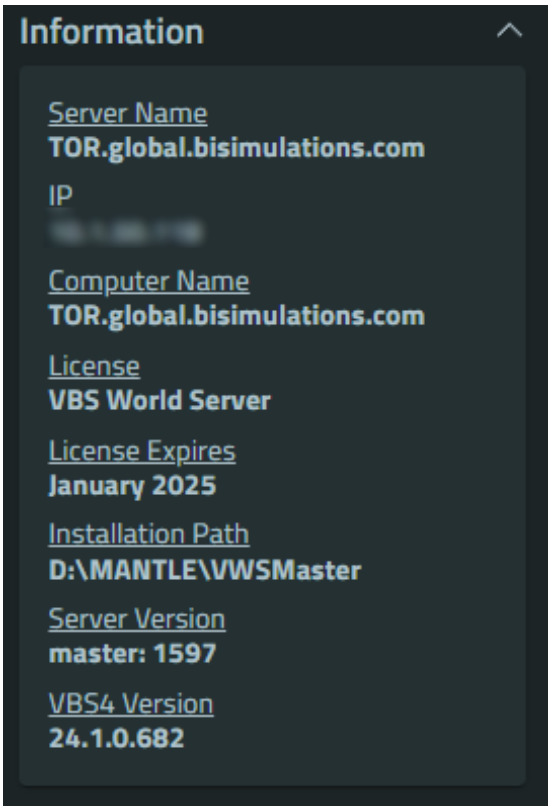
The **Status Panel** displays general status information of the connected server:



Status Item	Description
Status icon	Indicates whether the server is running or not: • **Online** - Indicates that the server is running normally.  • **Warning** - Indicates that the server is running with a warning. 
Services	Indicates the number of services that are configured and the number of services running on the server: `<services running> / <services configured>`
Uptime	Indicates the amount of time that the connected VBS World Server has been running.
Disk Space	Indicates how much free disk space remains on the drive where VBS World Server is installed. If there is more than 25% of free disk space available, the text appears gray. If there is less than 25% of free disk space available, the text appears yellow.

4.3.3 Information Panel

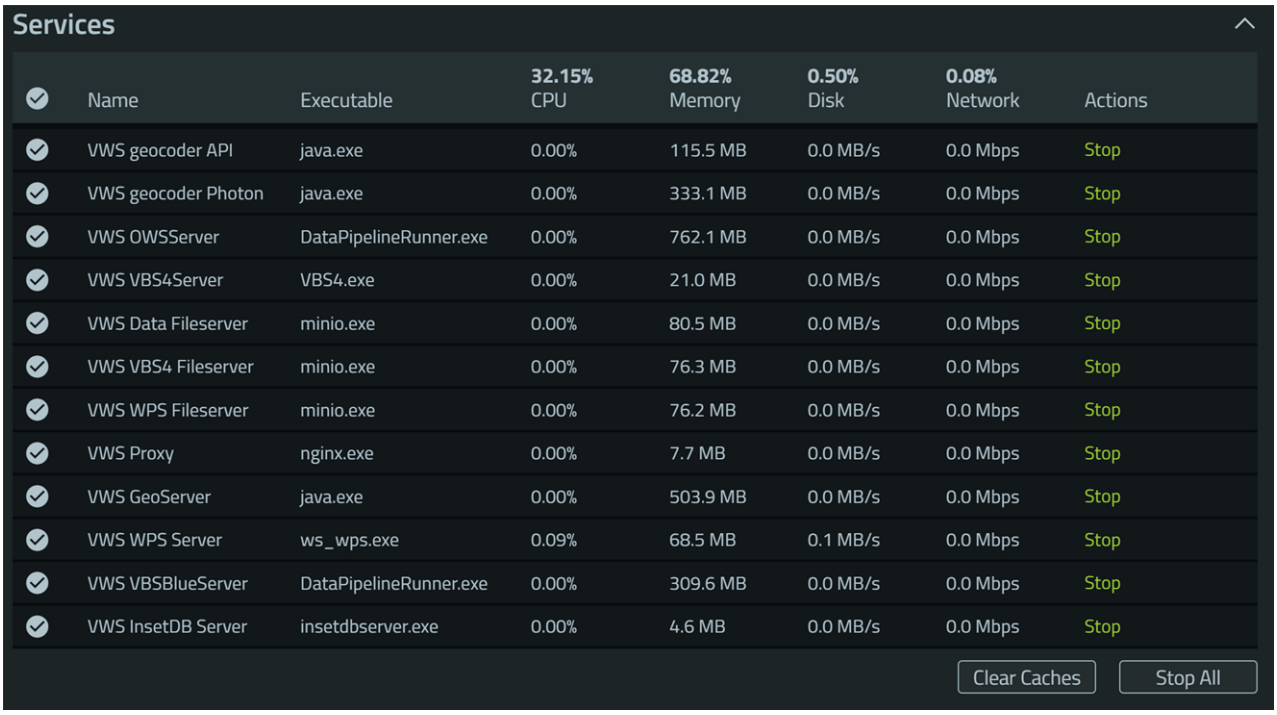
The **Information Panel** provides basic descriptive information about the server:



Information Item	Description
Server Name	Name of the VBS World Server.
IP	IP address of the VBS World Server.
Computer Name	Name of the machine hosting the VBS World Server.
License	License name associated with the VBS World Server.
License Expires	Month and year that the current VBS World Server license will expire.
Installation Path	Full file path to the VBS World Server installation on the machine.
Server Version	Version of the VBS World Server.
VBS4 Version	Version of VBS4 within the VBS World Server. This is the version that should be used for any VBS4 clients connected to the VBS World Server.

4.3.4 Services Panel

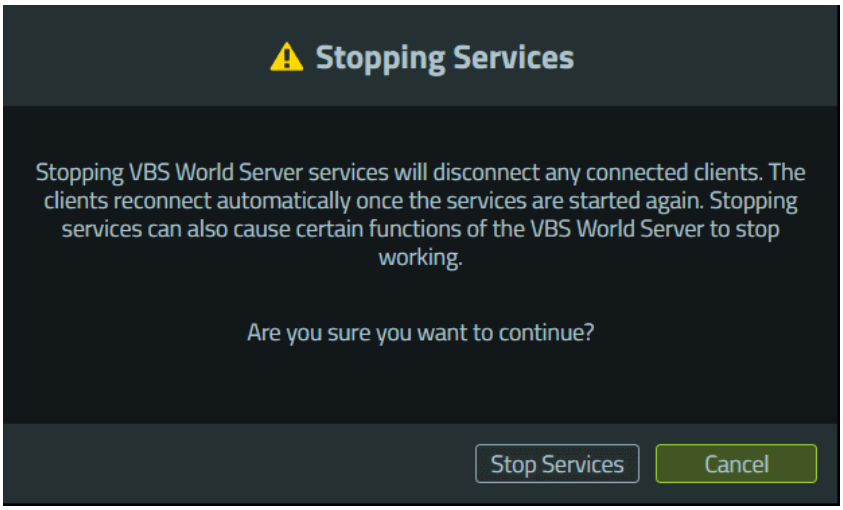
The **Services Panel** provides status, information, and controls for the connected services:



Services Item	Description
Status Icon	Displays whether a service is running or stopped.  Indicates a service is running  Indicates a service is stopped
Name	Displays the name of the service.
Executable	Displays the name of the executable associated with the service.
CPU	Displays the percentage of CPU being used by each service in the individual rows and the cumulative CPU usage by the server machine at the top of the panel.
Memory	Displays the amount of memory (in MB) being used by each service in the individual rows and the cumulative memory usage (in %) by the server machine at the top of the panel.
Disk	Displays the amount of disk (in MB/s) being used by each service in the individual rows and the cumulative disk usage (in %) by the server machine at the top of the panel.
Network	Displays the amount of network bandwidth (in Mbps) being used by each service in the individual rows and the cumulative network bandwidth usage (in %) by the server machine at the top of the panel.

Services Item	Description
Actions	Buttons for controlling individual services. • **Start** - Starts the respective service. • **Stop** - Stops the respective service.
Clear Caches	Clears the VBS4 cache (*Installation*\Services\VBS4\cache).
Start All Button	Starts all services. This button is only available when all services are stopped.
Stop All Button	Stops all services.

When services stop with the **Stop** action buttons or **Stop All Button**, the following warning message dialog appears:



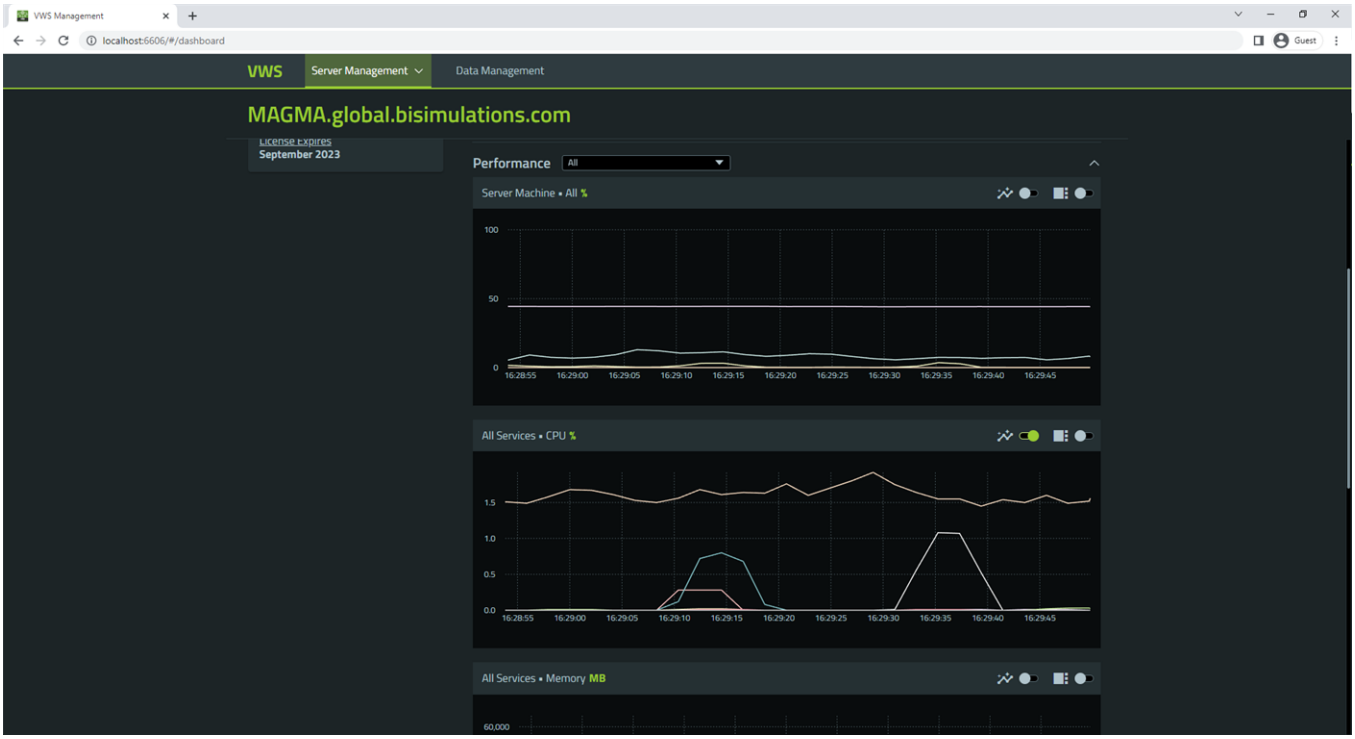
Click **Stop Services** to continue, or click **Cancel** to terminate the process.

WARNING

Stopping VBS World Server services disconnects any connected clients. Clients reconnect automatically once services start again. Stopping services can also cause certain functions of VBS World Server to stop working. For descriptions of each service, see VBS World Server Services (on page 37).

4.3.5 Performance Panel

The **Performance Panel** provides visual metrics on server machine resource usage. A variety of different charts and controls can be found in this panel including the following:



Performance Panel Item	Description
Performance Chart Selection	This drop-down menu can be used to select the set of performance charts to be displayed. • **All** - Displayed by default, this selection shows a set of aggregate charts that visualize all performance metrics for the server machine as well as charts that show the aggregate of all VBS World Server services by resource, including CPU usage, Memory usage, Disk usage, and Network bandwidth. • **Server Machine** - Displays the full performance metrics of the server machine broken down by resource, including CPU usage, Memory usage, Disk usage, and Network bandwidth. • **Individual Services** - Displays the performance metrics of the selected individual service broken down by resource, including CPU usage, Memory usage, Disk usage, and Network bandwidth.

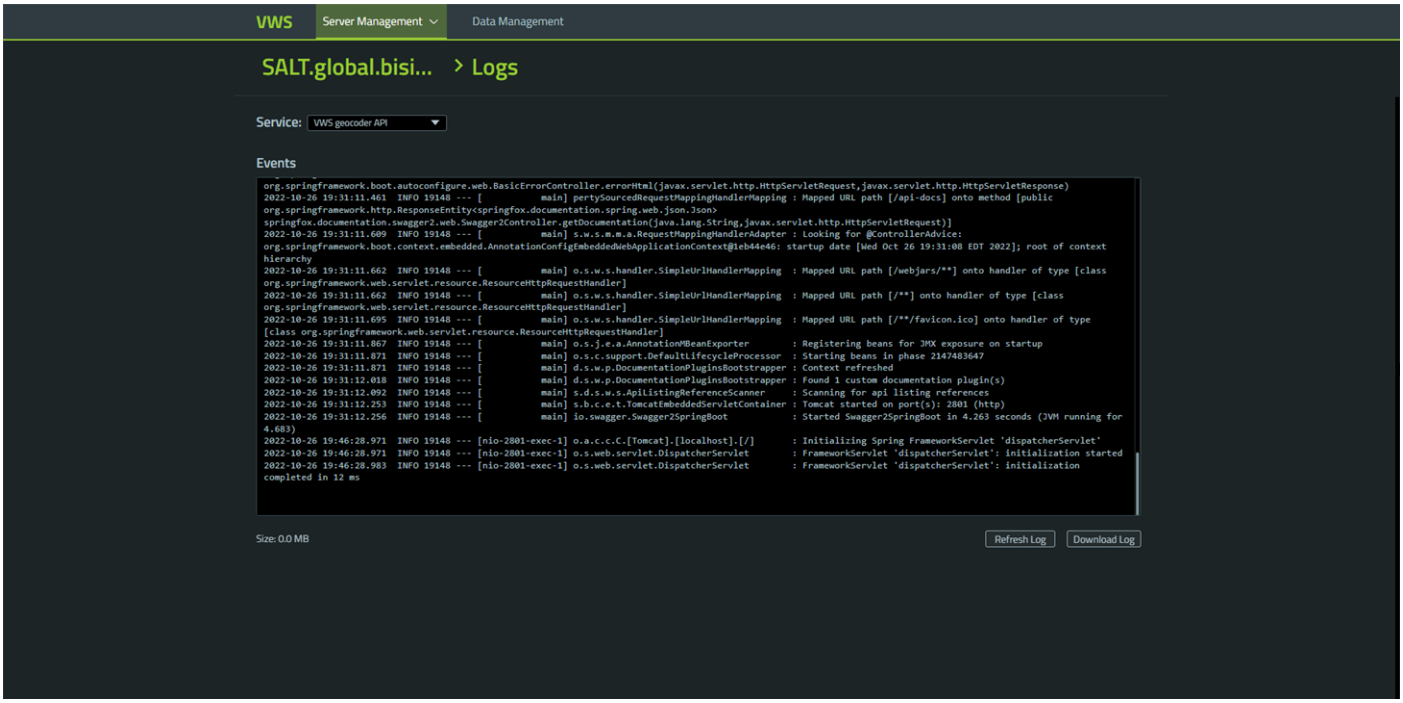
Performance Panel Item	Description
Performance Chart Title	Describes what the chart is displaying. Titles include: • **Server Machine - All%** - Displays the full resource usage of the server machine in an aggregate chart that includes CPU, Memory, Disk, and Network displayed as percentages. • **<title> - CPU %** - Displays the CPU usage of the selected service as a percentage. • **<title> - Memory MB** - Displays the Memory usage of the selected service in MB. • **<title> - Disk MB/s** - Displays the Disk usage of the selected service in MB/s. • **<title> - Network Mbps** - Displays the Network usage of the selected service in Mbps.
Auto-Y Toggle	Controls how the Y-axis is adjusted. Toggle the switch off to have the Y-axis represent the full scope of the resource displayed on the chart. Toggle the switch on to adjust the Y-axis so that the maximum Y value matches the maximum usage of the resource in the given span of time.
Legend Toggle	Present only for aggregate charts that show more than one line. Controls whether the legend is displayed or not. Toggle the switch on to display the legend and off to hide the legend.
Performance Chart	Line graphs that illustrates resource usage over time. These charts are populated in real-time and will collect performance data any time the user interface is open. The X-axis represents time and the Y-axis represents the amount of resource usage.
Performance Chart Cursor Actions	There are two cursor actions that can be used to gather additional information from the Performance charts: 1. Hover anywhere in the blank space of the chart to display the actual performance metrics at that point. This action will show the numeric metrics for all lines in an aggregate chart. 2. Hover directly over a line on the chart to see the numeric performance metric and the time it was recorded. This action will only show a single metric at a time in an aggregate chart.
Legend	Present only for aggregate charts when the **Legend Toggle** is switched on. Displays the color and name associated with each line on the chart. Hovering over an item in the legend will highlight it on the chart.

NOTE

The **Performance Panel** and the metrics it displays will reset each time the user interface is refreshed. No historical performance data is stored.

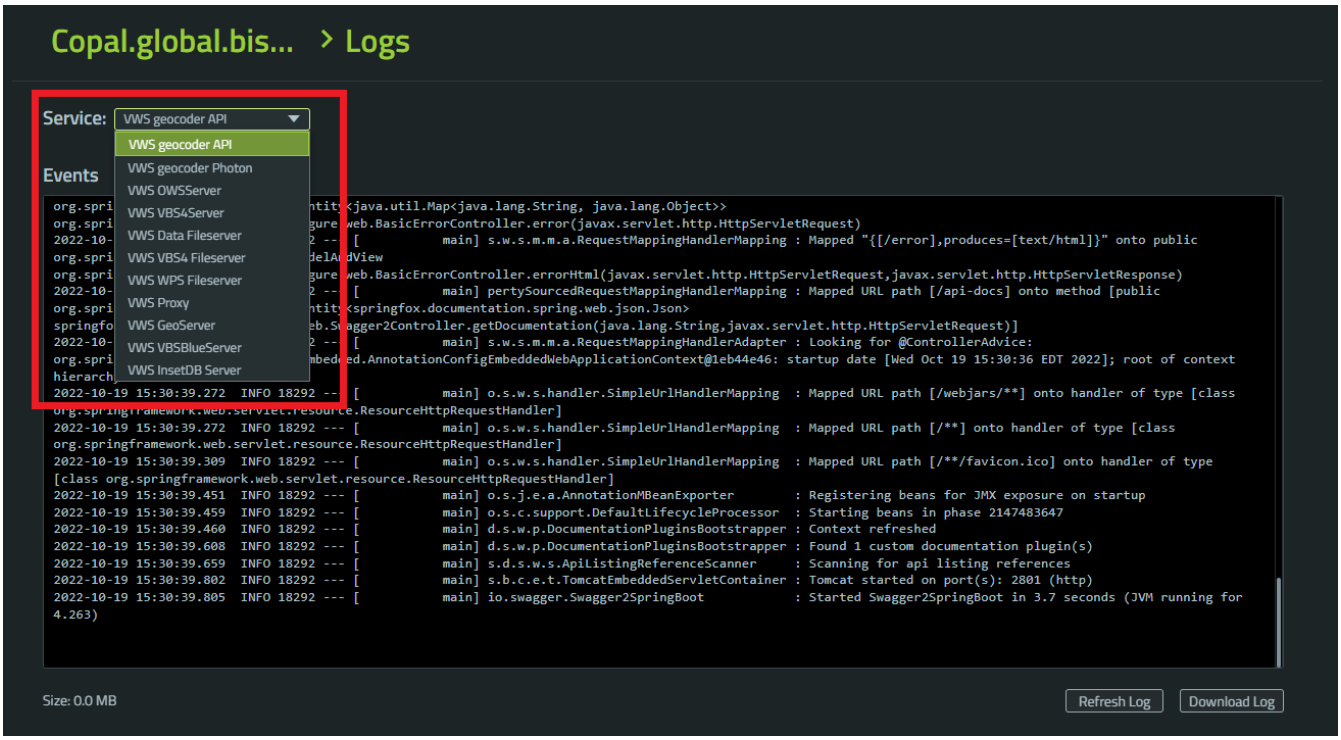
4.3.6 Logs

The **Logs** page gives information on the VBS World Server server log files found in `\Installation\Logs`. To access the logs for each of the server processes, hover over the **Server Management** tab and click **Logs** in the resulting drop-down menu.



Service

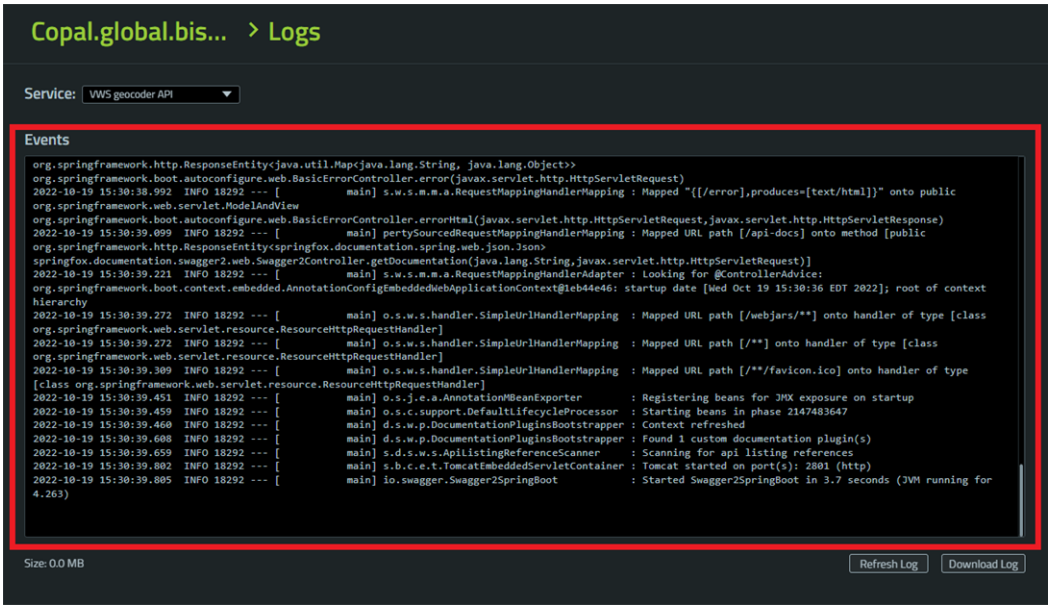
Use this drop-down menu to display the logs file for a particular VBS World Server service.



Events

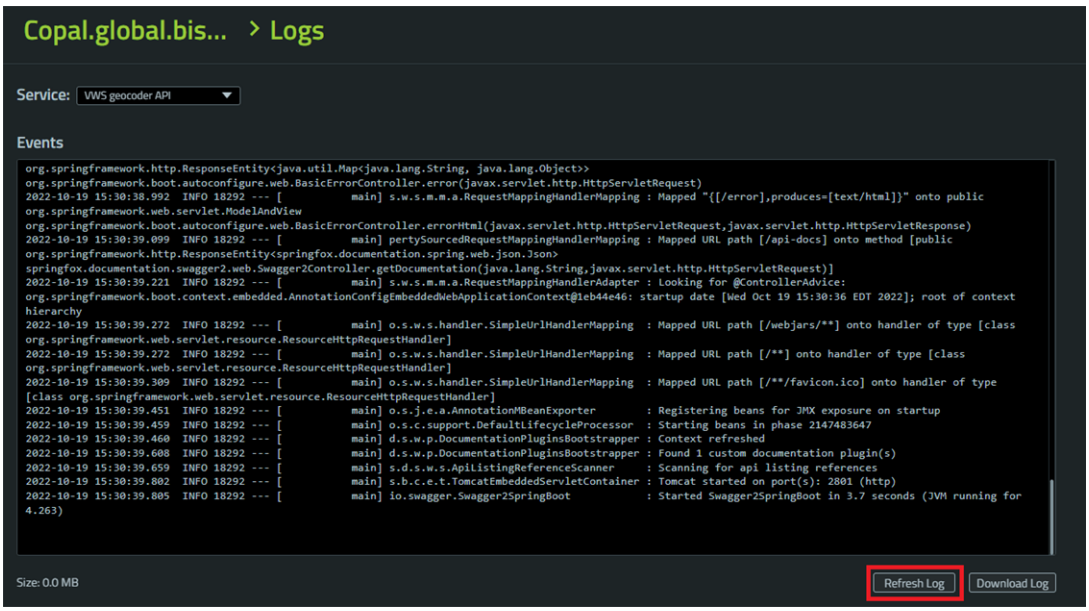
Displays the logs for the selected VBS World Server service.

- When a service is selected, the **Events** panel will automatically jump down to the most recent activity in the log.
- The scroll bar on the right of the **Events** panel allows you to scroll through the selected service log.
- You can highlight text within the **Events** panel and copy it by either pressing **Ctrl + C** or by right-clicking the text and selecting **Copy**. Copy the pasted text to another location by pressing **Ctrl + V** or by right-clicking and selecting **Paste**.



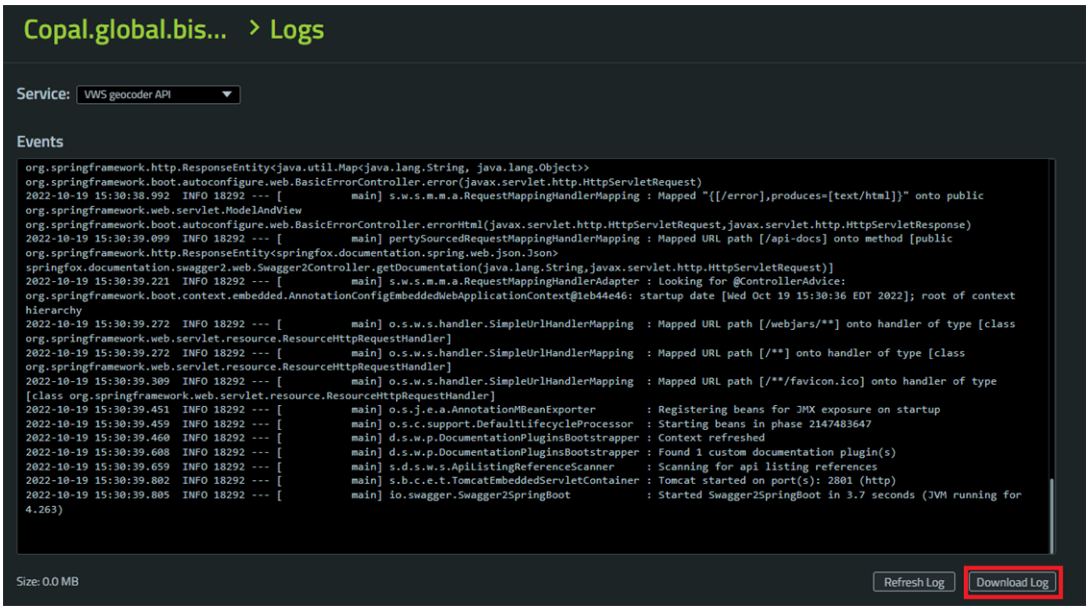
Refresh Log

Refreshes the log file for the currently selected VBS World Server service.



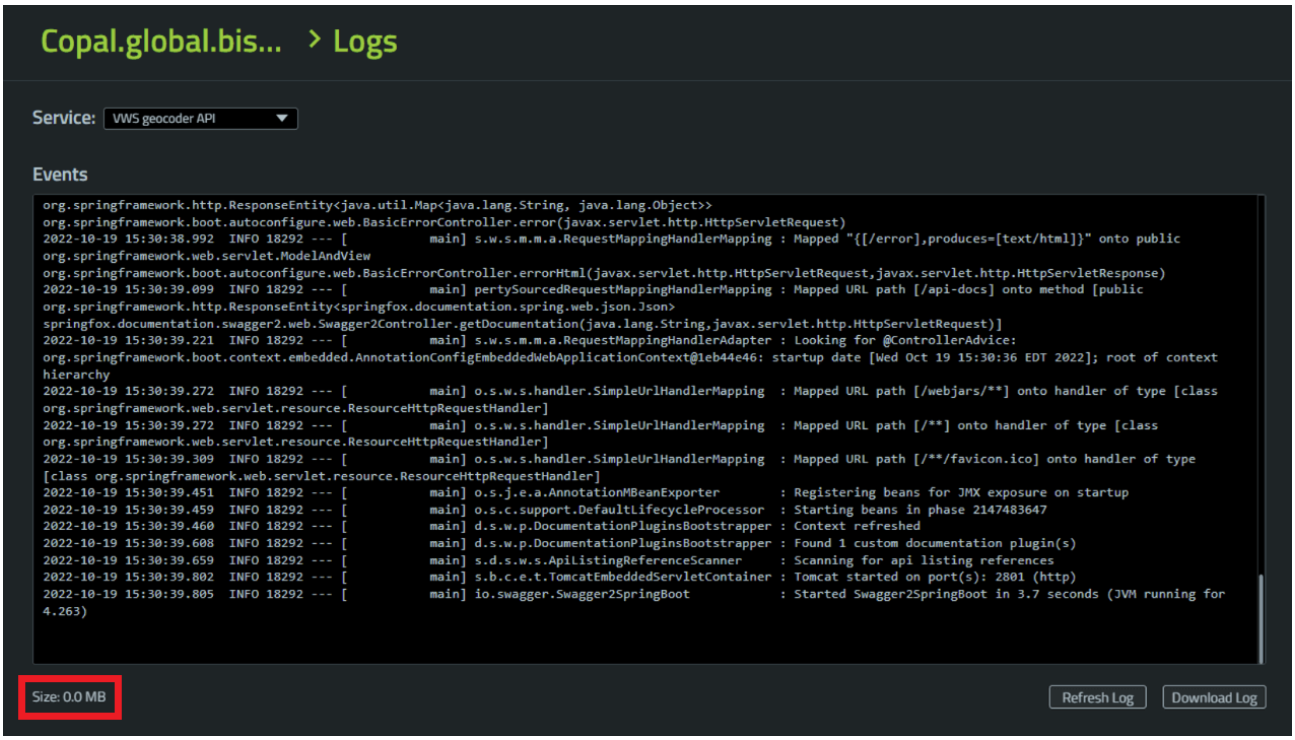
Download Log

Downloads the log file for the currently selected VBS World Server file as a `log.txt` file to your machine's `Downloads` folder.



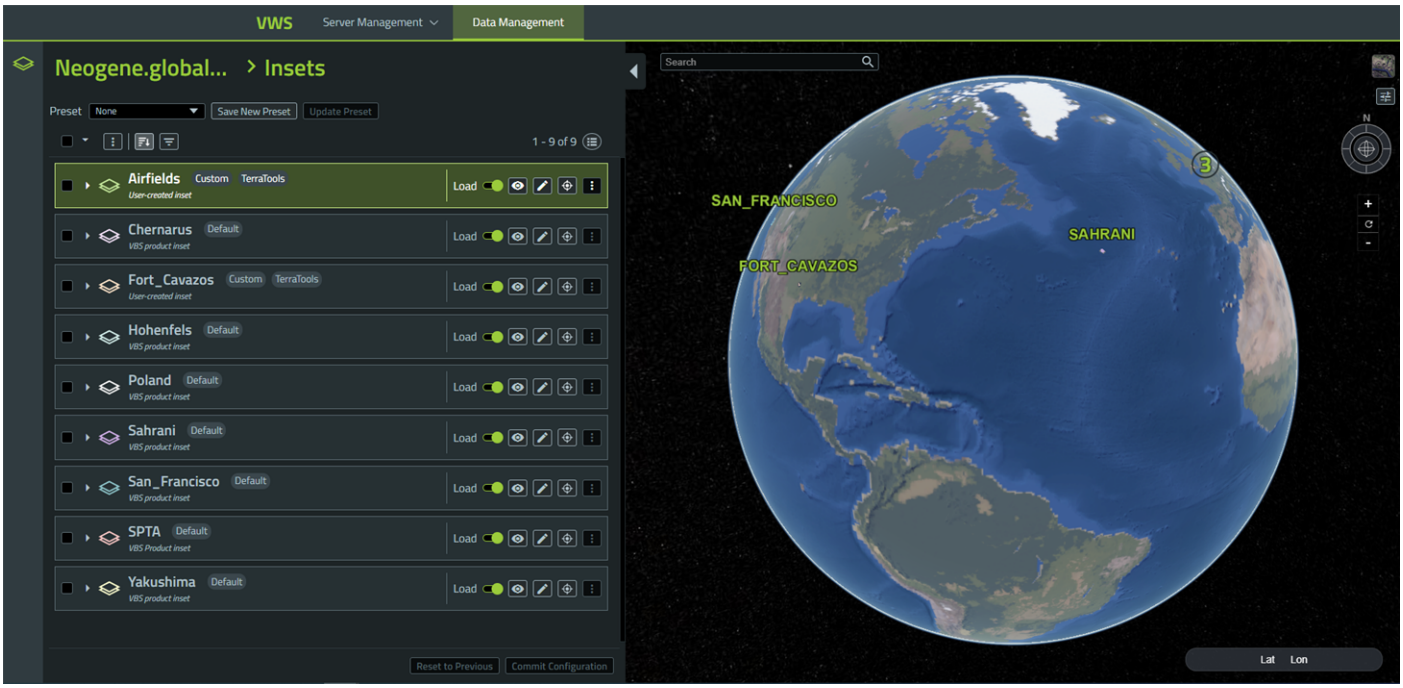
Size

Gives the file size information for the selected log.



4.4 Data Management

The **Data Management** tab provides an overview of the data on the server. It consists of an Insets Management (on the next page) panel and a Globe View (on page 70) panel.



NOTE

After configuring or starting services, allow the services to initialize for at least 5 minutes before accessing the **Data Management** tab. Alternatively, check the end of the VWS OWSServer log file for:

```
27.621 [Info] [PluginManager] Plugin configuration loaded.
28.573 [Info] [PluginManager] Recalculating the plugin graph ...
```

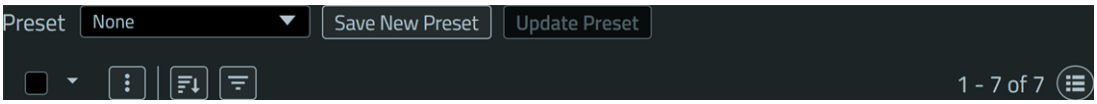
4.4.1 Insets Management

The **Insets Management** panel shows a list of the insets on the server—it can be used to configure and manage inset data, as well as change data visualization in client VBS4 instances. These changes are represented in the **Globe View** panel on the right.

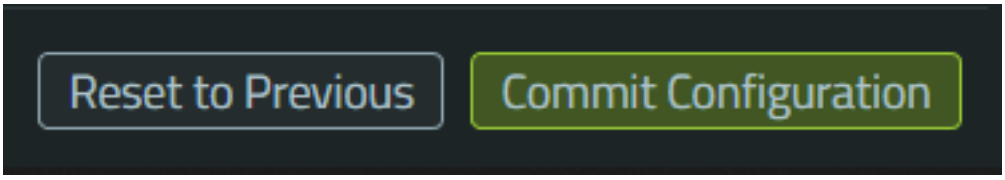
> **WARNING**
>
> A page refresh is required to see new inset configuration changes made by other clients connected to the same VBS World Server.

4.4.1.1 Configuration Management

The **Configuration Management** options are located above and below the inset list



When changes are made to the configuration, the **Reset** and **Commit Configuration** buttons below become selectable.



The **Configuration Management** options include:

Preset - As preset inset configurations are saved using the **Save New Preset** button, they will appear as options in the drop-down menu. Selecting a **Preset** in the drop-down menu will update the configuration of the insets in the list below to match the saved configuration associated with that **Preset**.

- Changes to the color, name, or tags of an inset or layer will apply regardless of the current preset. Only edits to the following parameters can be saved to a preset:
  - Whether an inset or layer is enabled.
  - Whether an inset or layer is hidden.
  - The load priority of the inset or layer.
  - The sort and filter state of the **Insets Management** panel.
    - Note that the sort state, but not the filter state, is shared with the **Layers** panel.

  See Inset Controls (on the next page) for more information on these options.

Battlespace - Promoting a Battlespace will make the associated VBS Geo project edits visible in the **Globe View** (3D Tiles and Imagery). To promote a Battlespace, select the Battlespace from the **Battlespace** drop-down menu and click **Commit Configuration** to apply. Promoted Battlespaces with no VBS Geo project edits will not alter the **Globe View**.

Update Preset - This updates the selected **Preset** with any changes made to the configuration of insets in the list below. This button will only be enabled when the configuration of insets differs from what was previously saved in the selected **Preset**.

Save New Preset - This saves the current inset configuration, including the **Color**, state of **Load** toggles, and **Load Priority** defined for all terrain insets and their constituent layers in the list below. When **Save New Preset** is clicked, you will be prompted to provide a **Name** for your preset that can then be found in the **Preset** drop-down.

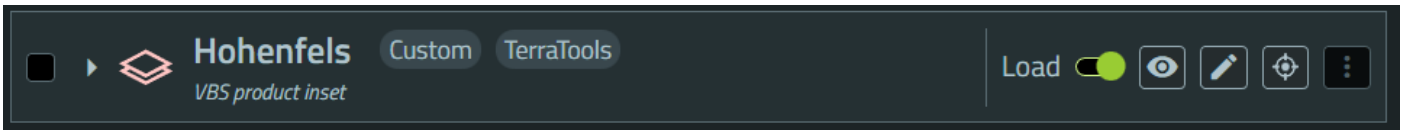
Update Preset - This updates the selected **Preset** with any new changes made to the inset configuration. This button will only be enabled when the current configuration differs from what was previously saved in the selected **Preset**.

Reset to Previous - This resets the **Data Management** panel to the previously committed configuration.

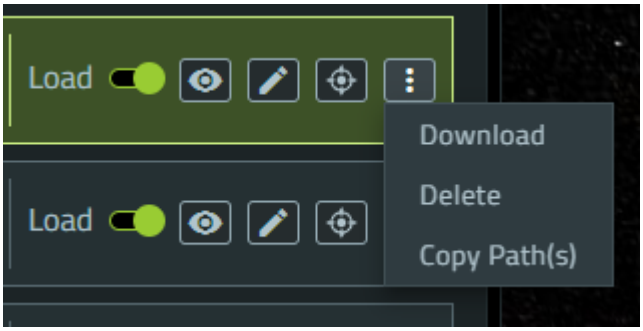
Commit Configuration - This commits the current configuration in the **Insets Management** panel and applies it to the server. In the resulting **Changing Inset Configuration** dialog, click **Commit Configuration** again to save the changes.

4.4.1.2 Inset Controls

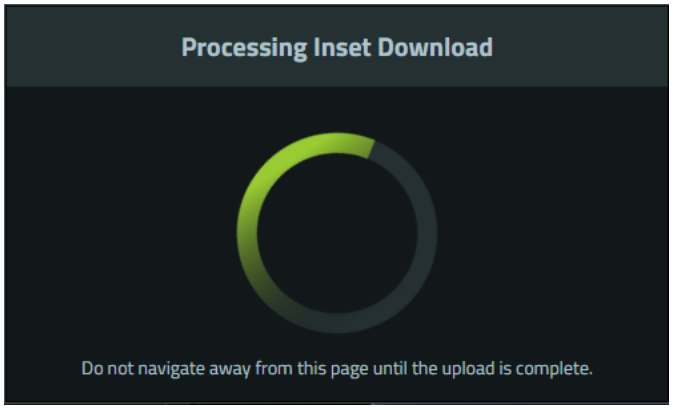
Each inset in the list has a selection check box and info drop-down arrow on the left of the listing, and several inset display controls to the right of the inset entry.



Inset Options - Click on the 3-dot icon on each inset listing to open a drop-down menu.



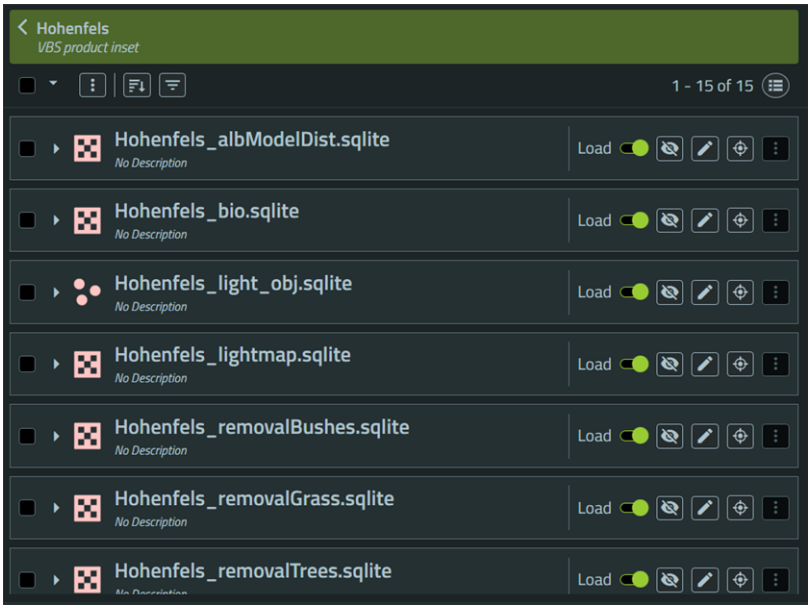
- Click **Download** to download a zip file containing the inset.
  - While the zip file is created, a progress dialog will appear on the screen.



  - See Using Downloaded VBS World Server Insets (on page 116) for more information on using insets that have been downloaded from VBS World Server.
- Click **Delete** to remove the inset from server.

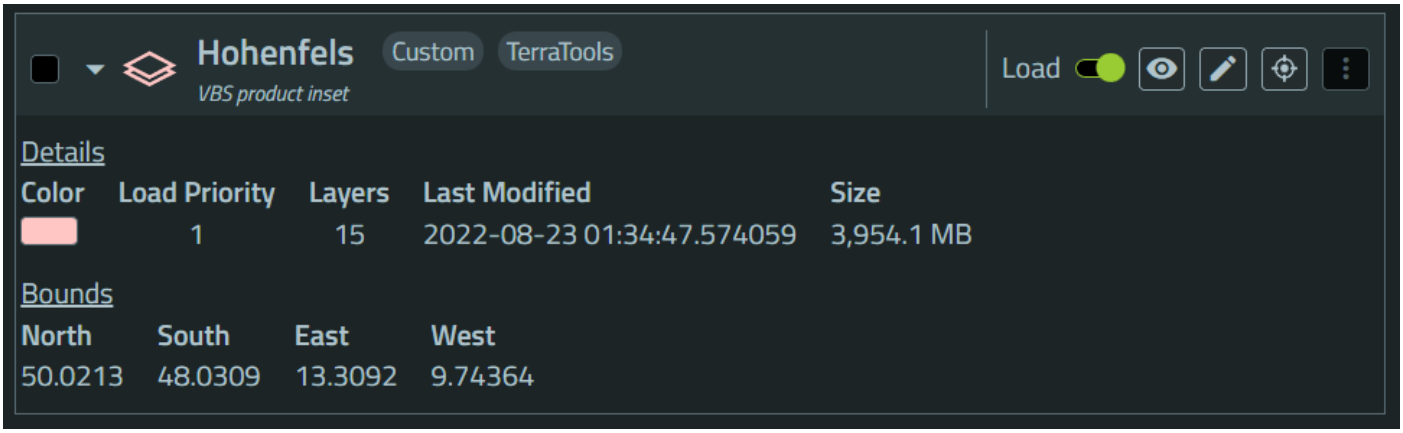
> **NOTE**
>
> Only user-created and installed insets can be downloaded or deleted. Default insets only have the **Copy Path(s)** option in the drop-down menu.

Terrain Layers Panel - Click on an inset listing to access the **Terrain Layers** panel for the inset. This panel shows all the VBS4 layers within the inset.



Each of the individual layers in an inset can be managed in largely the same way as the insets themselves, as described below. However, you cannot alter the names of layers or apply tags as with the insets.

- To leave the **Terrain Layers** view and return to the inset view, hit the back arrow by the inset name.
- Click the **Check Box** icon in the inset listing to select it.
- Use the **Inset details** drop-down arrow to access the inset's metadata.



The **Load** toggle switch controls whether the inset will be loaded in connected VBS4 clients. Toggle the switch to off to remove the layer from the **Globe View** and the globe in any connected VBS4 clients.

The **Eye** icon controls whether the inset bounds are displayed in the **Globe View** panel. Click the icon to toggle it off and remove the layer bounds representation from the **Globe View**. This does NOT control whether the inset renders in VBS4; use the **Load** toggle switch for this.

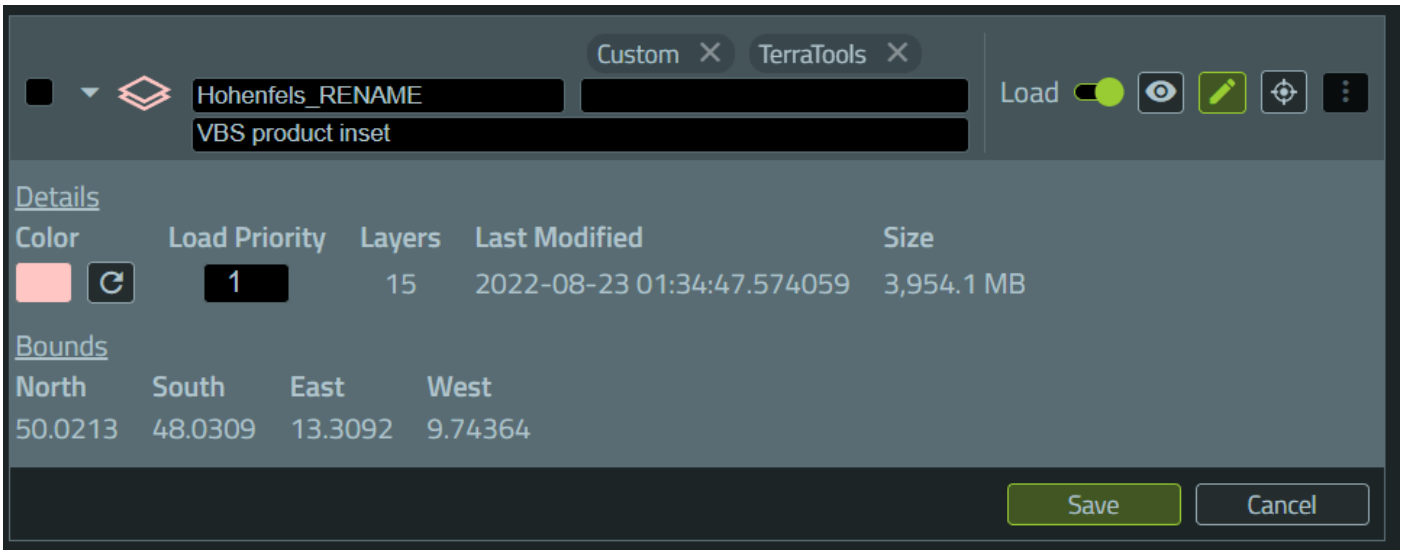
The **Edit** icon opens the inset metadata editor. Within this editor, you can rename the inset, change the description, add or remove labels, change or reset the display color, and change the load priority.

The **Load Priority** field accepts negative, positive, and zero values. The default load priority is *1*.

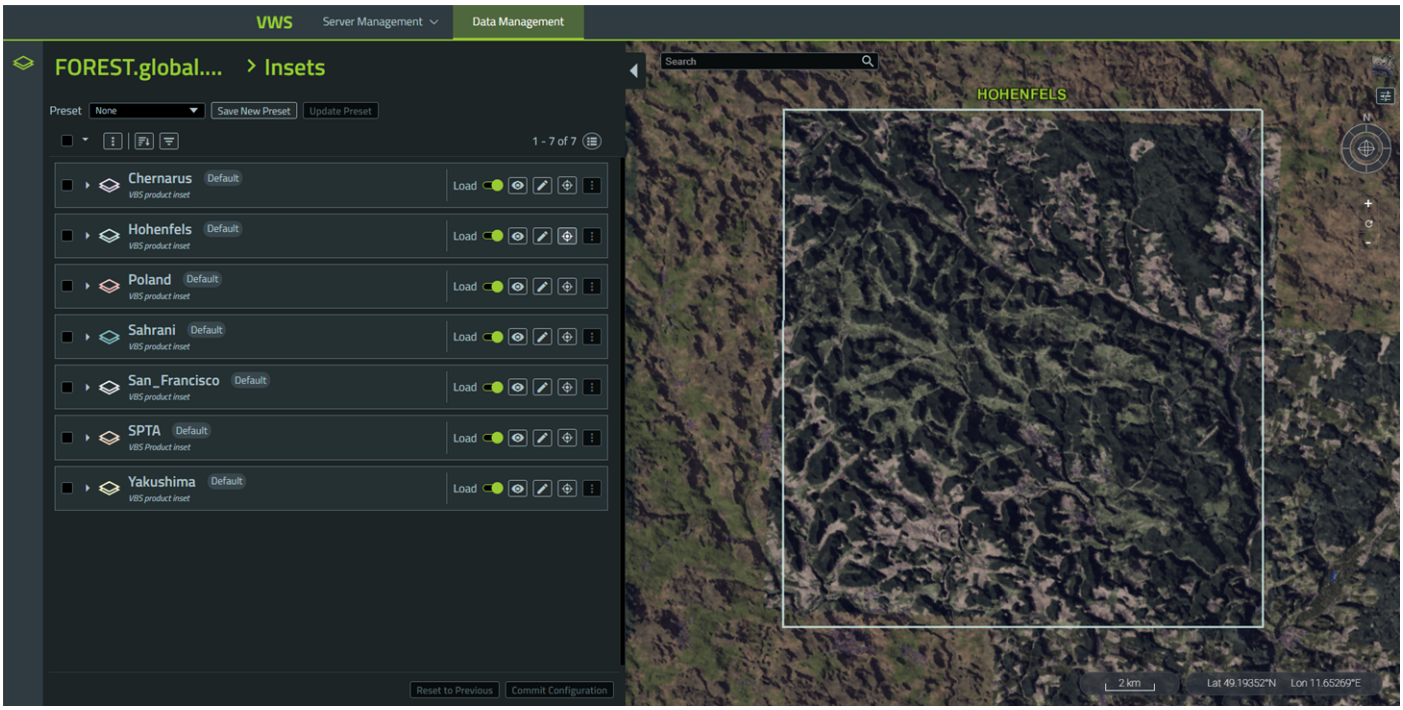
- Lower (more negative) values result in a lower load priority for the layer or inset.
- Higher (more positive) values result in a higher load priority, meaning the layer or inset will be prioritized above those with lower values when loading into the **Globe View**.
- If two insets have the same load priority, they will load in alphabetical order.

> **EXAMPLE**
>
> If *Inset_A* and *Inset_B* both have a load priority of 2, *Inset_B* will be the second inset to load. As a result, if removal regions are enabled on *Inset_B* and the two insets are in the same location, then *Inset_A* will be suppressed by *Inset_B*.

Click **Save** to keep these changes or **Cancel** to discard them.



Use the **Geolocate** button to jump the **Globe View** to center on the inset's location.



The **Inset Options** button on each inset listing opens a drop down menu. Click **Download** to download the inset JSON to the local computer, or **Delete** to remove the JSON from the server and delete the inset.

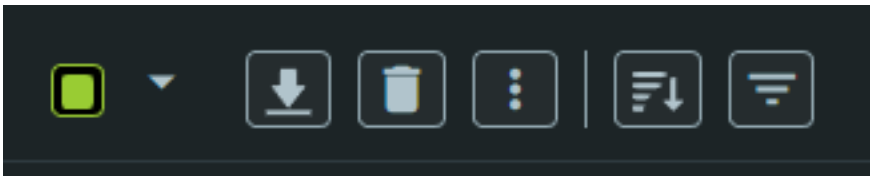
4.4.1.3 List Display Controls

The list in the **Insets Management** panel can be managed as follows:

Select All Instances Check Box - Click this button to select all insets or to deselect all currently selected insets. Use the **Expand/Collapse Arrow** to access the drop-down menu versions of these options: **Select All On** or **Select All Off**.

- When one or more insets in the list are selected, the **Download** option appears.
- When only user-created insets the list are selected, the **Delete** option appears.

Default insets included in your product cannot be deleted.

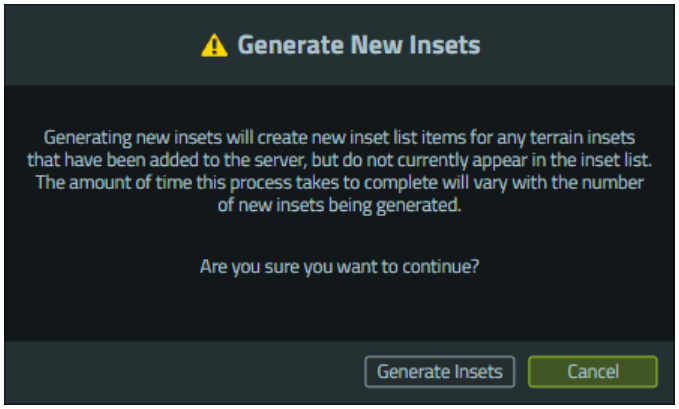


Inset List Options - The inset list options drop-down menu includes various list management operations:

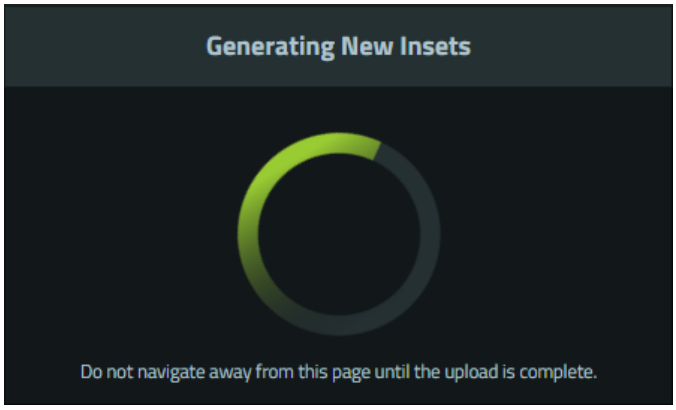
- **Change Color All** - Opens the **Color Palette** panel. Select a new color for all insets/inset layers.
- **Change Color Selected** - Opens the **Color Palette** panel. Select a new color for selected insets/inset layers.
- **Reset All Colors** - Reset all inset/inset layer colors to the default.
- **Reset Selected Colors** - Reset selected inset/inset layer colors to the default.
- **Hide All** - Hides all of the inset/inset layers in the **Globe View**.
- **Show All** - Shows all of the inset/inset layers in the **Globe View**.
- **Hide Selected** - Hides selected inset/inset layers in the **Globe View**.
- **Show Selected** - Shows selected inset/inset layers in the **Globe View**.
- **Turn All On** - Toggles the **Load** toggle switch to on for all insets or inset layers.
- **Turn All Off** - Toggles the **Load** toggle switch to off for all insets or inset layers.
- **Turn Selected On** - Toggles the **Load** toggle switch to on for selected insets or inset layers.
- **Turn Selected Off** - Toggles the **Load** toggle switch to off for selected insets or inset layers.

- **Generate New Insets** - Starts the **Generate New Insets** process. This will create new inset list items for any terrain insets that have been added to the server but do not currently appear in the insets list.

  Clicking **Generate New Insets** causes a warning dialog to appear. Click **Generate Insets** to initiate the process or click **Cancel**. A refresh is required after the process completes.

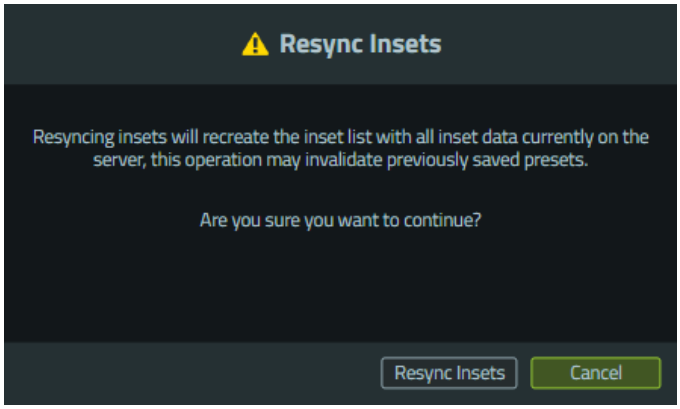


  A progress dialog is displayed when the **Generate New Insets** process is started and remains until the process is completed.

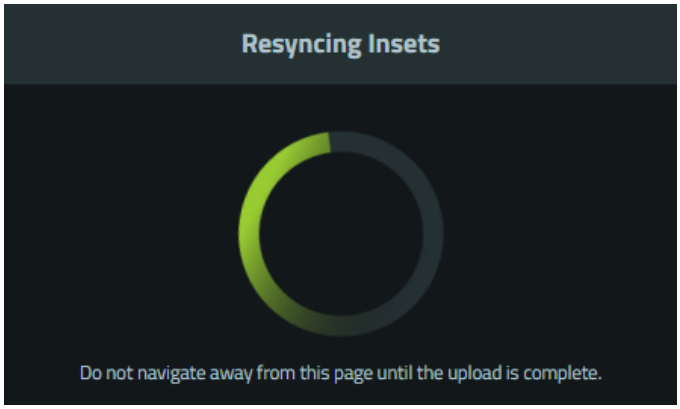


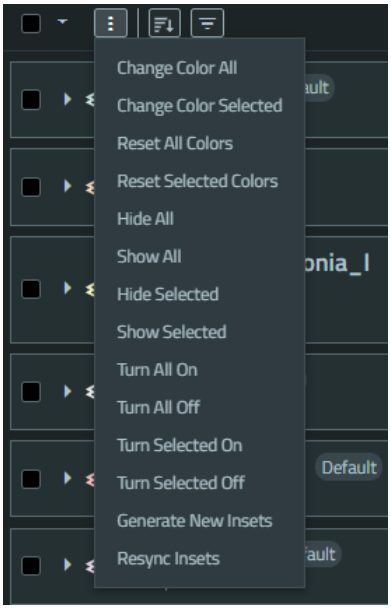
- **Resync Insets** - Starts the **Resync Insets** process. This will recreate the inset list with all inset data currently on the server.

  Clicking **Resync Insets** causes a new dialog to appear. Click **Resync Insets** to initiate the process or click **Cancel**. Any unsaved edits will be lost.

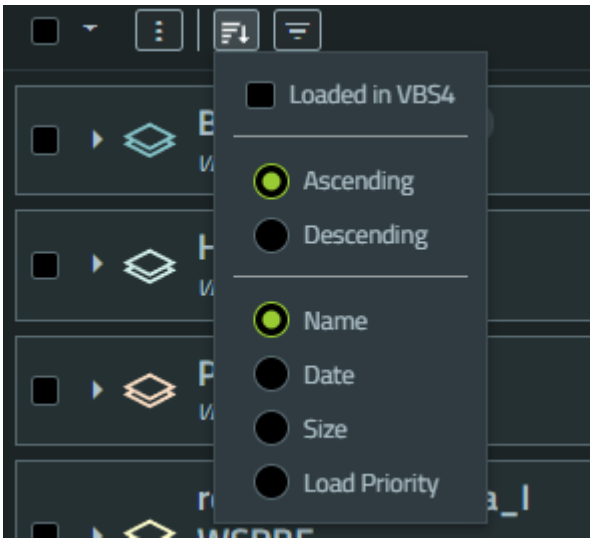


  A progress dialog is displayed when the resync process is started and remains until the process is completed.

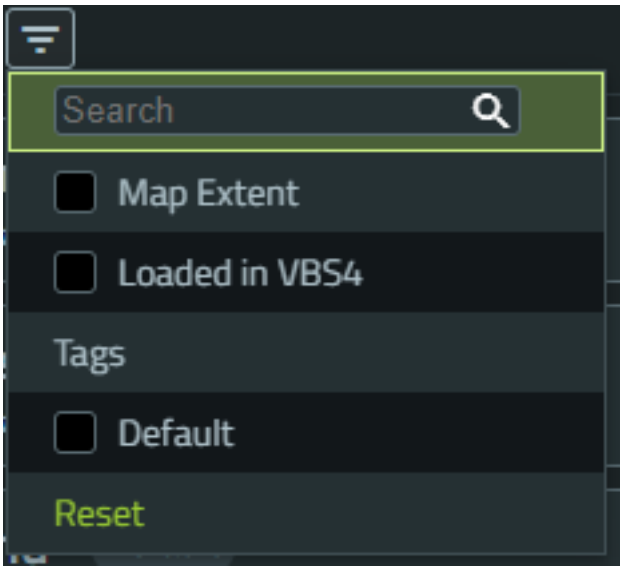




Inset List Sorting - Sort the list by various parameters, such as whether the inset is currently loaded in VBS4; or order the list by name, date, size, or load priority in ascending or descending order.



Inset List Filter - Filter the inset list using various options.



Map Extent - Filters the inset list based on the extents of the map visible in the **Globe View**.

Loaded in VBS4 - Filters the inset list to only show insets with the **Load** toggle set to ON.

Tags - Filters the inset list to only include insets that have the selected tag(s).

Reset - Clears all selected filters.

Inset Pagination - As more insets are added to the server, the inset pagination display will update.

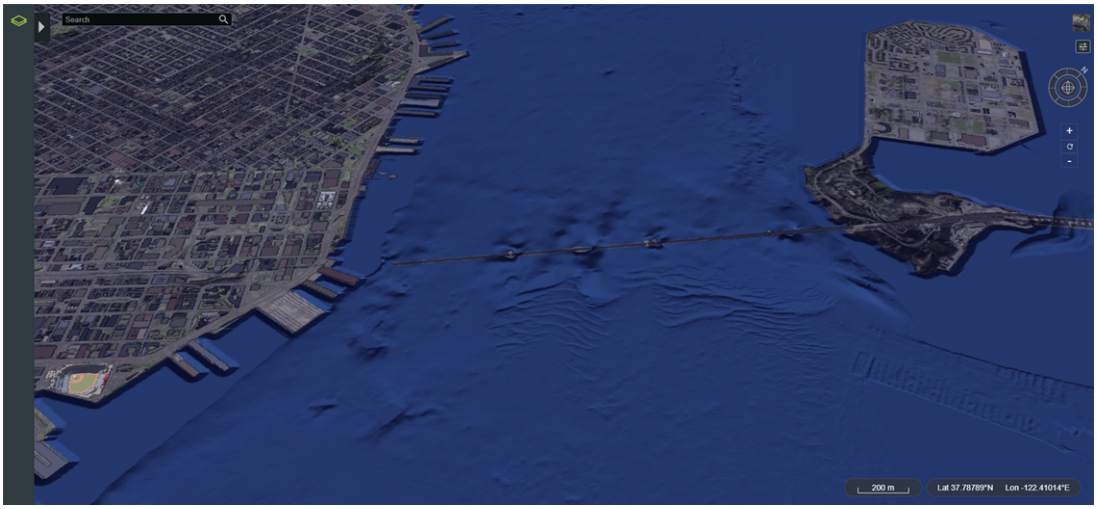
Maximize Inset List View - Click to maximize the inset list view and minimize the **Globe View**.

Toggle on Globe View - Click to restore the **Globe View** and return the interface to the default setup.

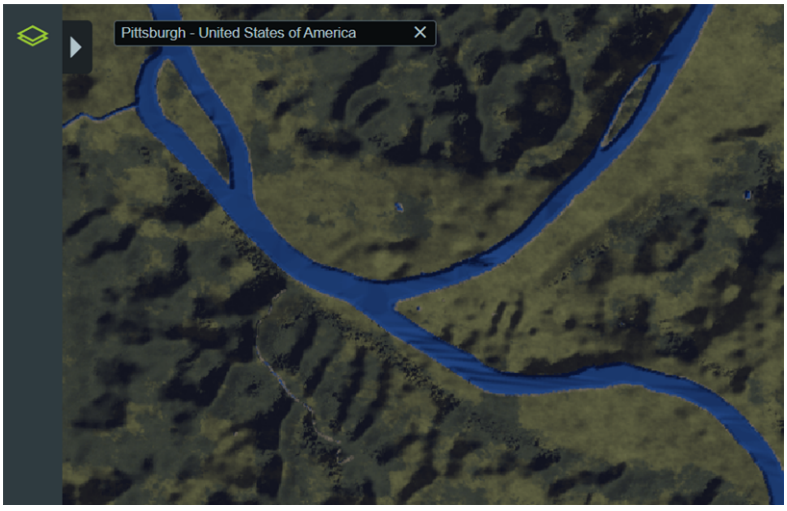
4.4.2 Globe View

The **Globe View** shows an overview of the data contained on the server.

Use the arrow on the right side of the **Insets Management** panel to collapse it to view the **Globe View** in full screen. To restore the **Insets Management** panel, click the expand arrow icon.



Use the geolocation search bar in the top-left corner of the **Globe View** to jump to different locations in the world. Type in the location, then select a suggested location from the resulting drop-down menu.



4.4.2.1 Global Imagery Panel

The **Global Imagery** panel can be used to configure the rendering of the Earth's surface in the **Globe View** panel. Click the square button in the top-right corner of the **Globe View** to access the **Global Imagery** panel.

4.4.2.1.1 Imagery

Selections in the **Imagery** section change the base map shown on the Earth's surface in the **Globe View** panel.

- **VWS** - imagery from the World Server Base globe.
- **Other** - Open-source imagery.

4.4.2.2 Navigating the Globe View

The **Globe View** can also be manually navigated using the following controls:

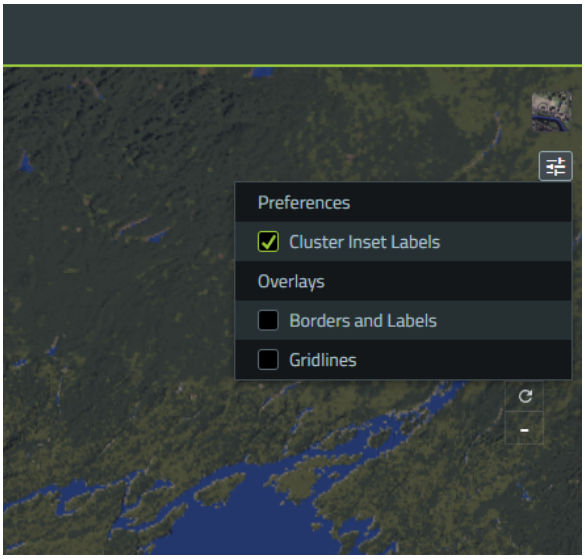
- **Pan** - Click and hold the left mouse button.
- **Zoom** - Scroll the center wheel or click and hold the right mouse button.
- **Change Viewing Angle** - Click and hold center wheel.

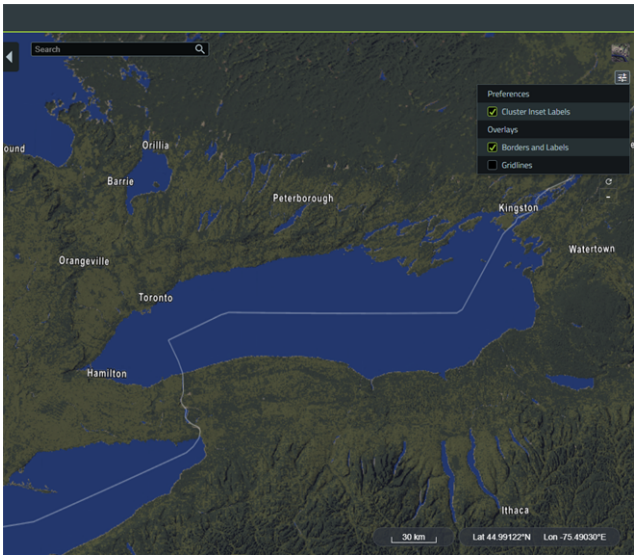
4.4.2.3 Map Settings Menu

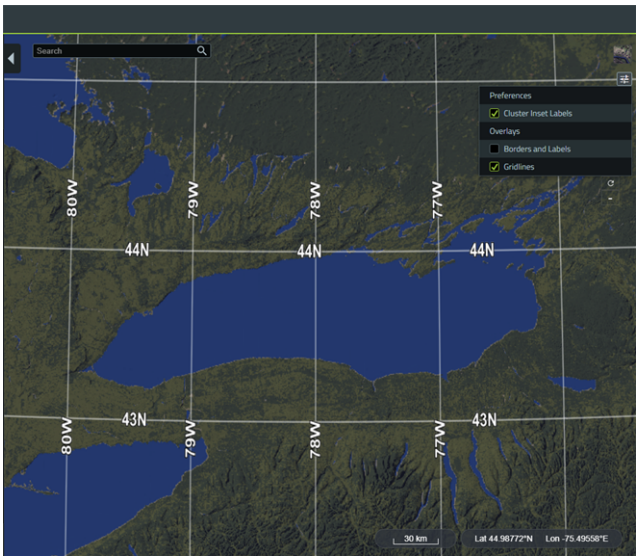
The **Map Settings Menu** can be used to change display preferences or to toggle the information that is overlaid on the map.

- **Cluster Inset Labels** - Toggles the clustering of inset labels in the **Globe View** panel.
- **Borders and Labels** - Toggles the **Borders and Labels** overlay in the **Globe View** panel.

- **Gridlines** - Toggles the **Latitude / Longitude Gridlines Gridlines** overlay in the **Globe View** panel.







5. Managing the Whole-Earth Terrain

The primary purpose of VBS World Server is to host and stream the Whole-Earth Terrain to connected VBS4 Clients.

VBS4 and VBS World Server provide multiple methods to import data, improving the level of detail in the Whole-Earth Terrain.

- Installing World Data (on the next page)
- Overriding World Data (on page 84)
- VBS Geo Data Import (on page 86)
- VBS3 to VBS4 Terrain Conversion Tool (on page 91)
- Installing Terrain Insets (on page 109)

In addition VBS Geo enables individual terrain edits for specific Battlespaces. These Battlespace specific edits are loaded on top of the Whole-Earth Terrain and streamed to connected clients during Scenario Execution. For more information, see VBS Geo Overview in the VBS Geo Manual.

WARNING

Do not manually add or remove data, such as terrain data or Battlespaces, from VBS World Server while services are configured. Use the methods described in Data Management (on page 60) or Battlespace Management in the Introduction to VBS4 Guide accordingly, otherwise run `vws_shutdown.exe` before making manual changes.

5.1 Installing World Data

VBS4 is available with a set of optional World Data packages that include buildings, roads, and airfields. They are intended to serve as background cultural data to enhance large scale training environments.

Download World Data from VBS License Manager.

Follow these steps:

1. In VBS License Manager, open the **Downloads** page.
2. Select **VBS4** from the products panel and **Choose Version**.
3. Expand **Products Available to Download** to display the World Data available for download:
   - **World Data (23.2)** contains procedurally generated buildings for each continent and regional roads generated from OpenStreetMap data.
   - **World Airfields (24.1)** is a large set of insets for global airfields. For a complete list of supported airfields (using ICAO airport codes), see Global_Airfield_List.txt.

   Click the **Configure List** icon, to view the available sets of World Data:

   - Asia
   - North America
   - South America
   - Europe
   - Australia
   - Africa
   - Antarctica
   - Islands
   - Airfields

   For more information, see World Airfields (on page 79) and World Data (on page 76).

   > **NOTE**
   > The World Airfields package includes some heightmap changes in the area of each airfield that can conflict with existing World Data buildings when used together. To address this, the World Airfields package contains cutouts of World Data buildings around each airfield to resolve building elevation changes. If using World Airfields without World Data buildings, these extra buildings around airfields may be distracting and can be removed. For more information, see Removing World Airfield Building Data (on page 85).

4. Select the World Data packages to download.

   > **TIP**
   > Deselect **VBS4** and all other products to only download World Data packages.

5. Expand **Save Location**, click **Change**, and select a download folder.
6. Click **Download**.

VBS License Manager downloads your selected packages to the selected folder.

Once your packages are downloaded, use the Updater Tool to install them.

Follow these steps:

1. Copy the download packages to the same temporary folder on the target computers.
2. Stop VBS World Server and close all target VBS4 Clients:

   On VBS World Server run `vws_stop.exe`.
3. Run the appropriate Updater Tool to install the World Data:
   - On VBS World Server:

     `\Installation\Updater.exe`
   - On VBS4 Clients:

     `\VBS_Installation\Updater.exe`
4. Specify the folder containing the World Data packages, and click **Install**.
5. After installation, restart VBS World Server:
   - On VBS World Server run `vws_start.exe`.

The VBS World Server or VBS4 Updater Tools will update your installation of VBS World Server or VBS4 with the applicable World Data.

5.1.1 World Data

The World Data packages for roads and buildings are organized by continent and include regional road coverage, and contain OpenStreetMap-based cultural data including procedurally extruded building footprints with regional texturing and roads with road type-based texturing. Shown below are examples of cities using the world data for each continent.

Image-2: Asia - Hong Kong

Image-3: North America - New York City

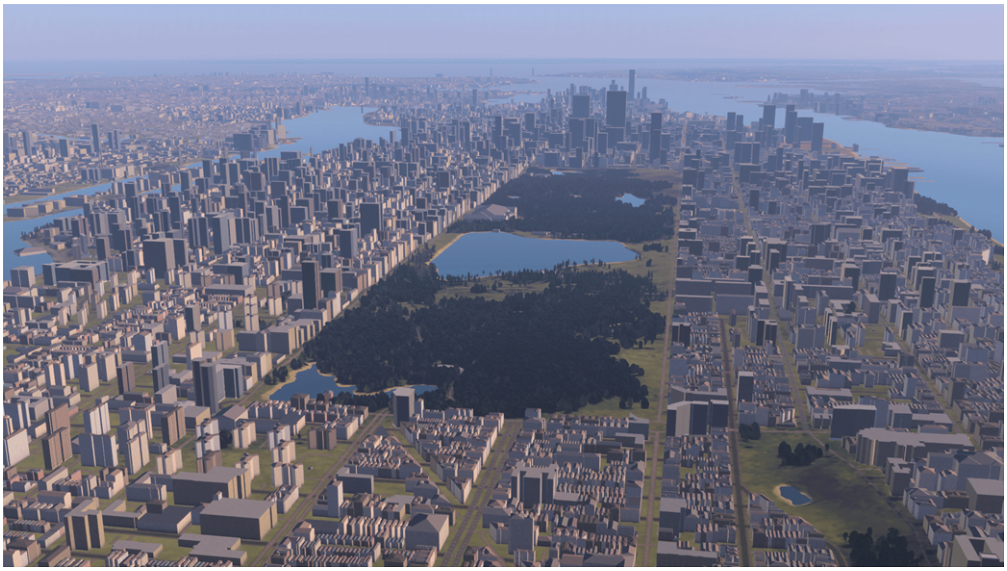


Image-4: South America - Rio de Janeiro

Image-5: Europe - San Marino

Image-6: Australia - Hobart

Image-7: Africa - Cape Town

Image-8: Antarctica - Troll Research Station

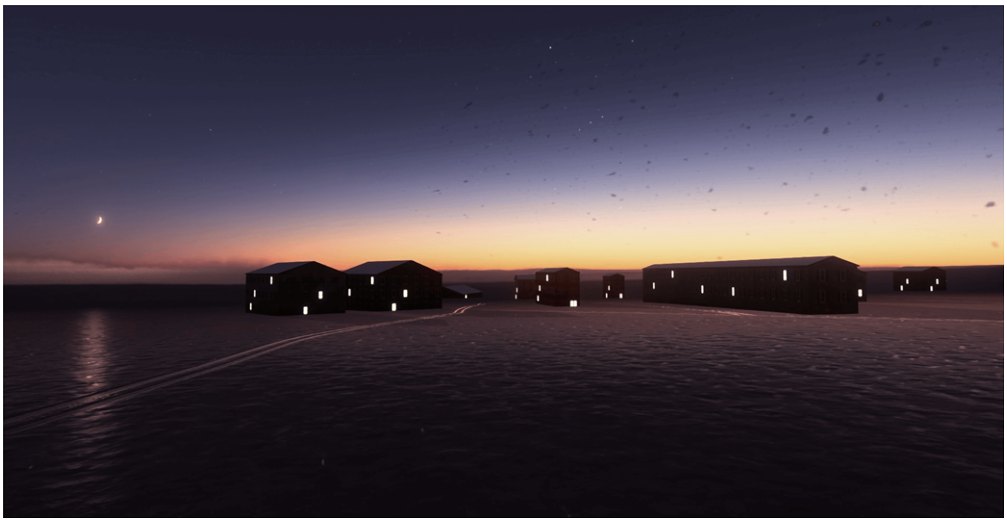
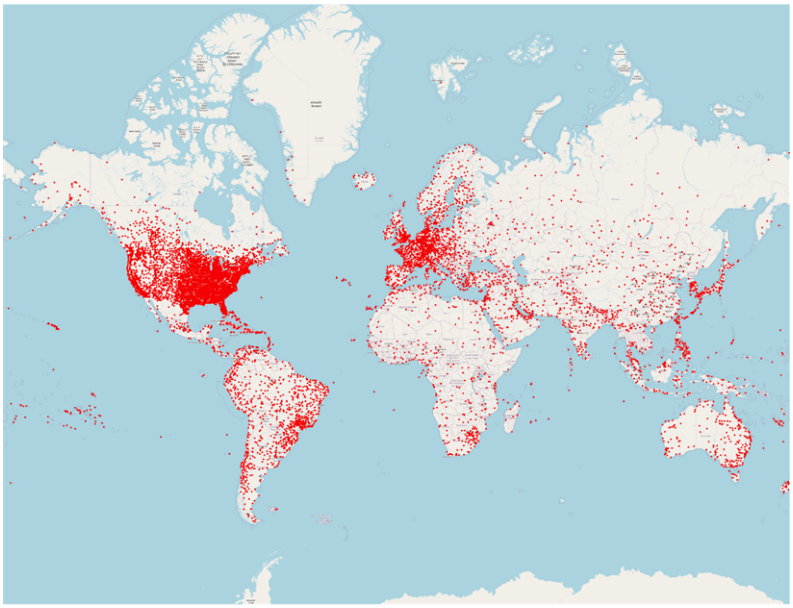


Image-9: Islands - Rejkjavik

5.1.2 World Airfields

VBS4 includes an optional airfield package that contains over 9,000 major and regional airfields throughout the world.

Image-10: VBS4 World Airfields Coverage



These airfields are created using TerraTools to produce accurate paint markings, realistic navigational light models, and updated heightmaps and surface masks for each inset. The airfield pack can be installed in an offline VBS4 instance or on the VBS World Server for streaming across your network.

For a complete list of airfields supported in VBS4 (provided in ICAO airport codes), see the Global_Airfield_List.txt list.

Below are examples of some of the airfields included in this package:

Image-11: EDDB - Berlin Brandenburg Airport, Germany

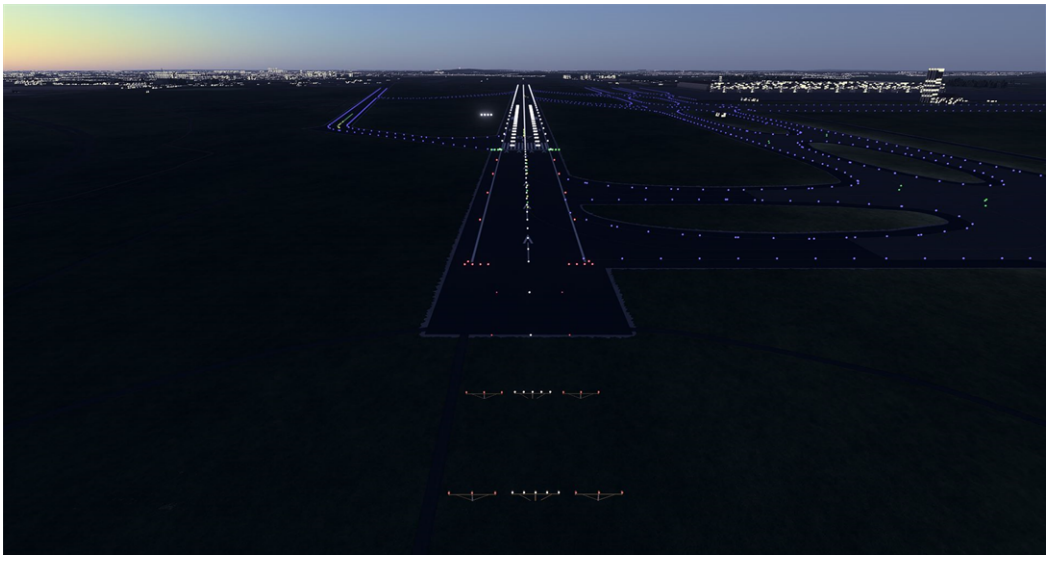


Image-12: EETN - Tallinn Airport, Estonia

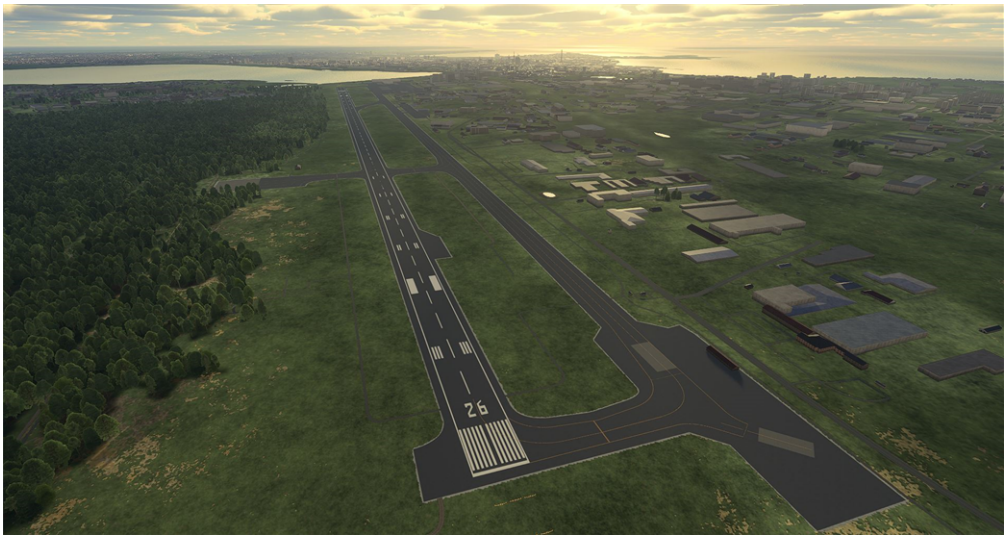


Image-13: ENGM - Oslo Gardermoen Airport, Norway

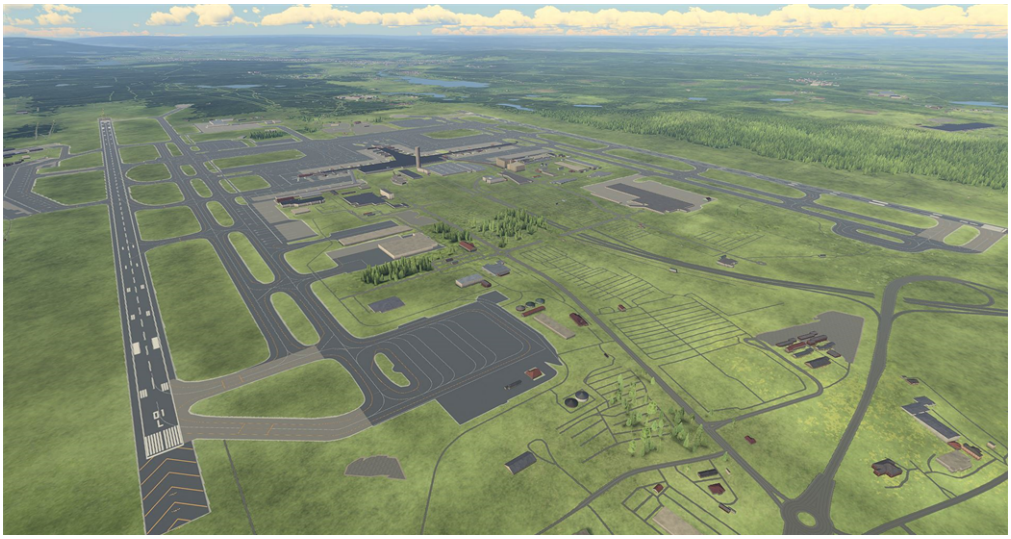


Image-14: EPWA - Warsaw Chopin Airport, Poland

Image-15: ETAR - Ramstein Air Base, Germany

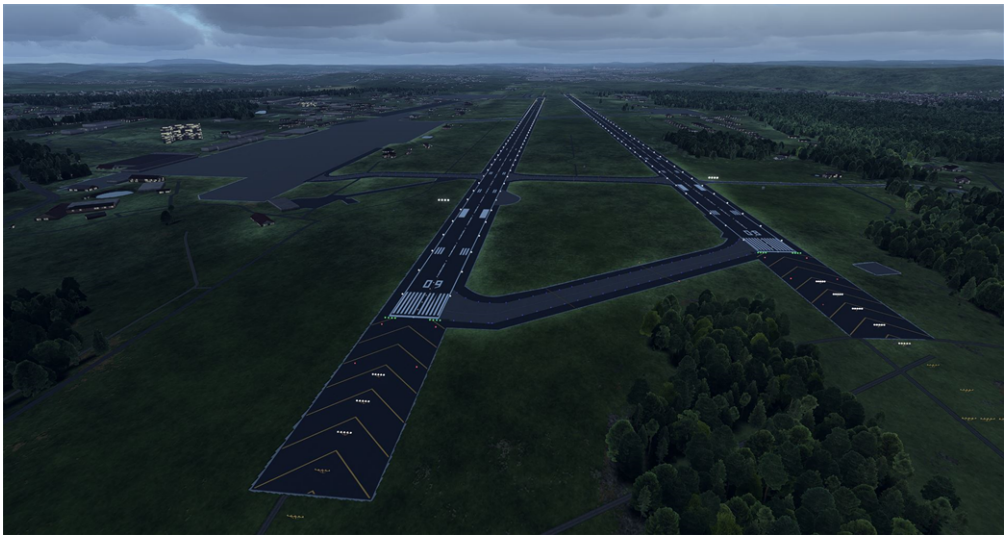


Image-16: FACT - Cape Town International Airport, South Africa

Image-17: KCLE - Cleveland Hopkins International Airport, United States

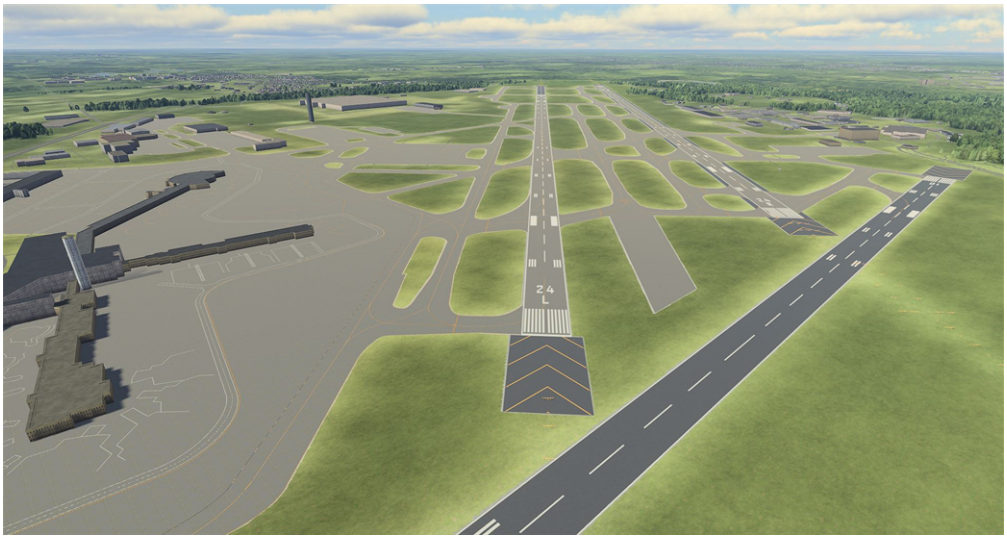


Image-18: KIAD - Dulles International Airport, United States

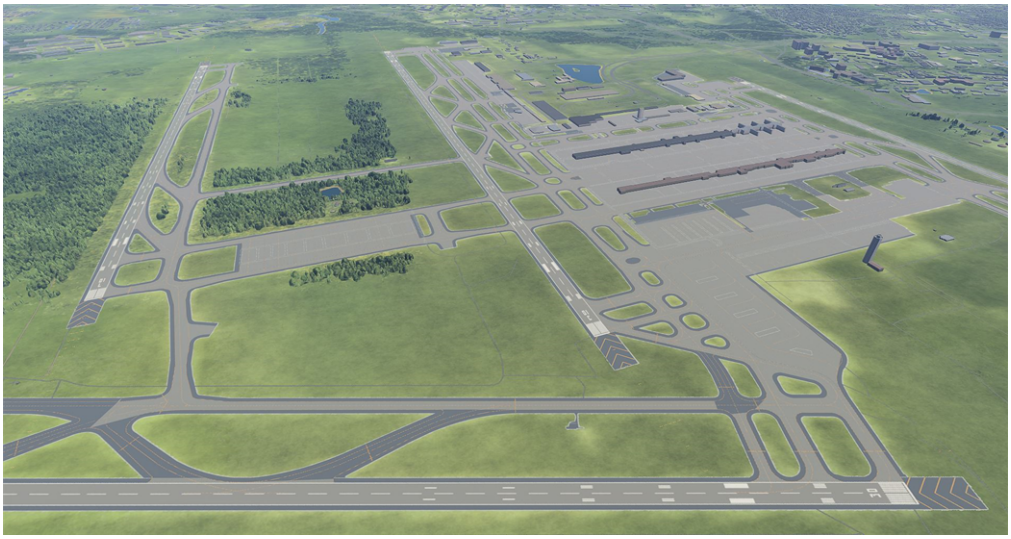


Image-19: LEBL - Josep Tarradellas Barcelona–El Prat Airport, Spain

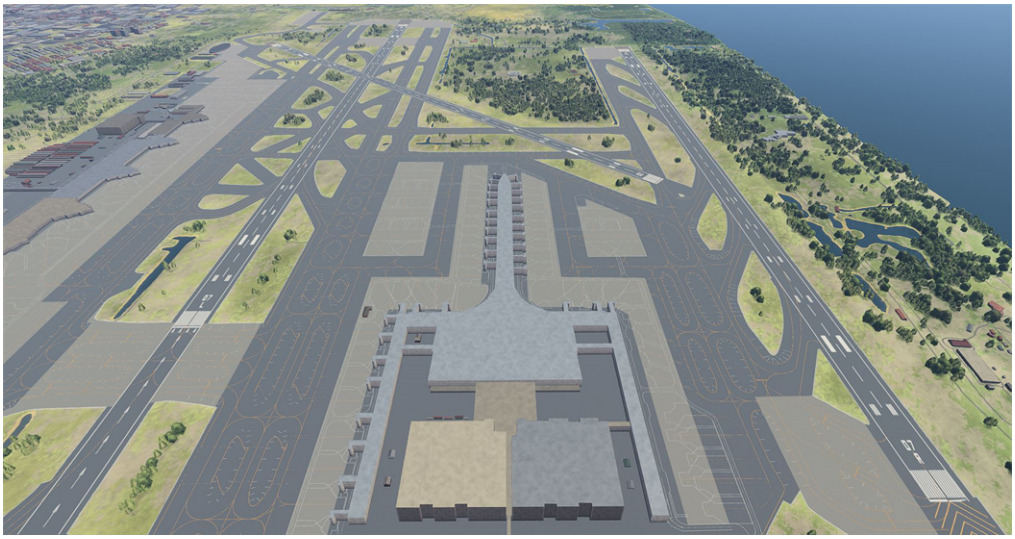


Image-20: LLBG - Ben Gurion Airport, Israel

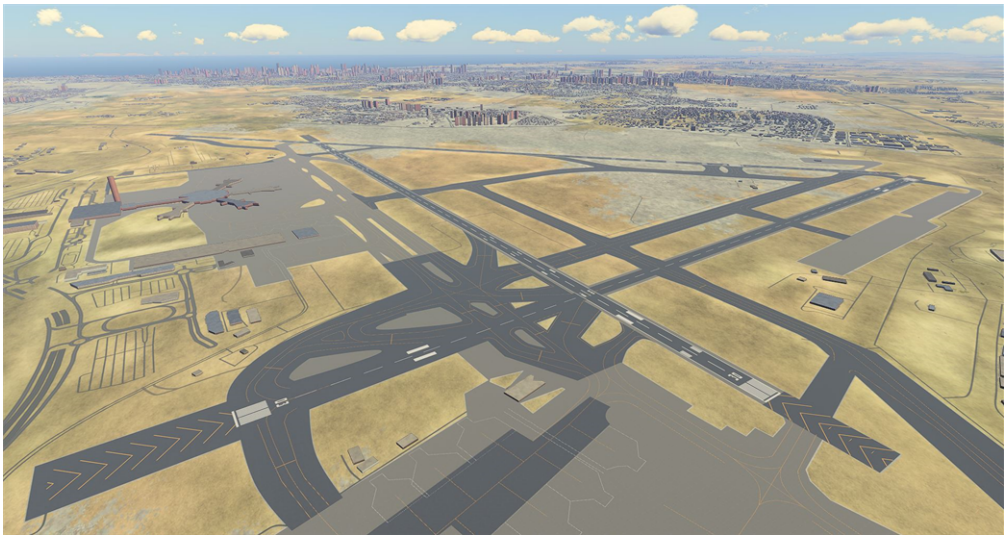
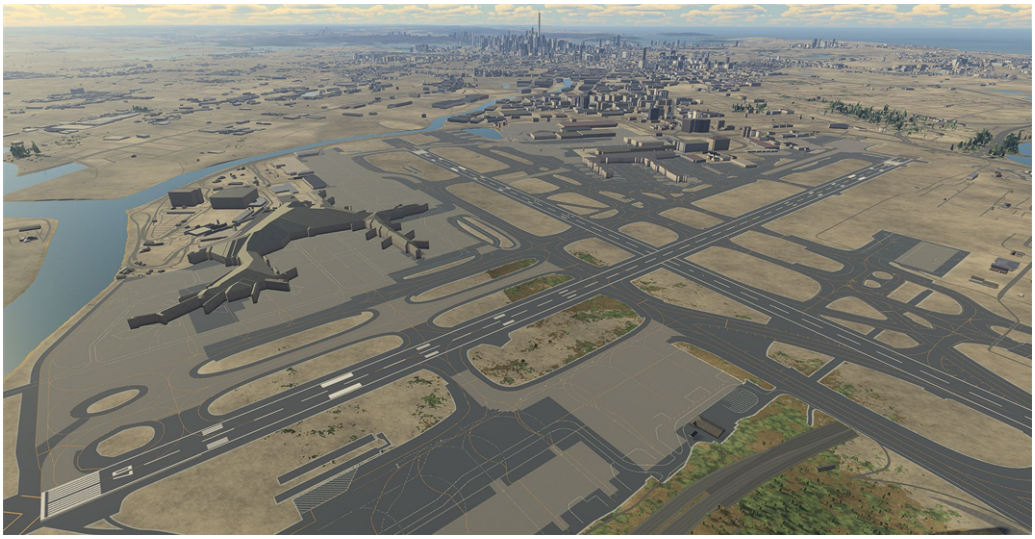


Image-21: LOWW - Vienna International Airport, Austria

Image-22: YSSY - Sydney International Airport, Australia



5.2 Overriding World Data

The optional World Data buildings and roads packages are automatically overridden by user data added via VBS Geo Data Import (on page 86) and the VBS3 to VBS4 Terrain Conversion Tool (on page 91). Once a user's inset buildings or roads data finishes processing on the VBS World Server, any existing base World Data will be removed where it overlaps.

5.2.1 Removing World Building and Roadway Data

In addition to the automatic override described above, World Buildings can also be selectively removed from VBS World Server in the following folder:

`\Installation\Services\VBS4\data\BlueBase\earth\`

- **Global building files:**
  - `\Global_Geometry\Global_Buildings\`
- **Global roadway files**:
  - `\Global_Roads\`
- **The corresponding Albedo layer files for global buildings:**
  - `\Global_Bld_To_Alb\Global_Buildings\`
- **The corresponding vegetation removal masks can be found here:**
  - `\Global_Veg_Removal\Global_Buildings\`

When these files are removed from the server, bushes and trees will fill in where buildings once stood.

Each `.sqlite` file is a 3 x 3 degree tile (3 degrees of latitude by 3 degrees of longitude). The files are named according to the latitude and longitude of the furthest southwest corner of the 3 x 3 degree tile.

> **NOTE**
>
> To find the southwest corner, round down both the latitude and longitude value to the nearest multiple of 3. For a negative value, this means rounding to the number further from zero.

For example, an area of interest at latitude 10.5 and longitude -70 would be covered by `N+009.00W-072.00_gshp.sqlite` and a terrain at latitude -31 and longitude 137.6 would be covered by `S-033.00E+135.00_gshp.sqlite`. The corresponding vegetation removal files are named the same with either `_removalTrees` or `_removalBushes` suffixes.

Once you have identified which areas you would like to remove:

Follow these steps:

1. Stop VBS World Server by running:

   `\Installation\vws_stop.exe`

2. Delete or move the `.sqlite` files, then clear the cache by deleting:

   `\Installation\Services\VBS4\cache\`

3. Start the services by running:.

   `\Installation\vws_start.exe`

5.2.2 Removing World Airfield Building Data

When the world airfields are included as part of the World Data installation, updated World Buildings are automatically installed with the various airfield data layers. Buildings directly upon and immediately surrounding each airfield have been re-generated for correct elevation placement, since the airfield elevation data modifies the base VBS4 terrain. The airfield buildings are considered an update to the World Data buildings, and are generally intended for viewing airfields and global buildings simultaneously. The airfield buildings may also be viewed independently without World Data buildings installed. However, hard breaks in building coverage may be observed along the airfield inset edges, depending on surrounding building density.

To remove the world airfield buildings layer, remove the following file:

- `\Installation\Services\VBS4\data\BlueProduct\earth\Global_Airfields\global_airfields_ext_gshp.sqlite`

5.3 VBS Geo Data Import

Geospatial data can be imported to VBS World Server from VBS4 clients via the VBS Geo Data Import process. Supported data layers include elevation data, orthoimagery, surface data, roads (centerlines), and buildings (footprints).

NOTE

Railroad import is not currently supported.

Insets are created in the VBS World Server User Interface for each imported layer. For more information about insets, see Insets Management (on page 61).

WARNING

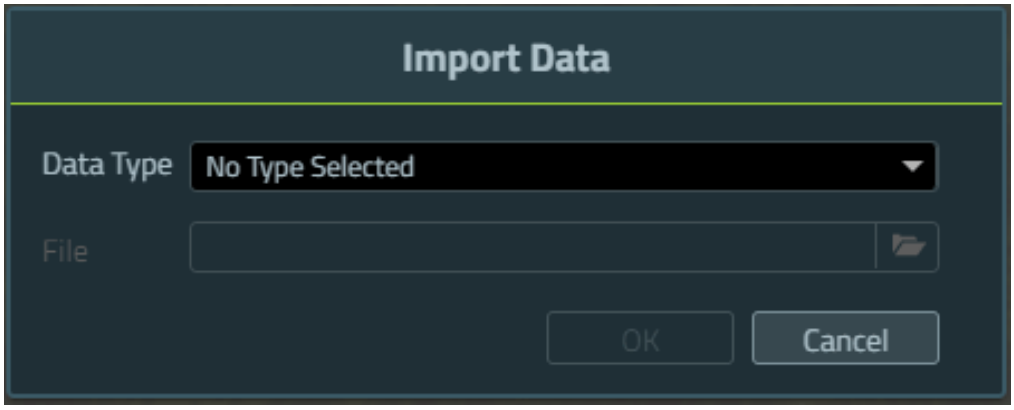
You must launch VBS4 in its online configuration and connect to the VBS World Server for data import or removal to be functional. For details, see in the VBS4 Administrator Manual.

5.3.1 Data Import Workflow

You can import data files from the Main Menu in VBS Geo (see VBS4 Main Menu for VBS Geo).

Follow these steps:

1. From the **VBS4 Toolbar**, click the **Main Menu** icon and select **Import**. The **Import Data** dialog will appear.



2. From the **Data Type** drop-down menu, select the type of data you want to import into VBS Geo.

NOTE

It is important to import elevation data first because it will influence how building data is placed.

3. Click the **Browse** button to open a new File Explorer window. Navigate to a folder with geospatial data and select a data file of the selected type to add to VBS Geo.

> **NOTE**
>
> When loading your own data, ensure no error messages appear. Error messages will appear if the selected data file does not meet the import requirements. Click on the error symbol for more information.

4. Click **OK** to upload the selected data file to the connected VBS World Server where it is automatically processed. A status bar displays while the import is in progress, which may take several minutes depending on the size of the data import.

5. Once your data is imported, you receive an **Import Complete** message. The data is added to its respective geolocation.

After all data files have been imported, you can edit the imported data in VBS Geo and continue with your typical Battlespace creation workflow.

5.3.2 Overview of Data Types

The following table lists the source data requirements (e.g., data type, format) for importing data into VBS4 via VBS Geo and the VBS World Server.

Data Type	Format	Coordinate System	Bit Depth
Orthoimagery	GeoTIFF, BigTIFF	EPSG4326/WGS84	8-bit, 3-band RGB recommended
Elevation	GeoTIFF, BigTIFF	EPSG4326/WGS84	32-bit float
Buildings	Shapefile - polygons	EPSG4326/WGS84	N/A
Roads	Shapefile - lines	EPSG4326/WGS84	N/A
Surfaces	GeoTIFF, BigTIFF	EPSG4326/WGS84	8-bit single band

> **WARNING**
>
> File name length of user-provided data must be kept to 25 characters or less. This does not include the file type extension.

5.3.3 Building Data

Building footprints are extruded into procedurally textured 3D models upon import. This process will utilize OpenStreetMap (OSM) attribution to apply region-specific building textures (e.g., walls, foundations, roofs), heights, and roof types (e.g., flat, peaked, gabled).

The specific OSM building footprint and linear road attributes utilized during the data import process are outlined in the following table:

Vector Data Type	Attribute	Value(s)
Areal Building Footprints	`height`	building height in meters
Areal Building Footprints	`type`	house, detached, garage, garages, hut, shed, farm, farm_ auxiliary, church, cathedral, hospital, bunker

Any input areal building footprint data that does not contain any of the above attribute / value combinations are assigned random building textures (e.g., walls, roofs, and foundations) and roof types for the region it resides in. Additionally, the footprint size and relative location to a city center database factors into the height and texturing the building receives.

5.3.4 Road Data

The following `fclass` values are supported in VBS Geo and create roads in an expected visual style accordingly.

- `motorway`
- `motorway_link`
- `trunk`
- `trunk_link`
- `primary`
- `primary_link`
- `secondary`
- `secondary_link`
- `tertiary`
- `tertiary_link`
- `residential`
- `service`
- `*track*`
- `unclassified`
- `<none>`

NOTE

Data Import does not support the `runway` VBS4 road type.

The `width` attribute is used to control the width of the road. Input this value as the width of the road surface in meters. For more details about road textures, default widths, and what the road textures look like, see Road Presets in the VBS Geo Manual.

Any input linear road vector data that does not contain any of the above attribute / value combinations are assigned the *tertiary* road texture by default. For previews of how each road type will appear in VBS4, see Road Remapping (on page 99).

5.3.5 Surface Data

The input surface mask layer denotes how the terrain surface will be rendered in VBS4. This is an important layer because it controls where biome vegetation objects (such as trees, shrubs, grass, and rocks) are placed, and it also drives the procedural terrain texturing.

5.3.5.1 Natural Surfaces

The following table shows the mappings for the Natural Surfaces in VBS Geo. For more details about the VBS Geo surfaces and what these surfaces look like, see Surface Types in the VBS Geo Manual.

Natural Surface Name	Pixel Value	Natural Surface Name	Pixel Value
Bare Earth	0	Muddy Soil	17
Barren Area	16	Open Shrublands	7
Closed Shrublands	6	Packed Soil	40
Croplands	12	Pasture	18
Deciduous Broadleaf Forest	4	Rock	15
Deciduous Needleleaf Forest	3	Sand	37
Dirt and Weeds	54	Savannas	9
Evergreen Broadleaf Forest	2	Tall Grass	21
Evergreen Needleleaf Forest	1	Urban Grass	13
Furrowed Field	23	Wetlands	11
Grasslands	10	Wheatfield	19
Mixed Forest	5	Woody Savannas	8
Muddy Pasture	14	<Forest Surface with No Trees>	24

5.3.5.2 Urban Surfaces

The following table shows the mappings for the Urban Surfaces in VBS Geo. For more details about the VBS Geo surfaces and what these surfaces look like, see Surface Types in the VBS Geo Manual.

Urban Surface Name	Pixel Value	Urban Surface Name	Pixel Value
Asphalt	52	Jointed Concrete	46
Asphalt Cracked	53	Mulch	47
Cobblestone Irregular	42	Red Brick Pavers	49
Cobblestone Medium	43	Stone Pavers	48
Cobblestone Small	44	Tile Pavers	50
Gravel	41	Trimmed Grass	45
Gray Brick Pavers	51	Urban Area	38

5.4 VBS3 to VBS4 Terrain Conversion Tool

The Terrain Conversion Tool is a VBS3 plug-in and conversion services on VBS World Server. The Terrain Conversion Tool extracts specified terrain layers from any VBS3 terrain, then uploads and converts this data for VBS World Server. After uploading to VBS World Server, the data is converted for use by VBS4. As the Terrain Conversion Tool converts the uploaded terrain layers, they appear in real-time in the VBS4 client in the same location as the VBS3 source terrain.

Before using the Terrain Conversion Tool, ensure that the following requirements are met:

- To use the Terrain Conversion Tool, you must have a temporary TCT license, which is not delivered with VBS3 or VBS4 by default. The license duration is 90 days and can be extended on request. To obtain the license, contact support@bisimulations.com.
- Install VBS3 20.1 or above on the client that runs the terrain conversion process.
- Install VBS4 20.1 or above on any client machine to view the converted terrain as it is streamed from VBS World Server.

  NOTE

  This machine can be the same one where the VBS3 extraction will be performed, or it can be any other VBS4 client capable of connecting to the VBS World Server.

  WARNING

  The VBS4 installed by the VBS World Server installer is utilized by the server and should not be used as a VBS World Server client. VBS4 should be downloaded and installed on a separate computer in order to serve as the client.

- Place any custom content PBOs that you may wish to use on both the VBS4 client and the VBS World Server workstation in the following locations:
  - **VBS4 Client**: `\VBS4_Installation\myData\Blue\content\`
  - **VBS World Server**: `\Installation\Services\VBS4\myData\Blue\content\`

  See Identifying Dependent Models (on page 105) for information about custom content PBOs.

  NOTE

  VBS4 only supports P3D version 10000 and above. VBS4 may not support PBOs with old content (2008 or before). To rectify this issue, pack the source content with a recent version of VBS3 or VBS4. Additionally, the Terrain Conversion Tool cannot convert VBS3 terrains with models stored in a CBO file. These models must be put into a PBO or ZBO file in order to be converted.

5.4.1 Installing the Terrain Conversion Tool

This section describes how to download and install the VBS3 to VBS4 Terrain Conversion Tool.

Follow these steps:

1. Using a web browser, navigate to:

   `http://VBS World Server:6707/downloads/Convert_VBS3toVBS4_Terrain.zip`

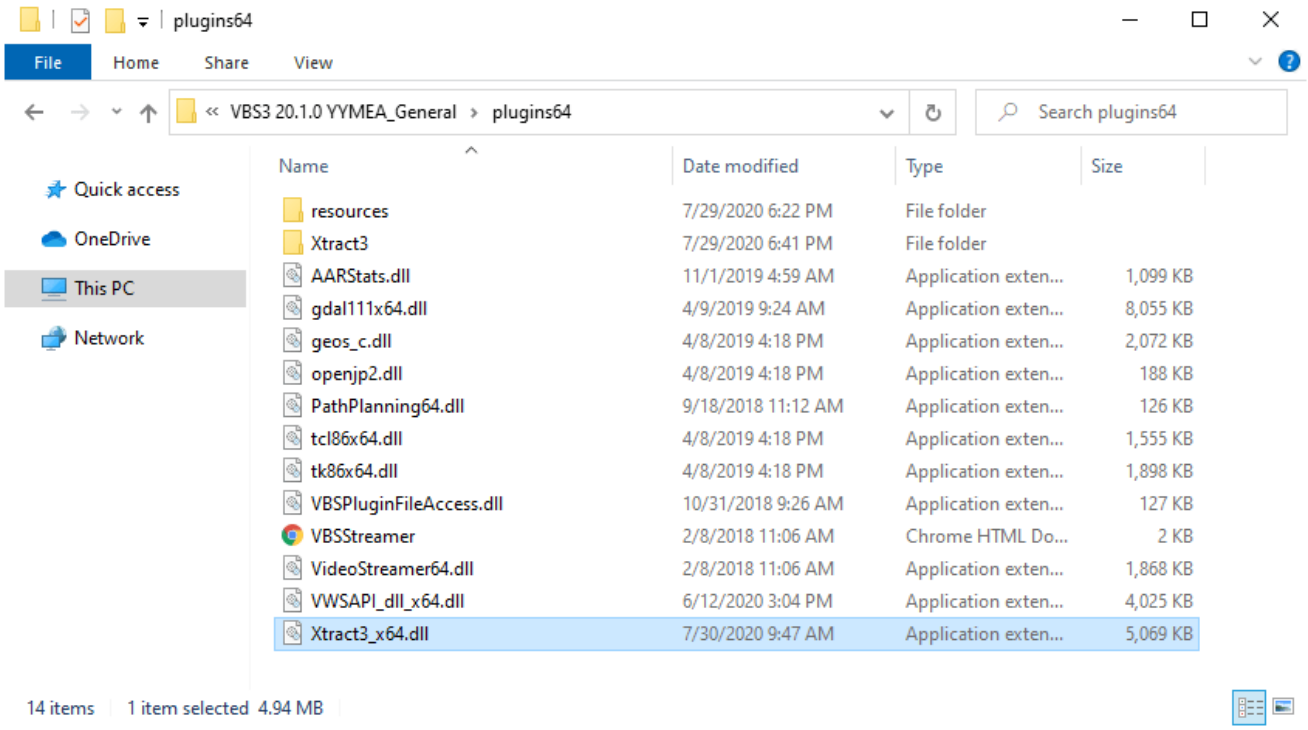
   Replacing `{VBS World Server}` with the IP address or hostname of the VBS World Server workstation.

2. Extract the contents of the ZIP file to VBS3 client machine.

3. Copy the `plugins64` and `core` subfolders directly into the root folder of the VBS3 installation directory, for example:

   `C:\Program Files\Bohemia Interactive Simulations\VBS3 20.1.0 YYMEA_General\`

4. Navigate to the `plugins64` subfolder in your VBS3 installation and verify that the `Xtract3_x64.dll` file is present.



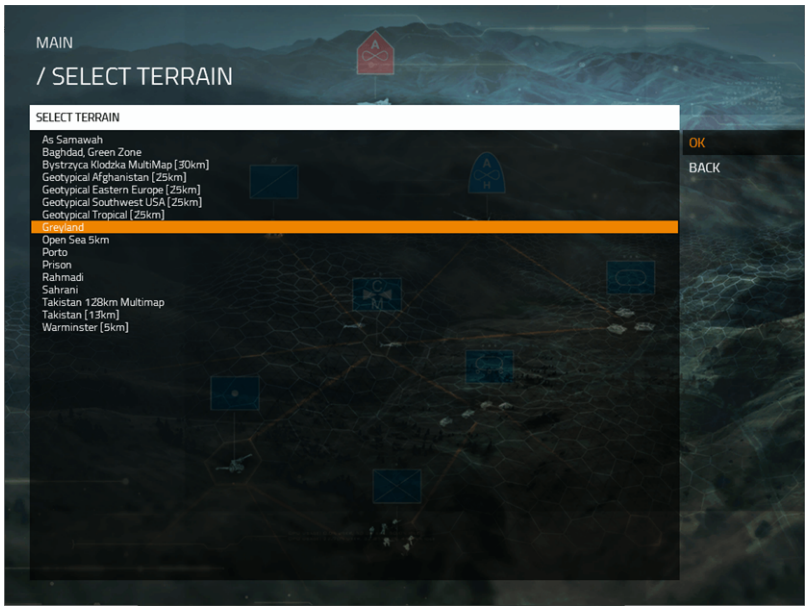
The VBS3 to VBS4 Terrain Conversion Tool is now installed into VBS3.

5.4.2 Using the Terrain Conversion Tool

This section describes how to convert a VBS3 terrain from within VBS3 to a VBS4 terrain using the Terrain Conversion Tool. This is a recommended workflow for converting and customizing your VBS4 terrain.

Follow these steps:

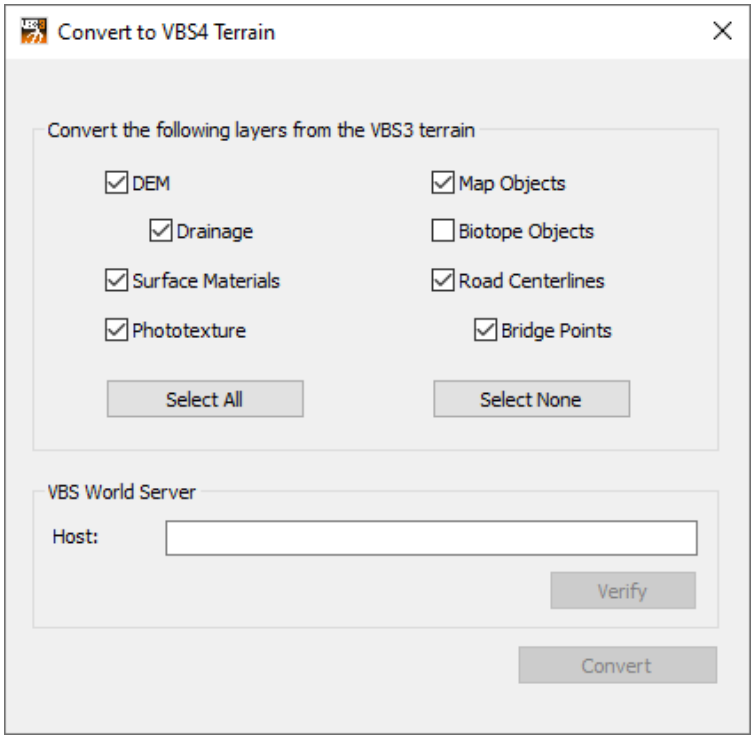
1. Place any custom content PBO files on the VBS World Server and VBS4 client.
2. Launch VBS3.
3. From the VBS3 main menu, open the Mission Editor.
4. Select a VBS3 terrain that to convert to VBS4.



NOTE

Many of the terrains included with VBS3, such as Sahrani or Takistan, are unable to be converted to VBS4 using the Terrain Conversion Tool. If such a terrain is loaded into the Terrain Conversion Tool, the following warning message will appear.

5. Once the terrain loads in the Mission Editor, click **File** > **Convert to VBS4 Terrain** to launch the Terrain Conversion Tool. The following dialog will appear.



6. In the **Convert the following layers from the VBS3 terrain** section, check the boxes next to any of the layers to be converted to the VBS4 terrain format EXCEPT the **Phototexture** option. This layer will be converted later.

> **TIP**
>
> It is recommended you convert the **Phototexture** layer after customizing your surface materials. For more information on the considerations of terrain customization, see the Customizing the Converted Terrain (on page 96) section.

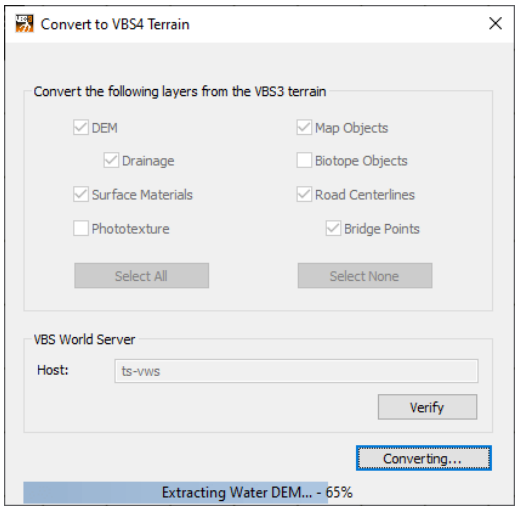
> **NOTE**
>
> All layers except the **Biotope Objects** layer are checked by default. The **Biotope Objects** layer is disabled by default because it can take a long time to process and convert all the model points in a VBS3 biotope. Unless 1:1 positioning for every plant in the vegetated regions within a terrain is necessary, it is more efficient to remap your surface materials to a vegetation surface and use VBS4 biome vegetation. For instructions on how to set up your surface materials to use the VBS4 biome vegetation, see the Surface Remapping (on page 97) section.

7. After selecting all desired layers, enter the VBS World Server hostname or IP address from your VBS4 client in the **Host** field in the **VBS World Server** section.

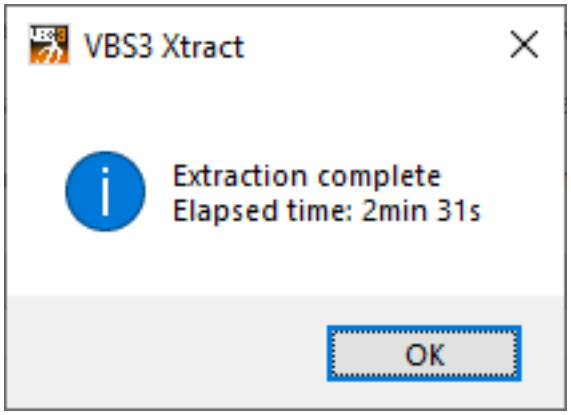
8. Click the **Verify** button to test your connection to the specified VBS World Server. If your connection is successful, then a **Success: Server ready!** message will appear under the **Host** field. If your connection is unsuccessful, an **Error: Could not connect to server!** message will appear.

> **NOTE**
>
> If the Terrain Conversion Tool reports an unsuccessful connection, verify that all services are running on the server. For more information, see Managing VBS World Server (on page 37). Additionally, check that the hostname/IP address of the server is correct or try using the server IP address instead of a hostname. If these issues persist, contact your network administrator.

9. Once your connection is verified, click the **Convert** button. Conversion status messages and a progress bar will be displayed at the bottom of the **Convert to VBS4 Terrain** dialog.



10. Once the terrain has been converted, a success dialog will appear, which will report the overall conversion time for all selected layers.



For more information about conversion times and what can affect how long it takes to convert your terrain, see the Impacts on Conversion Time (on page 106) section.

11. The terrain is now converted to VBS4 and resides on the VBS World Server, ready to be streamed to clients. Launch your VBS4 client and connect it to a VBS World Server. You can navigate to your converted terrain by entering the terrain's geographic coordinates in the **Global Navigation Toolbar** in VBS4.

TIP

Geographic coordinates for the converted terrain can be found in the following file in your VBS3 installation:

`\VBS3_Installation\Xtract3_export\map_name\xtract_logfile.txt`

The VBS4 Geolocation entry (line 6) displays the geographic center of the terrain. This value can be copied into the **Global Navigation Toolbar** in VBS4 to directly navigate to the terrain.

```
1  Begin LogFile
2  mapOriginX = 481084.000000, mapOriginY = 3161744.000000, utmZone=33, northHemisphere=1
3
4  cellSize = 5.000000, terrainRange = 96
5  isMultimap = 0, multimapGrid = 480.000000, multimapRange=1
6  VBS4 Geolocation:
7  28.584644 N, 14.809013 E
8  Writing VBS3 camera state to 'D:\Program Files\Bohemia Interactive Simulations\VBS3
   20.1.0 YYMEA_General\Xtract3_export\map_greyland/map_greyland_camerastate.xml'...
9  landGrid = 40.000000, landRange = 12
```

A camera state file may also be found in the generated `_camerastate.xml` file in the `Xtract3_export` folder in your VBS3 installation, but this camera state can only be used in the VBS Editor within a Battlespace. For more information, see Camera State in the Introduction to VBS4 Guide.

5.4.3 Customizing the Converted Terrain

The Terrain Conversion Tool attempts to convert VBS3 terrain features to VBS4 terrain features with reasonable default settings. However, this mapping can be customized to a desired result. This section describes how to make changes to your converted terrain once it has been uploaded to the VBS World Server.

For all of the remapping operations described in the following sections, it is suggested you have your VBS4 client open and connected to a VBS World Server, and keep the location of your terrain in view in VBS4 so that you can see the changes taking effect in real time.

5.4.3.1 Surface Remapping

Surface Materials in VBS4 operate differently than VBS3 in that they influence procedural generic surface texturing as well as biome-based vegetation placement. It is possible to only use the generic surface texturing in VBS4, so it is suggested you set up your surface map as desired first and then convert your phototexture to see which is preferred.

> **TIP**
>
> If your terrain uses the VBS3 biotope system, we recommended that you remap your surface materials to a vegetation surface in order to leverage the VBS4 biome system for placing vegetation models. Your VBS4 terrain will be more performant and the conversion process will be faster.

Follow these steps:

1. Examine the surface materials as they appear in the converted VBS4 terrain. Identify any surface materials which do not correspond well to the original terrain surface material. Once you have identified the name of a new surface you want to use, continue with step 2.

   > **TIP**
   >
   > Use the **Select Surface** tool in VBS Geo **Surface** mode to query the name of a surface. You can also use it to preview what other surfaces look like. For more information, see in the VBS Geo Manual.

2. Open the surface remapping text file located in your VBS3 installation:

   `\VBS3_Installation\Xtract3_export\map_name\VBS3toBlueSurfaceRemapping.txt`

   The first section, `Available Blue Surfaces`, lists all of the surfaces available in VBS4 in the format of `VBS4_surface_name,,ID`. These lines should be used to copy / paste the proper values into the remapping section of this file.

```
# ****************************
# Available Blue surfaces are:
# ****************************
# S00_Water,,@0
# S01_Evergreen_Needleleaf_forest,,@1
# S02_Evergreen_Broadleaf_forest,,@2
# S03_Deciduous_Needleleaf_forest,,@3
# S04_Deciduous_Broadleaf_forest,,@4
# S05_Mixed_forest,,@5
# S06_Closed_shrublands,,@6
# S07_Open_shrublands,,@7
# S08_Woody_savannas,,@8
# S09_Savannas,,@9
# S10_Grasslands,,@10
# S11_Wetlands,,@11
# S12_Croplands,,@12
# S13_Urban_grass,,@13
# S14_Muddy_pasture,,@14
# S15_Rock,,@15
# S16_Barren_area,,@16
# S17_Muddy_soil,,@17
# S18_Pasture,,@18
# S19_Wheatfield,,@19
# S21_Tall_Grass,,@21
# S23_Furrowed_field,,@23
# S37_Sand,,@37
# S38_Urban_area,,@38
# S40_Packed_soil,,@40
# S41_Gravel,,@41
# S42_Cobblestone_irregular,,@42
# S43_Cobblestone_medium,,@43
# S44_Cobblestone_small,,@44
# S45_Trimmed_grass,,@45
# S46_Jointed_concrete,,@46
# S47_Mulch,,@47
# S48_Stone_pavers,,@48
# S49_Red_brick_pavers,,@49
# S50_Tile_pavers,,@50
# S51_Gray_brick_pavers,,@51
# S52_Asphalt,,@52
# S53_Asphalt_cracked,,@53
# S54_Dirt_and_weeds,,@54
# ****************************
```

3. The next section, called `MODIFY HERE`, is where you will edit the destination VBS4 surface textures that shall correspond to all source VBS3 surface textures. To perform a surface remapping, locate the entry for the VBS3 surface classification to be modified. Each entry will contain two comment lines listing the VBS3 surface name. The third line is the actual mapping in the format of `VBS3_surface_name,VBS4_surface_name,,ID`.

   EXAMPLE

   ```
                          # ************* MODIFY HERE
   ******************************
   # Class tt_akrotiri_bush_g: vbs2_land_grass_low
   # files = tt_akrotiri_bush_g*
   tt_akrotiri_bushg,S13_Short_grass,,@13
   ```

   In this example, the VBS3 surface `tt_akrotiri_bush_g` has been automatically matched to the VBS4 surface of `S13_short_grass,,@13`. If you wanted to change the VBS4 surface that is mapped to, copy the desired surface name and ID (everything except the `#` character) from the header section in Step 2 and paste it after the VBS3 surface name.

4. Perform all desired surface remapping edits and save the text file.
5. Return to the `\VBS3_Installation\Xtract3_export\map_name\` folder.

   Locate the `VBS3toBlueSrfConvert.bat` file and double-click it to convert the surfaces using the new mappings. A Command Prompt window will appear displaying the status of the surface map conversions. Upon completion, a success message and elapsed processing times are reported in the Command Prompt. The modified surfaces will dynamically appear in your VBS4 client.
6. Perform additional remappings as necessary to achieve the desired appearance in the converted terrain.

NOTE

Once you are finished remapping your surface materials, you can enable JUST the **Phototexture** option in the Terrain Conversion Tool and perform another conversion to convert your VBS3 phototexture so that it will appear in VBS4. In VBS4, this is an optional layer and will cover the generic surface texturing in VBS4. If you wish to remove the phototexture layer, see Data Management (on page 60) for details.

5.4.3.2 Road Remapping

VBS3 and VBS4 use different road systems. VBS3 uses a model-driven road system while VBS4 procedurally bakes in textures along road centerline data. Many of the common VBS3 road textures have been ported for use in VBS4. The Terrain Conversion Tool will attempt to match your VBS3 roads to a correlated VBS4 road texture. This section describes how to customize the width and texture of your VBS4 roads.

Follow these steps:

1. Examine the road widths and textures as they appear in the converted VBS4 terrain. If any road textures do not sufficiently match the VBS3 terrain or you would like to change for some other reason, follow the steps below.
2. Open the road remapping `.tcl` file located in your VBS3 installation:

   `\VBS3_Installation\Xtract3_export\map_name\VBS3toBlueRoadAttrRemapping.tcl`
3. Two sections appear in the header area at the top of the `.tcl` script. The first section lists all VBS4 roads and their default widths in meters. The second section lists available VBS3 road textures that are included in VBS4. See the VBS4 Road Types and VBS3 Road Textures section below for what these roads look like.

```
# VBS3 to Blue Road Attribution.tcl
# Version 1.0
#
# Copyright © 2020 TerraSim, Inc. All rights reserved.

# This script is used to apply VBS Blue road attributes to substring matches in extracted VBS3 roadway linears.

# List of supported Blue road names and default widths
# motorway, 12
# path, 3
# primary, 12
# railroad, 3
# railway, 3
# residential, 16
# runway, 60
# secondary, 10
# service, 6
# tertiary, 6
# track, 3
# trunk, 12
# unclassified, 6
#

# List of available VBS3 road textures
# ces2_hl_ca.paa
# dirt1_straight_co.paa
# grav_dirt_ca.paa
# mud_ca.paa
# mud_gravel_ca.paa
# pasf_ca.paa
# path_dirt_ca.paa
# sealed_ca.paa
# sealed_old_ca.paa
# sealed_paintedlanes_ca.paa
# uli2p_hl_ca.paa
#
```

   The conversion process uses the VBS3 road basename to match to a similar road texture in VBS4. In the event a match cannot be found, the road will be mapped to the `unmapped` value in the `.tcl` script. Unmapped roads will be set to the Secondary VBS4 road type with a default width of 10 meters.

4. To change a default road mapping, modify its attributes.

```
                    # VBS3 Road basename:asf1
set asf1_road tertiary
set asf1_width 6
set asf1_vbs3tex pasf_ca.paa
set asf1_override_width 0
```

In this example, the first road in the VBS3 terrain is named `asf1`. Change this road using any of the attributes below:

- `set asf1_road` sets a VBS4 road type; in this case, the road type is changed to `tertiary`. These are preset road types with a pre-defined texture and width. You can set only this attribute for a quick road preset. See VBS4 Road Types (on the next page) for images.
- `set asf1_width` sets a custom width in meters for this particular VBS3 road. For each VBS3 road type, you can specify a custom width. Use this attribute with `{base_name}_override_width`.
- `set asf1_vbs3tex` sets a custom texture for your VBS4 roads. The `pasf_ca.paa` value is the name of the road texture. VBS3 road textures are available for use in VBS4. See VBS3 Road Textures (on the next page) for images. You can then use the **List of available VBS3 road textures** section in the header of this script to copy and paste the road texture name onto this line. Set the value of this attribute to `""` if you wish to not use a custom texture.
- `set asf1_override_width` determines whether the custom width is used. When set to `0` (default), the width used is specified by `asf1_road`. See the **List of supported Blue road names and default widths** section in the script header for the default widths of each road type. When set to `1`, the custom width for `set asf1_width` is used.

```
                          # VBS3 Road basename:kos
set kos_road unmapped
set kos_width 10
set kos_vbs3tex ""
set kos_override_width 0
```

This is an example of an unmapped road. You can either change the `kos_road` attribute to a VBS4 road type or you can set a custom texture and width to use.

> **TIP**
>
> You can prevent a road type from appearing in your VBS4 terrain by setting `{base_name}_road` and `{base_name}_vbs3tex to ""`.

5. Save the `.tcl` script in the text editor.

6. Run `VBS3toBlueBridgeRotationRoadsRemappingConvert.bat` to convert your roads with the new mapping.
7. Upon completion, a success message and processing time are reported in the command window. The modified roads will dynamically appear in the VBS4 client.
8. Perform additional remappings and width adjustments as necessary to achieve the desired appearance in the converted terrain.

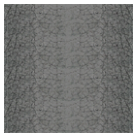
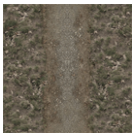
VBS4 Road Types

motorway	path	primary	railroad	railway	residential	runway
						

secondary	service	tertiary	track	trunk	unclassified
					

VBS3 Road Textures

ces2_hl_ca.paa	dirt1_straight_co.paa	grav_dirt_ca.paa	mud_ca.paa
			

mud_gravel_ca.paa	pasf_ca.paa	path_dirt_ca.paa	sealed_ca.paa
			

sealed_old_ca.paa	sealed_paintedlanes_ca.paa	uli2p_hl_ca.paa
		

5.4.3.3 Vegetation Remapping

Not all VBS3 vegetation models are compatible within VBS4, so their target model references need to be re-mapped to a VBS4-compatible vegetation model. The Terrain Conversion Tool does this automatically on the initial objects conversion. These mapped models may look slightly different than the VBS3 versions. After this initial conversion, you can then customize which VBS4 vegetation model is used in the mapping.

It is recommended that unless you need 1:1 positional correlation of all vegetation models, then removing your vegetation model references and using VBS4 biome vegetation will be more performant and faster to convert. Step 4 details how to remove your vegetation model references. See the Surface Remapping (on page 97) section for how to set up your surface materials for VBS4 biomes.

1. To perform remapping, open the vegetation remapping `.tcl` file located in your VBS3 installation:

   `\VBS3_Installation\Xtract3_export\map_name\VBS3toBlueVegObjRemapping.tcl`

2. Under the `List of vegetation objects in terrain: [terrain_name]` section, identify the VBS3 vegetation object(s) for which remapping will occur. These will be listed on a comment line in the format `# VBS3 Vegetation object:{plant_name}`. Beneath each VBS3 vegetation object listing is the plant model path to which remapping will take place.

   EXAMPLE

   ```
                          # VBS3 Vegetation object:dd_bush01
   set dd_bush01_remap
   {vbs2\vegetation\bush\vitis_vinifera\vbs_bush_vitis_vinifera_emt_sol_
   001.p3d}
   set dd_bush01_do_remap 1
   set dd_bush01_keep_reference 1
   ```

   In this example, the source VBS3 vegetation model `dd_bush01.p3d` has been automatically remapped to `vbs_bush_vitis_vinifera_emt_sol_001.p3d` after the initial terrain conversion.

3. If you wish to change the VBS4 model that is being mapped to, you can use VBS Geo to find a substitute vegetation model. See in the VBS Geo Manual for how to place a model and find its model name. Once you found a replacement model, use the path you copied from VBS Geo and paste it between the curly braces `{}` of the `set dd_bush01_remap` line (as per the example above). There are two binary switches on the second and third line of the remapping entry:
   a. `_do_remap` - toggles the remapping for that specific vegetation model; *1* (default) performs remapping, while *0* bypasses remapping.
   b. `_keep_reference` - under this switch, models references may be removed for that particular model. *1* (default) keeps the reference, *0* removes the models from being placed. It is recommended you set this switch to *0* for any models that can be sufficiently represented by the procedural VBS4 biome vegetation.
4. At the top of the `.tcl` script is a global switch: `ProcessRemapping`. Setting this switch to *1* (default) triggers the remapping process; setting it to *0* bypasses the remapping process. If the switch is set to *0* when using VBS3 models, this causes no trees to appear. All VBS3 vegetation models will eventually be made VBS4-compatible in future releases. When that occurs, you may re-run the object conversion process with this switch set to *0* to not remap vegetation models.
5. Save the `.tcl` file in the text editor.
6. Return to the `\VBS3_Installation\Xtract3_export\map_name\` folder.

   Locate the `VBS3toBlueVegObjConvert.bat` file and double-click it to re-process the vegetation model conversion with the new target VBS4-compatible models. A Command Prompt window will appear displaying the status of the vegetation model re-processing. Upon completion, a success message and processing time are reported in the command window. The updated vegetation models will dynamically appear in the VBS4 client.
7. Perform additional remappings as necessary to achieve the desired appearance in the converted terrain.

NOTE

The scale of the original VBS3 vegetation model is preserved after the mapping. This is because the mapped VBS4 vegetation models are slightly different sizes, so the Terrain Conversion Tool tries to preserve the original design of the VBS3 terrain. This means if you map a VBS3 model to a VBS4 model of drastically different size (such as mapping a tree to a bush), the resulting model may have undesired scaling. Also note that grass is not part of vegetation mapping as it is driven by the surface materials in VBS4 instead of object placement.

5.4.3.4 Bridge Rotation Adjustments

The Terrain Conversion Tool does a best effort in automatically aligning bridge models to the adjoining roads in the VBS4 terrain. However, due to variability of bridge modeling standards, certain models may be placed that are rotated at an angle or are perpendicular to the road, causing it to be impassable by AI entities. To fix this issue, there are some adjustment options available to you in the following file:

`\VBS3_Installation\Xtract3_export\map_name\VBS3toBlueBridgeRotation.tcl`

This script is only written out if bridge models are detected in the VBS3 terrain.

Follow these steps:

1. Open the bridge rotation `.tcl` file located your VBS3 installation:

   `\VBS3_Installation\Xtract3_export\map_name\VBS3toBlueBridgeRotation.tcl`.

2. There will be entries in the `MODIFY HERE` section. They are in the form of:

   ```
                       {bridge_model}_doSpecial and {bridge_model}_rmSkewAttr:
   # VBS3 Bridge model:kamenny_most30
   set kamenny_most30_doSpecial 0
   set kamenny_most30_rmSkewAttr 0
   ```

3. In most cases, bridge models that are incorrectly rotated can be fixed by setting the following attributes for each incorrect bridge model:

   - `set kamenny_most30_doSpecial 1`
   - `set kamenny_most30_rmSkewAttr 1`

   Where:

   - `_doSpecial` attribute tells the conversion process to run through a special process to align the bridge models
   - `_rmSkewAttr` attribute tells the conversion process to remove skew attributes set on the bridge model

4. Save the `.tcl` file in the text editor.

5. Return to the `\VBS3_Installation\Xtract3_export\map_name` folder.

   Locate the `VBS3toBlueBridgeRotationRoadsRemappingConvert.bat` file and double-click it to re-process the bridge model conversion with the modified rotation and skew parameters. A Command Prompt window will appear displaying the status of the bridge model re-processing. Upon completion, a success message and processing time are reported in the command window. The updated bridge models will dynamically appear in the VBS4 client.

6. For cases where the actions in step 3 do nothing to fix the bridge rotation, try toggling one or both of the `_doSpecial` and `_rmSkewAttr` attributes from *1* to *0*. For cases, where every bridge model in the terrain is wrongly rotated, set the global option `ProcessRotation` to *0*, to bypass the bridge alignment process completely in the conversion and check if it fixes the issue.

5.4.3.5 Identifying Dependent Models

Some VBS3 terrains contain models that are not present in the core VBS model library. For custom content, the PBO files must be placed in the following locations:

- **VBS World Server**:

  `\Installation\Services\VBS4\myData\Blue\content\`

- **Each VBS4 Client**:

  `\VBS4_Installation\myData\Blue\content\`

Sometimes it is not known exactly which content PBO files are used by a VBS3 terrain. To help narrow things down, the Terrain Conversion Tool lists out the folders of all models placed in the terrain in the log file.

The log file is located in:

`\VBS3_Installation\Xtract3_export\map_name\xtract_logfile.txt`

```
Model folders used in the VBS3 terrain:
***************************************
ca\buildings\
ca\misc\
ca\plants\
ca\rocks\
vbs2\customer\maps\air_base\data\
vbs2\customer\misc\buildings\usa\
vbs2\customer\new\scenery\
```

In this example, there are three `vbs2\customer\` content paths listed at the bottom of the model folders list. These paths should share a folder name with the name of the content PBO in the following folder:

`\VBS3_Installation\mycontent\addons\`

5.4.3.6 Removing Overlapping Global Data

The Terrain Conversion Tool lists out which global data tiles overlap the converted terrain so that they can be removed from the server.

The log file is located in:

`\VBS3_Installation\Xtract3_export\map_name\xtract_logfile.txt`

```
The following sqlites are the filenames for parts of the global data that this VBS
export overlaps.
Typically, buildings should be removed, and vegetation optionally kept.
The following list of files are the buildings:
************************
N+033.00W-081.00_gshp.sqlite
************************
Additionally, these are the vegetation files that you may choose to remove:
************************
N+033.00W-081.00_removalTrees.sqlite
N+033.00W-081.00_removalBushes.sqlite
************************
The following list of files are the buildings:
************************
N+033.00W-081.00_gshp.sqlite
************************
Additionally, these are the vegetation files that you may choose to remove:
************************
N+033.00W-081.00_removalTrees.sqlite
N+033.00W-081.00_removalBushes.sqlite
```

See Removing World Building and Roadway Data (on page 84) for next steps.

5.4.3.7 Impacts on Conversion Time

VBS3 terrains can vary wildly in size, image resolution, and object count. All of these factors can impact how long it takes to convert the terrain to VBS4. The general rule of thumb is that the more objects placed in the terrain, the longer it will take to convert. This is especially true if you use the **Biotope Objects** option as there are typically millions of placed trees in a biotope. Here is a table of some example VBS3 terrains that have been converted to VBS4.

Terrain Extent	Imagery Resolution	Number of Map Objects	Conversion Time
1.28 x 1.28 km	1280 x 1280 px	20,170	13 min
10.24 x 10.24 km	10240 x 10240 px	65,149	34 min
25.6 x 25.6 km	6400 x 6400 px	391,199	58 min
22.5 x 22.5 km	22528 x 22528 px	900,492	3 hr 58 min*

These are all non-multimap terrains. If you have a multimap terrain, imagine these times are for a single tile of your multimap and the total conversion time will scale linearly with the number of tiles in your multimap.

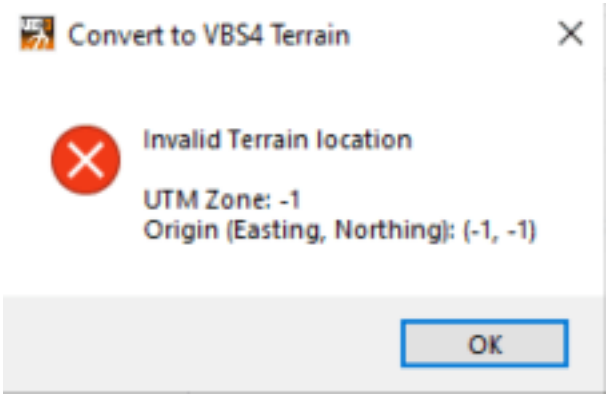
TIP

If you do not require 1:1 placement of trees throughout your terrain, you can speed up the conversion by disabling tree placement and instead using a vegetation surface to utilize the procedural VBS4 biome vegetation placement. See the Vegetation Remapping (on page 102) section for how to disable trees from being processed.

* This terrain's conversion time was reduced to 1 hr 13 min by disabling tree placement and using VBS4 biome vegetation.

5.4.3.8 Terrains with Invalid Location

In rare cases, a VBS3 terrain may have been generated without geolocation information. You will see this error when trying to convert your terrain:



As a result, invalid coordinates are returned during the conversion process. The resulting VBS4 terrain may exist in an unexpected location or fail to convert.

If this happens you can set the origin of the map to the correct UTM coordinate and then convert your terrain.

1. With your terrain loaded in VBS3, click **Tools** > **Developer Console**.
2. Use the setOrigin (https://sqf.bisimulations.com/display/SQF/setOrigin) SQF command to define the origin of the terrain.
3. Convert your VBS3 terrain as normal.

5.4.4 Known Issues

The Terrain Conversion Tool has the following known issues in the VBS4 24.1.1 release:

- When converted to VBS4, static lights on models in the source VBS3 terrain will not be a 1:1 match in the resulting VBS4 terrain. Specifically, light brightness and color will be approximated. Blinking and / or rotating lights will not be converted.
- After running the Terrain Conversion Tool, some of the layers may not display properly due to the load order that happens during the Terrain Conversion process. To fix this:

1. Close the VBS4 client of any client computers that were connected to VBS World Server while the TCT was executed.
2. Delete the cache folder at:

   `\VBS4_Installation\cache\`
3. Click the **Clear Caches** button in the VBS World Server user interface, located under the **Services Panel**.
4. Connect the VBS4 client, everything should now be in its place.

This should allow the layers have the correct load order, and make everything visible again.

5.5 Installing Terrain Insets

VBS4 provides the following terrain insets—a group of one or more terrain files built to enhance a specific geographic region—as optional content during download:

- Sahrani Inset (below)
- Bystrzyca Klodkza Inset (on the next page)
- Hohenfels Inset (on the next page)
- San Francisco Inset (on page 111)
- Yakushima Inset (on page 112)
- Beale Air Force Base Inset (on page 113)

To obtain these insets and deploy them as part of your initial installation, see Download VBS4 (on page 27).

> **NOTE**
>
> To deploy Terrain Insets at a later date, download them from VBS License Manager, copy the downloads to the same folder as the VBS4 Installer, and re-run the VBS4 Installation.

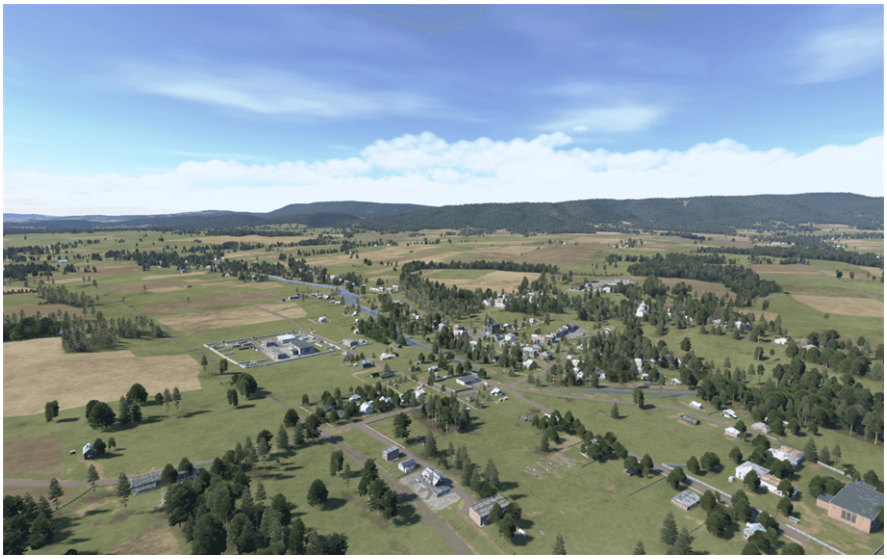
TerraTools® can be used to develop high-fidelity, geo-specific environments for defense simulation and training. To deploy terrains developed using TerraTools®, see Installing Custom Terrain Insets (on page 114).

5.5.1 Sahrani Inset

The Sahrani inset is a fictional terrain area located in the middle of the Atlantic ocean. This area provides a mixture of urban, rural, and mountain regions. It was developed to correlate with the Sahrani and Rahmadi terrains from VBS3.

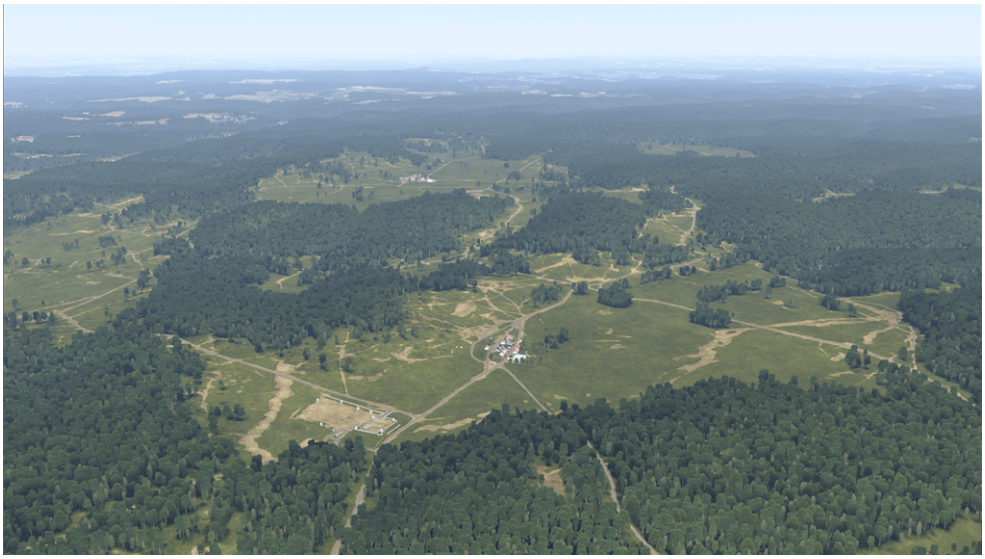
5.5.2 Bystrzyca Klodkza Inset

The Bystrzyca Klodkza, Poland terrain inset highlights the capabilities of TerraTools to generate high-detail terrain content for specific training areas. This area is modeled with high-resolution elevation, surface mask, buildings, man-made objects, fences, and vegetation data over a 30 x 30 km area. The database uses Chernarus buildings and objects from the VBS content library for the man-made features. This terrain was developed to correlate to the Bystrzyca Klodkza, Poland terrain that is available with VBS3.



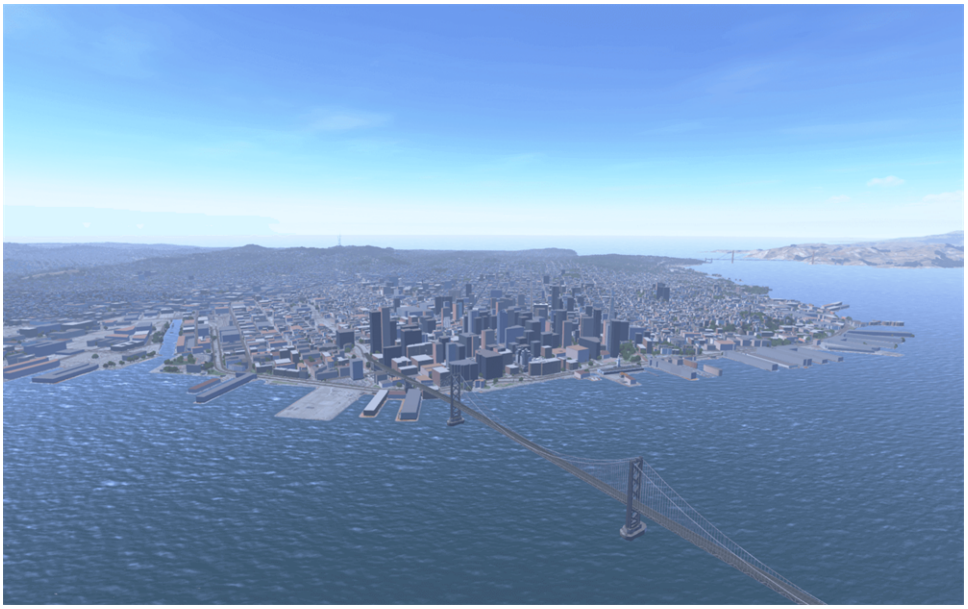
5.5.3 Hohenfels Inset

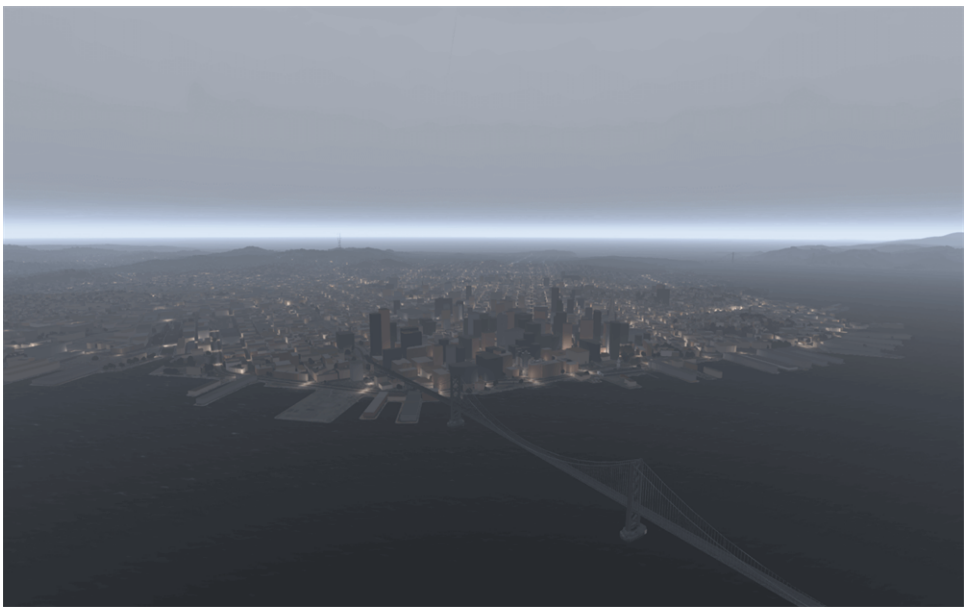
The new Hohenfels inset encompasses the entire Hohenfels Training Area, Germany which includes detailed areas for two MOUT sites in the training area proper, and the nearby town of Rohrbach, Bavaria. The terrain covers a 20 x 20 km area and includes elevation, surface mask, geotypical imagery, custom water, roads, bridges, buildings, and several other placed model types.



5.5.4 San Francisco Inset

The San Francisco terrain inset highlights the capability of VBS Blue IG to render large high-detail geospecific terrain insets. The terrain covers approximately 100 x 200 km and includes a mix of surface representations with a high-resolution surface mask and satellite imagery. San Francisco is modeled with a mix of geotypical extruded buildings models and geospecific building and bridge models.



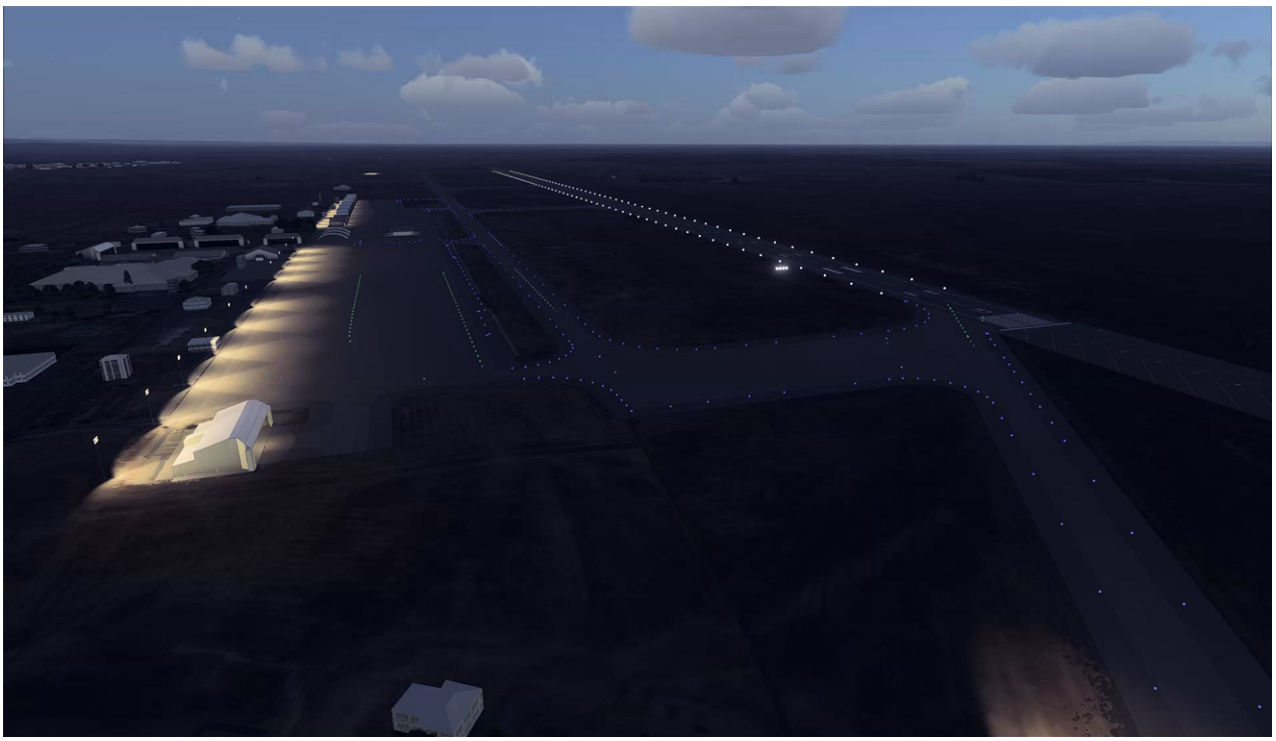


5.5.5 Yakushima Inset

The Yakushima inset is a small sample terrain in Japan that contains dense subtropical forests with towering mountains. The northeast of this island contains an airfield prototype as well as buildings and streetlights. This inset is only for demonstration purposes and is used to show night scenes with multiple kinds of lights.

5.5.6 Beale Air Force Base Inset

The Beale Air Force Base, California terrain inset highlights the capabilities of VBS4 and VBS Blue IG to render high detail airfield content. This airfield inset contains high-resolution representations of airfield surfaces, markings, signage, lighting, and custom airfield structures, and contains a high-resolution surface mask and imagery.



5.5.7 Installing Custom Terrain Insets

TerraTools® can be used to develop high-fidelity, geo-specific environments for defense simulation and training. With the TerraTools VBS Bundle, VBS4 users can generate high-detail terrain insets.

These insets override the global terrain database included in VBS4 for the specified region and offer users complete control over DEM, satellite imagery, models, surface masks, roads, and water layers.

After Installing VBS World Server (on page 30), you can deploy highly detailed custom terrain insets developed with TerraTools®.

Follow these steps:

1. Stop all VBS World Server services:

   Run `\Installation\vws_stop.exe`.

2. Copy the terrain inset files to the following location:

   `\Installation\Services\VBS4\myData\Blue\earth\`

3. Copy any custom model PBOs to the following location:

   `\Installation\Services\VBS4\myData\Blue\content\`

   WARNING

   Also copy these PBOs to the following location on each VBS4 Client:

   `\VBS_Installation\myData\Blue\content`

4. Restart all VBS World Server services:

   Run `\Installation\vws_start.exe`.

The terrain is installed and is available to stream to connected client computers.

5.5.8 Syncing Custom Inset Data to Clients

The VBS4 installation provides some tools for easily syncing inset data from the VBS World Server to a VBS4 client machine. This is useful when needing to sync custom content data prior to running a mission or syncing a copy of all the server's custom inset data to a client machine for offline use.

Follow these steps:

1. On a VBS4 client machine navigate to:

   `\VBS4\optional\WS Sync Tool\`.

2. Edit the `sync_server_content.bat` script in a text editor and modify line 6, `set ip=0.0.0.0`, to match the IP address of the VBS World Server you wish to sync. Save and close the script.
3. Double-click the edited `sync_server_content.bat` file to initiate the sync of the server's `\myData\Blue\content\` folder. This will copy all custom PBO data to the client machine.
4. Edit the `sync_server_earth.bat` script in a text editor and modify line 6, `set ip=0.0.0.0`, to match the IP address of the VBS World Server you wish to sync. Save and close the script.
5. Double-click on the edited `sync_server_earth.bat` file to initiate the sync of the server's `\myData\Blue\earth\` folder. This will copy all custom SQLite data to the client machine.

> **NOTE**
>
> For information on managing your insets in VBS World Server, see Insets Management (on page 61).

5.6 Using Downloaded VBS World Server Insets

Insets can be downloaded from VBS World Server via the **Data Management** tab. For more information, see Data Management (on page 60).

VBS World Server insets can be installed on another VBS World Server instance or installed in a VBS4 client to be used offline.

5.6.1 Installing Downloaded Insets on Mantle

Follow these steps:

1. Create a new folder and only place the downloaded inset zip file inside this new folder.
2. Run `vws_stop.exe` on VBS World Server to stop all services.
3. Close all target VBS4 clients.
4. Navigate to the VBS World Server installation and double-click the **Updater** executable.
5. In the resulting **Updater** window, click **Browse** and locate the folder containing the inset zip created in step 1.

   > **NOTE**
   > The updater will report the file size of the inset.

6. Click **Install** to run the update.
7. The contents of the downloaded inset zip will be installed to `<Installation>\myData\Blue\earth` and `<Installation>\Services\VBS4\myData\Blue\content` accordingly.
8. Run `vws_start.exe` on Mantle to restart all services.

The inset is now available in the **Globe View** panel in the **Data Management** tab of connected clients.

5.6.2 Installing Downloaded Insets on VBS4 Clients

Follow these steps:

1. Create a new folder and only place the downloaded inset zip file inside this new folder.
2. Close the target VBS4 instance.
3. Navigate to the VBS4 installation and double-click the **Updater** executable.

4. In the resulting **Updater** window, click **Browse** and locate the folder containing the inset zip created in step 1.

   > **NOTE**
   >
   > The updater will report the file size of the inset.

5. Click **Install** to run the update.
6. The contents of the downloaded inset zip will be installed to `<Installation>\myData\Blue\earth` and `<Installation>\Services\VBS4\myData\Blue\content` accordingly.
7. Restart the VBS4 client.

The inset should now be available in VBS4.

6. Connecting Clients

VBS World Server supports up to 60 simultaneously connected clients. Beyond this limit, there may be a drop in performance on each client.

> **WARNING**
> Ensure that each client meets the specifications required to run that product.

6.1 Connecting VBS4 Clients

Bohemia Interactive Simulations recommends the following hardware requirements for VBS4 Clients:

VBS4	Recommended	Optimal
CPU	Intel Core i7-12700K (or better) Ryzen 9 7900X	Intel Core i9-12900K (or better) Ryzen 9 7950X
RAM	32GB DDR4 (or better)	64GB DDR4 (or better)
GPU	Nvidia GeForce RTX 3070 (or better) DirectX 11	Nvidia GeForce RTX 3080 (or better) DirectX 11
	WARNING AMD GPUs are not currently supported.	
Disk	512GB SSD for OS and VBS4	1TB SSD for OS and VBS4
OS	Windows 10 (v1607+) or 11, 64-bit	Windows 10 (v1607+) or 11, 64-bit
	WARNING VBS4 uses the Windows account name as the VBS4 user name. This name can only contain printable ASCII (https://www.w3schools.com/charsets/ref_html_ascii.asp) characters. VBS4 may crash if characters outside this range are used. Modify the Windows account name before starting VBS4 if it contains non-ASCII characters.	
Network	1 Gbps / 2.5 Gbps	1 Gbps / 2.5 Gbps

NOTE

VBS4 does not require expensive professional graphics cards (designed for CAD work, CGI, or other complex scientific calculations). These cards do not provide any additional benefits compared to graphics cards designed for gaming.

VBS4 installations that are intended to be used as Dedicated Servers or Simulation Clients can meet the VBS World Server requirements instead of the more graphically demanding VBS4 requirements.

Third-party cybersecurity software may increase load time and impact VBS4 performance.

WARNING

To avoid potential UI display issues, do not use USB hubs or adapters to connect monitors. Also, support of the new map view (see Advanced New Map and Map Layers in the VBS4 Release Notes) is limited on 4K monitors. Delays may occur when moving / dragging the map.

To connect to VBS World Server, VBS4 Clients must specify the VBS World Server to use.

Use VBS Launcher to specify the IP Address of the VBS World Server when you start VBS4.

Follow these steps:

1. On the VBS4 Client, start VBS Launcher.

   `\VBS_Installation\VBSLauncher.exe`

2. In the **VBS4 > Client** tab, select the **VBS4 Online** configuration and specify the IP Address of the VBS World Server to use.

   - Click **Refresh**, and then select or input the IP Address of the computer running the VBS World Server.

   TIP

   To obtain the IP Address of the VBS World Server:

   a. On the VBS World Server, open a **Command Prompt** (type **cmd** in the Windows Toolbar Search).

   b. In the Command Prompt, type `ipconfig` and press **Enter**.

   The displayed IPv4 Address is the value required.

3. Specify any other startup parameters as required.

   For more information, see in the VBS4 Administrator Manual.

4. Click **Launch Modules**.

VBS4 starts and connects to the VBS World Server.

For more information, or alternate ways to start VBS4, see in the VBS4 Administrator Manual.

6.2 Connecting VBS Blue IG Clients

Bohemia Interactive Simulations recommend the following hardware requirements for VBS Blue IG:

Requirement	Minimum	Recommended	Optimum
CPU	Intel Core i5-7500	Intel Core i7-8700	Intel Core i9-9900K
Ram	16GB DDR4	32GB DDR4	32GB DDR4
GPU	NVIDIA GeForce GTX 970	NVIDIA GeForce GTX 1080 Ti	NVIDIA GeForce RTX 2080 Ti
	NOTE Use of a data GPU is not required but is recommended at all levels to improve performance of terrain refinement and multi-channel syncing.		
Free Disk Space	150 GB SATA III SSD	150 GB SATA III SSD	150 GB NVMe SSD
	WARNING To avoid significant performance issues, do not run VBS Blue IG on an HDD, but the minimum recommended SSD.		
Operating System	Windows 10 (v1809+), 64-bit	Windows 10 (v1809+), 64-bit	Windows 10 (v1809+), 64-bit

After you have installed and licensed VBS Blue IG, you are ready to launch the runtime as a client connected to VBS World Server.

NOTE

Typical use cases host the Scenario on a separate Dedicated Server or VBS4 Admin Client. This procedure is only required if you host the Scenario directly on the Dedicated Server running on the VBS World Server.

Follow these steps:

1. Configure Dedicated Server for VBS World Server (on page 43) to enable `-vbsHostNet` on the VBS World Server Dedicated Server.

2. Configure VBS4 on the VBS World Server computer to enable it as a host.
   a. Open the VBS4 network configuration file with a text editor:
      - Default VBS4 Profile location:

        `%LOCALAPPDATA%\VBS4\Settings\VBSExternalNetworking.xml`
      - Other VBS4 Profile location:

        `Path``\Settings\VBSExternalNetworking.xml`

        `Path` is specified using the `-profiles=`*`Path`* command-line option - for more information, see Command Line and Launcher Options in the VBS4 Administrator Manual.
   b. Change the parameter `<STR_SETTINGS_EXTERNALNETWORKING_VBS3_HOST_MODE>` to `true`.
   c. Save and close the file.
3. Configure the Scenario with the required IG viewpoints.

   For more information, see Add IG Viewpoints to Scenarios in the VBS4 Editor Manual.
4. Configure each VBS Blue IG Client to use the VBS World Server as the host:
   a. Open the `VBSExternalNetworking.xml` file with a text editor at:

      `%LOCALAPPDATA%\Bohemia Interactive Simulations\`*`VBS_Blue_IG_Installation`*`\Settings\`
   b. In the open file, find the following line and change the IP address to the address of the VBS World Server:

      ```
      <STR_SETTINGS_EXTERNALNETWORKING_HOST_ADDRESS>
          IP Address
      </STR_SETTINGS_EXTERNALNETWORKING_HOST_ADDRESS>
      ```
   c. Save and close the file.
5. Execute the Scenario using the Online Workflow.

   For more information, see Dedicated Server Scenario Execution in the VBS4 Instructor Manual.
6. Start the VBS Blue IG Clients.

VBS Blue IG connects to the VBS World Server and displays the viewpoints defined in the Scenario.

For more detailed instructions, see Configure VBS Blue IG and VBS4 in the VBS Blue IG Manual.

7. Troubleshooting VBS World Server

This section covers how to resolve the issues you may encounter with the VBS World Server

If your particular issue is not covered, contact support@bisimulations.com.

7.1 Installing the VBS World Server Issues

The following are common issues that occur when installing the VBS World Server:

- The VBS World Server is licensed separately from VBS4. Ensure that you have a valid VBS World Server license prior to downloading and installing the VBS World Server. To obtain the license, contact support@bisimulations.com.
- If you encounter issues running the installer, instead run it as an Administrator by right-clicking on the installer executable and selecting **Run as administrator**.
- Verify that the computer that the VBS World Server is being installed on meets the VBS World Server System Requirements (on page 26).
- The VBS4 and VBS World Server installers should be present in the same directory in order for the VBS World Server installer to automatically detect and install VBS4 in the correct location.
- The VBS4 installed by the VBS World Server installer is utilized by the server and thus should not be used as a VBS World Server client. As a result, VBS4 should be downloaded and installed on a separate computer in order to serve as the client.

7.2 Specified Port is Occupied by Another Service

If another service is occupying a port needed for VBS World Server:

Port used:

- VWS geocoder API: 2801
- VWS geocoder Photon: 2802
- VWS OWSServer: 7070, 25500, and 25505
- VWS Data Fileserver: 2900
- VWS VBS4 Fileserver: 2901
- VWS WPS Fileserver: 2902
- VWS Proxy: 6707-6709
- VWS GeoServer: 8079 and 8080
- VWS VBS4Server: 7071 and 25501
- VWS VBSBlueServer: 2583 through 2590; 4887
- VWS InsetDB Server: 6611
- VWS Coordinator Port/User Interface: 6606
- VWS WPS Server: 8082

Stop the service conflicting with a VBS World Server service using the VBS World Server User Interface (as described in VBS World Server User Interface (on page 48)).

Start the service using the VBS World Server User Interface (as described in VBS World Server User Interface (on page 48)).

If the process occupying the port is not a service, do the following:

1. Open a new Command Prompt window as an Administrator.
2. Run the following command:

   ```
   netstat -a -o -n
   ```

   A list of active connections used by the network displays.
3. Locate the **ProcessID (PID)** for the specified port (for example, 2800).
4. Run the following command:

   ```
   taskkill /f /pid ####
   ```

   Where `####` equals the PID of the conflicting process.

If neither of these options are possible, contact support@bisimulations.com.

7.3 Debug Mode in VBS World Server

Toggling Debug Mode allows error messages to be displayed in the VBS World Server user interface as a pop up at the bottom of the screen. For more information on the error message displayed in the pop up, reference the table found in the Debug Mode Error Messages (on the next page) section.

7.3.1 Enabling the Debug Mode in VBS World Server

Debug Mode is disabled by default. To enable Debug Mode, add it to the `config.json` file.

> **NOTE**
>
> Changes in the `config.json` will affect all the clients that connect after the update in `config.json` was made

Follow these steps:

1. Navigate to `\VBS World Server_Installation\Services\VBS4Agent\CoreUI\assets` and locate the `config.json` file.
2. Open the `config.json` file in a text editor.

3. Add `"debugMode": true` to line 12 in the file.

```
{
"navBar": {
"displayTitle": "VWS",
"displayImage": ""
},
"debugMode": true
}
```

4. Save the changes to the `config.json` file.
5. Reload the VBS World Server client tab in a web browser.

7.3.2 Disabling the Debug Mode in VBS World Server

When Debug Mode is no longer needed, it can be disabled in the `config.json` file.

Follow these steps:

1. Navigate to `\VBS World Server_Installation\Services\VBS4Agent\CoreUI\assets` and locate the `config.json` file.
2. Open the `config.json` file in a text editor.
3. Delete `"debugMode": true` from the file.
4. Save the changes to the `config.json` file.
5. Reload the VBS World Server client tab in a web browser.

7.3.3 Debug Mode Error Messages

The following table lists the possible error messages that can be displayed when Debug Mode is enabled.

Message	Display Type	Cause
“Failed to get the inset list”	Error	The call to pull the inset list failed.
“Preset failed to save”	Error	The call to return the terrain preset failed.
“Failed to commit preset”	Error	The call to commit the preset failed.
“Failed to get the currently committed preset”	Error	The call to get the committed preset failed.

Message	Display Type	Cause
“Failed to promote battlespace”	Error	The call to promote the Battlespace during a preset commit failed.
“Failed to delete inset”	Error	The call to delete an inset failed.
“Failed to update inset”	Error	The call to update an inset failed.
“Attempted to save invalid layer”	Error	The call to save a layer that VBS World Server considered invalid failed.
“Failed to save inset”	Error	The call to save an inset failed.
“Failed to load inset list”	Error	The call to load the inset list failed.
“Failed to delete layer”	Error	The call to delete a layer failed.
“Failed to update inset”	Error	The call to update the inset failed.
“Failed to generate new insets”	Error	The call to regenerate insets failed.
“Failed to resync inset”	Error	The call to resync insets failed.
“Failed to get the inset generate/resync status”	Error	The call to generate or resync insets status failed.
“Failed to get executed processes list”	Error	The call to get the WPS processes list failed.
“Failed to get the status of a process”	Error	The call to get a WPS process's status (while the process was still processing) failed.
“Failed to start process”	Error	The call to start a WPS process failed.
“Failed to clear processes”	Error	The call to clear WPS processes (the endpoint taking an array rather than a single value) failed.

Message	Display Type	Cause
“Failed to terminate process”	Error	The call to terminate a WPS process failed.
“Failed to load configuration files”	Error	The call to CoreUI to load at least one of the configuration files failed.
“Failed to get service logs”	Error	The call to get a service's log or log size failed.
“Preset is attempting to use a registered name”	Warning	An attempt was made to save a new preset using a blacklisted name. This includes an empty value or *None*.
“Attempted to delete non-deletable inset”	Warning	An attempt was made to delete an inset that is not able to be deleted. Examples include not having layers or using a path that does not allow deleting.
“Attempted to delete non-deletable layer”	Warning	An attempt was made to delete a layer that is not able to be deleted. Examples include not having layers or using a path that does not allow deleting.
“Cannot get logs for service that does not exist”	Warning	An attempt was made to get the logs for a service ID that does not exist. This is likely to happen if an invalid service ID is entered into the URL of the **Logs** page.

7.4 Client Runtimes are Loading Slowly or Crashing

If the client loads slowly or crashes, especially after adding new data, clearing their cache may help.

Follow these steps:

1. On the client machine:
    a. Close all Bohemia Interactive Simulations product runtimes.
    b. Navigate to the `\Product_Installation\cache\` folder.
    c. Delete the contents of the `\cache\` folder.

2. On the server machine:
    a. Open the VBS World Server user interface from a web browser (see VBS World Server User Interface (on page 48) for more information).
    b. Navigate to the **Server Management** tab.
    c. Click the **Clear Caches** button located under the **Service** panel.
    d. In the resulting warning dialog, click **Clear Caches**.
    e. Wait until all services restart and are running again.
    f. Optionally, restart the machine. This can be helpful if a machine has had a long uptime.

Additionally, terrain network streaming can be slow if the network connection between the VBS World Server and clients is slow or congested; or if the VBS World Server machine is at max resource usage.

> **WARNING**
> Do not manually add or remove data, such as terrain data or Battlespaces, from VBS World Server while services are configured. Use the methods described in Data Management (on page 60) or Battlespace Management in the Introduction to VBS4 Guide accordingly, otherwise run `vws_shutdown.exe` before making manual changes.

7.5 SSD is Low on Disk Space

If the SSD drive starts to run low on disk space, there are some ways to clear space.

Clear the VWS BlueServer cache:

1. Open the VBS World Server user interface from a web browser (see VBS World Server User Interface (on page 48) for more information).
2. Navigate to the **Server Management** tab.
3. Click the **Clear Caches** button located under the **Service** panel.
4. In the resulting warning dialog, click **Clear Caches**.
5. Wait until all services restart and are running again.

Remove unused terrain data:

- Refer to Data Management (on page 60) for instructions on how to remove terrain data from the VBS World Server that you are no longer using.

If disk space on a single drive is an ongoing concern, create a symbolically linked folder that points to another drive for the VBS4 Battlespace folder and/or VBS Geo project data. This can only be done on NTFS-formatted drives.

7.6 Anti-Virus Software Detects VBS World Server Files

Some VBS World Server services contain embedded servers which can sometimes be flagged as a risk. These services pose no harm and exceptions should be made in your anti-virus software for any affected files.

8. Known Issues

This release of VBS World Server contains the following known issues:

8.1 General

- The VBS World Server installer sometimes fails to trigger the VBS4 server installer, resulting in services not starting (i.e., VWS OWSServer, VWS VBS4Service, VWS BlueService). To confirm that VBS4 was not properly installed, navigate to `<Installation>\Services\VBS4`. If the folder is empty, use the following workaround.
  - *Workaround*:
    1. Stop and remove all VBS World Server services.
       a. Run `<Installation>\vws_shutdown.exe`.
       b. Press **Enter** to close the resulting command prompt.
    2. Uninstall VBS World Server:
       a. Run `<Installation>\uninstall.exe`.
       b. When the uninstaller finishes running, VBS World Server is removed and the installation directory is deleted.
    3. Uninstall any other VBS4 24.1 installations from the server machine.
    4. Reinstall VBS World Server. The VBS4 service should be properly installed.
- VBS World Server must be installed to a folder on the root of the drive (e.g., `D:\<Server>`) to avoid issues that can arise from long file paths.
- There is a known issue with the `Updater.exe`. To install update packages, the packages must be stored on the same drive as the VBS World Server installation.

8.2 User Interface

- When downloading a large AAR, the progress will be stuck on 1% then jump to 100% when the download completes.
- Inset bounding boxes and inset layer bounding boxes may be larger than the extents of the actual data on the map.
- The **Download Log** button of the **Logs** panel does not work in the VBS4 version of the user interface. To download VBS World Server service logs, access the VBS World Server User Interface (on page 48) using a web browser.
- Only the displayed log in the VBS World Server User Interface can be downloaded with the **Download Log** button. The full log can only be accessed on the server machine directly.
- Several innocuous CORS errors may be encountered in the VBS World Server User Interface.
- Terrains produced with the Terrain Conversion Tool will not appear in the VBS World Server User Interface unless the **Generate New Insets** button is pressed.
- After **Start Al**l is ran on the **Server Management** tab of the VBS World Server User Interface, some services may report as **Stopped** until the page is refreshed.
- Incorrect action buttons might be displayed in the **Service Panel** immediately after a refresh of the **Server Management** page.
- Some terrain inset changes can not be made when the **Inset List View** is maximized.
- Network resources in the **Server Management** tab may be reported as 0% on machines that have two or more network interfaces.
- Political boundaries and place name labels displayed in the **Globe View** are based on open source data; errors and discrepancies with these labels are expected until a future release.
- Place name labels displayed in the **Globe View** are centered over the area on the map. For non-contiguous countries, this can cause the label to be placed in an incorrect position on the map (i.e., at the centroid of the various territories).

The following known issues related to `<inset>.json` files and inset load lists may occur:

- **Delete** will not remove the `<inset>.json` file for any insets that were generated in versions prior to VBS World Server 23.2, which will cause it to keep reappearing in the **Inset List** following deletion.

  To workaround this issue: First delete the respective `<inset>.json` file at `<VBS World Server>\Services\VBS4\mydata\blue\earth\<insetfolder>\<inset>.json` and then run the **Resync Insets** command in the VBS World Server UI. After the old/mismatched `<inset>.json` file has been deleted manually, the **Generate New Insets** button will create a new `<inset>.json` file, and an inset list entry with the proper metadata will be added, which allows it to be deleted again in the VBS World Server user interface.

- **Delete** will not remove the `<inset>.json` file for any inset that has had its folder name manually changed after the inset was generated, which will cause it to keep reappearing on the **Inset List** following deletion.

  To workaround this issue: First delete the respective `<inset>.json` file at `<VBS World Server>\Services\VBS4\mydata\blue\earth\<insetfolder>\<inset>.json` and then run the **Resync Insets** command in the VBS World Server UI. After the old/mismatched `<inset>.json` file has been deleted manually, the **Generate New Insets** button will create a new `<inset>.json` file, and an inset list entry with the proper metadata will be added, which allows it to be deleted again in the VBS World Server user interface.

- Users updating from an earlier VBS World Server version will not have their inset list load in the VBS World Server UI.
  - To fix (method 1, deleting and recreating the inset list): While services are shut down, delete the `<VBS World Server>\Services\InsetServer\mantle-insets.sqlite` file. After configuring services, run the **Resync Insets** command to regenerate the list based on your previous setup. This should only need to be done once when first updating to VBS World Server 23.2. If you want to permanently delete any older insets, they will still need to be deleted manually as per known issues 1-2 and its workaround.
  - To fix (method 2, manually updating the inset list file): Within the `<VBS World Server>\Services\InsetServer\mantle-insets.sqlite,` use a SQL GUI or SQL Commands to manually add the Column **original_filepath** to the Table **insets**. This will maintain the state of the inset list when updating to VBS World Server 23.2. If you want to permanently delete any older insets, they will still need to be deleted manually as per known issues 1-2 and its workaround.

- Insets generated via an import process (such as TCT) will have their `original_filepath` variable set to an absolute file path instead of a relative file path. If VBS World Server has its location changed then these insets can no longer be deleted via the VBS World Server UI.

  If you want to permanently delete any insets created in this way, they will still need to be deleted manually as per known issues 1-2 and its workaround.

- Scrolling elements of the **VBS World Server Dashboard** in VBS4 clients do not react to mouse wheel inputs. Use the browser version of the **VBS World Server Dashboard** for full mouse wheel scrolling support.

8.3 Terrain Conversion Tool

- The Terrain Conversion Tool dialog in VBS3 may become unresponsive during the conversion.
- If a VBS3 road network does not overlap at intersections, then converted roads may have some gaps in these intersections. These gaps can be corrected using VBS Geo.
- The Terrain Conversion Tool cannot convert VBS3 terrains with models stored in a CBO file. These models must be put into a PBO or ZBO file in order to be converted.
- Some models with non-standard configurations lose their lightpoint attribution during the terrain conversion process, which causes these models to be unilluminated in VBS4.
- When running a terrain conversion from VBS3 to VBS4, the data layers can load in such a way that bridges and other objects will not be visible. Clearing the cache on the client and server machines causes bridges and objects to appear as expected. To fix this issue after running the Terrain Conversion Tool:
  1. Close the VBS4 client of any client computers that were connected to VBS World Server while the TCT was executed.
  2. Delete the cache folder at:

     `\VBS4_Installation\cache\`
  3. Click the **Clear Caches** button in the VBS World Server user interface, located under the **Services Panel**.
  4. Connect the VBS4 client, everything should now be in its place.
- Terrain and model edits made in the VBS3 Mission Editor are not converted by the Terrain Conversion Tool process and therefore will not show up in the resulting VBS4 terrain.
- VBS3 must be restarted to verify a different server after the first server verification has occurred.

8.4 World Airfields

- Airfield taxiways and runways immediately adjacent to water bodies may be slightly distorted due to a conflict with the global water layer. This will be improved in a future release.
- Airfields may occasionally be missing sections of tarmac or taxiways.
- Not all world airfields have signage. This will be improved in a future release.
- When world airfield buildings are viewed simultaneously with the World Data buildings, there may exist a narrow band where buildings are not rendered along the transition between the two building datasets.
- Approach lighting models may conflict with World Data roads and buildings if they are in close proximity to the runway approach.
- Approach lighting models may float above the surface if there is a severe dropoff at the end of the runway, such as a cliff.

8.5 Terrain Processes

- After VBS Geo data import, imported layers are not initially visible in VBS4 or in the **Globe View** for the first process that is run. Subsequent processes will work.