Master

Visitor 3 Personal Edition
(BI Tools v2.5.1)

The manual assumes that you have to run the terrain V3 ***Visitor 3 Personal Edition***.
TIP: To access the V3 while reading this manual, switch these by the pressing the left *Alt+Tab* keys.
NOTE: The abbreviations used here:

- LMB (Left Mouse Button)
- MMB (Middle Mouse Button/Scroll Wheel)
- RMB (Right Mouse Button)

Contents

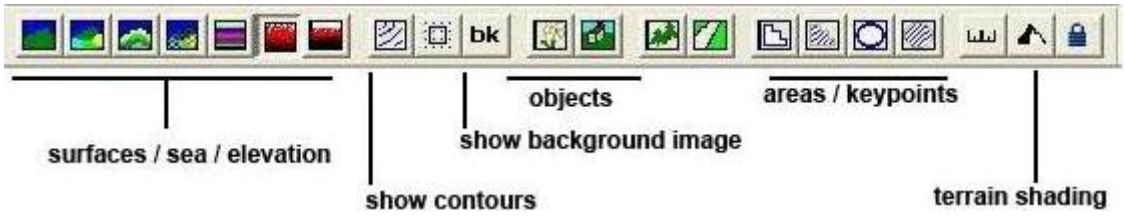
INTRODUCTION

The terrain V3 is delivered *by Bohemia Interactive a.s.* with the package versions:

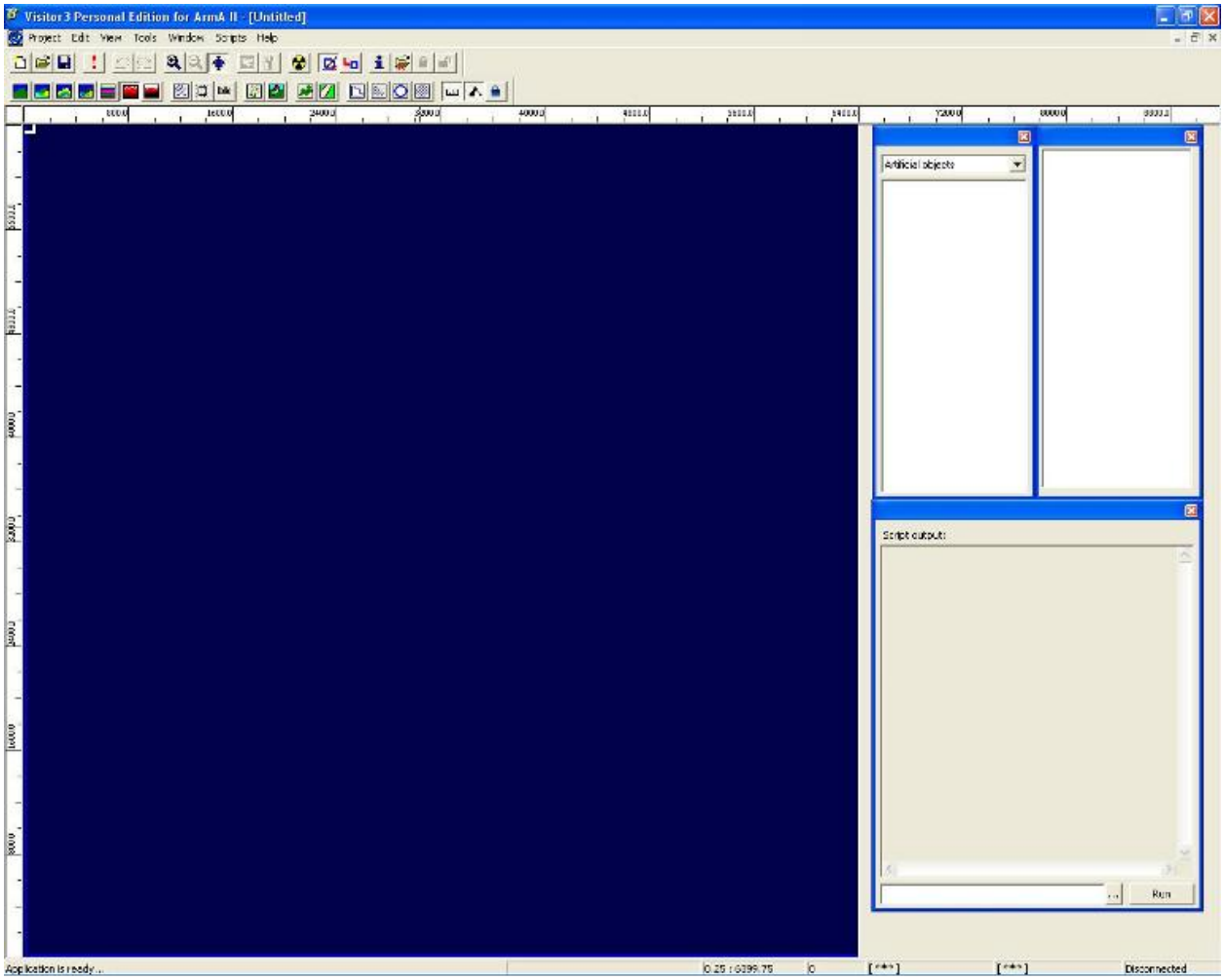
Package Versions	BI Titles
BI Tools	ArmA 1 (Armed Assault)
BI Tools 2 and BI Tools 2.5	ArmA 1, ArmA 2
BI Tools 2.5.1	ArmA 1, ArmA 2&Operation Arrowhead

1. INTERFACE

Main toolbar



TIP: To get better idea on a terrain, turn on the *Show shadows* button.



2. TOOLS

2.1 Natural Objects

The ***Natural objects*** button on the top toolbar is used to show the objects on a map.
To access the objects definition, select *Tools > Natural Objects*
Options of the *Natural Objects Definition*:

- ***Add/Browse…*** - add and browse the objects (***.p3d** files).
  NOTE: The maximum length of the object name has to be up to 50 characters.
- **Randomize Object:**
  - ***Randomize size interval*** – a random size of a model.
  - ***Randomize angle interval*** – a random angle of a model.
  - ***Randomize orientation interval*** – a random facing of a model.

NOTE: Randomization can be realized with a script.

2.2 Artificial Objects

The ***Artificial objects*** button on the top toolbar is used to show the objects on a map.
To access the artificial objects definition, select *Tools > Artificial Objects*
Options of the *Artificial Objects Definition*:

- ***Add/Browse…*** - add and browse the objects (***.p3d** files).
  NOTE: The maximum length of the object name has to be up to 50 characters.
- **Randomize object**:
  - ***Randomize size interval*** – a random size of a model.
  - ***Randomize angle interval*** – a random angle of a model.
  - ***Randomize orientation interval*** – a random facing of a model.

NOTE: Randomization can be realized with a script.

2.3 Roads

The road types are defined here.
NOTE: The ***Crossroads*** are the road parts that need to have suitable the road types defined for each of their ending directions.
To define a *Road* type:

1. In the V3 window, select *Tools > Roads…*
2. In a untitled dialog box, one-click LMB the ***Add***… button
3. In next untitled window, input a road settings:
   - *Road* –define main settings of a road type.
   - *Straight Parts*–define the straight parts of a road.
     NOTE: These parts have certain length, for example: 6.25, 12.5 or 25 meters.
   - *Curves* –define the curved parts of a road.
     NOTE: These parts have a certain radius, for example: 25, 50, 75 or 100 meters.
   - *Special Parts* –define the special parts like a **T**-shape and **X**-shape of a road.
   - *Terminators*–define the end parts of the road.
     NOTE: These parts are suffixed by "_konec".
4. One-click LMB on the *OK* button to close the window with road settings.
5. One-click LMB on the *OK* button to close the window with defined *Roads* and *Crossroads*.

NOTE: A name of a road type will appear within the *Road networks* list in the *Panel of Objects* tool box.

2.4 Forests
(for *Operation Flashpoint (OFP)* only)

The forest contents are defined here.
To define a forest type:

1. In the V3 window, select *Tools > Forests*
2. In *Forests* dialog box, one-click LMB the ***Add***… button

Forest definition dialog:

- *Forest parameters* section:
  - *Name (type) of* - self-explanatory
  - *Outline*: standard/special checks – these define a color of the forest outline
  - *Color*: standard/special checks – these define a color of the forest objects
- *Forest objects* section:
  - *Square-fill:* – this defines the forest objects within the square zone.
  - *Square-:*– this defines the forest objects on borders of the square zone.
  - *Triangle (+* - it is unknown.

3. One-click LMB *OK* button to close the *Forest definition* dialog box.
4. One-click LMB *OK* button to close the *Forests* dialog box.

A name of a forest type will appear within *Woods (OFP)* list in *Panel of Objects* tool box.
NOTE: The number of forest types used affects performance (especially the workload of the CPU).

2.5 Project Parameters

The project parameters contain basic information about the project size. The most of settings is available when project is started. After the project has been set, the *Satellite Grid, Texture layers* and *Satellite grid calculator* settings are only available.

2.6 Project Preferences

The project preferences define a path to textures, objects, and other settings:

- ***Folder – Textures*** field defines a path to the terrain textures.
- ***Folder - Objects*** field defines a path to the terrain objects.

NOTE: All the paths are relative in the terrain project. Thus, you have to keep the project structure.

2.7 Object Manager

There are only two functions.
NOTE: The *Buldozer* has to be disconnected with the **V3** when using these functions.
If the *Resolution LOD* size or *Geometry LOD* size of a model is changed, then these functions are useful to update object description or to fix object shifts in vertical axis, including recalculation of the objects to relative elevation to surface = 0.

2.8 Replace Objects

The option allows deleting and replacing the instances of a given object from the terrain.

3. EDITING MODES

3.1 Artificial Objects

To create an artificial object:

1. In the **V3** window, select *View > Panel of Objects* item.
2. In the untitled drop-down menu, select *Artificial objects* (F1 key) item.
3. Select an artificial object.
4. One-click LMB on the map where you want to place it.

NOTE: The list contains artificial objects except the road types.

3.2 Natural Objects

To create a natural object:

1. In the V3 window, select *View > Panel of Objects* item.
2. In the untitled drop-down menu, select *Natural objects* (F2 key) item.
3. Select an natural object.
4. One-click LMB on the map where you want to place it.

NOTE: The list contains natural objects except the forest types.
TIP: It is recommended to use *World Tools* instead of this method.
(See the *World Tools: Creating Vegetation* TAGorial)

3.3 Road Networks

To create a key part of road:

1. In the V3 window, select *View > Panel of Objects*
2. In the untitled drop-down menu, select *Road networks* (F3 key)
3. In field below, select a road type you want
4. One-click LMB on the map where you want to place it
5. In the *Type of key part {1. from 4}* window:
    1) Select a type of a key part, and one-click LMB on *Next* button
    2) Select a key part of a road, and one-click LMB on *Next* button
    3) Set up parameters of a key part, and one-click LMB on *Next* button
    4) Create a key point of a road, and one-click LMB on *OK* button

NOTE:

- To use this editing mode, take the unbinarized format (**MLOD**) of ***.p3d** files supplied with **BI Tools** in the default directory **P:\CA\Roads2**. The binarized format (**ODOL**) of ***.p3d** files supplied with a game in the directory **%game_installation%\Addons\Roads2.pbo** is not suitable for. In a text editor, the unbinarized files start with letters **MLOD**, but the binarized ones start with letters **ODOL**.
- To see the road parts, click the ***Show roads*** button on the view toolbar.

To edit a road double-click LMB on a road.
Settings of "Key part of road":

- *Orientation of key part* (direction A) - Direction the A end is facing.
  NOTE: The angles are only possible in 10° per step.
- Position X and Z - Position of the key part on the map.
- *Modify Dir. A/B* – create/delete parts of a road in the A/B direction.
- *Gen.Terminator* - create *Terminator* or new key part at the end of certain direction.
- *All Parts Of This Direction* - all parts from the key part to the end of the road.
  NOTE:
    - Adding or deleting a part in the middle of the road changes also the rest of the road.
    - Added part will be inserted before the part selected in *All parts of this direction* list.
- *Delete* - delete a selected road part
- *Straight Part* - add the selected straight part to the road.
- *Left Curve* - add the selected left curve part to the road.
- *Right Curve* - add the selected right curve part to the road.
- *Special* - add the selected special part to the road.

3.4 Key Points

To create key points:

1. In the **V3** window, select *View > Panel of Objects*.
2. In the untitled drop-down menu, select *Key points* (F4 key).
3. One-click LMB on the map where you want to place it.

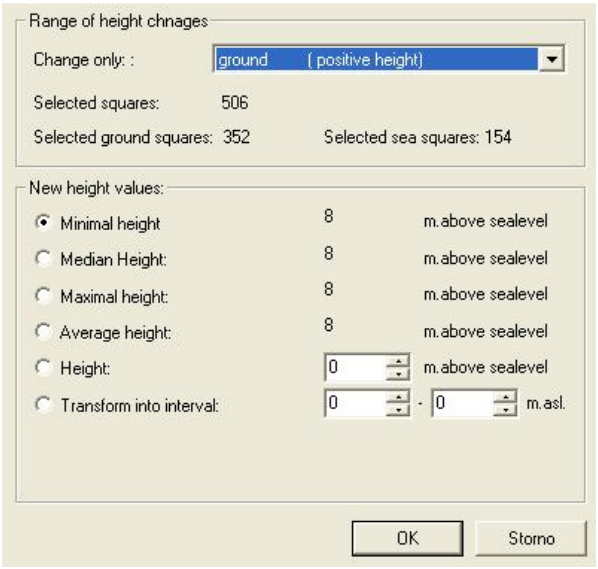
NOTE: The same options as in *Named Zones* editing mode (see below).

3.5 Terrain Vertices

To access terrain vertices:

1. In the **V3** window, select *View > Panel of Objects*
2. In the untitled drop-down menu, select *Terrain vertices* (F5 key)
3. One-click LMB or draw a selection box on the map where you want to edit a location

Change height…



- *Change only* – this is active when the selection contains sea points and land points.
  - *ground (positive height)* - vertices above water level can be only changed.
  - *sea (negative height)* - vertices below water level can be only changed.
- *Minimal Height* - vertices will set to the lowest level in a selection.
- *Median Height* - vertices will set to the median level in a selection.
- *Maximal Height* - vertices will set to the highest level in a selection.
- *Average Height* - vertices will set to the average level in a selection.
- *Height* - vertices will set to the custom height.
- *Transform into interval* - take the current height profile in a selection and stretch it into the given height interval.

Erosion:

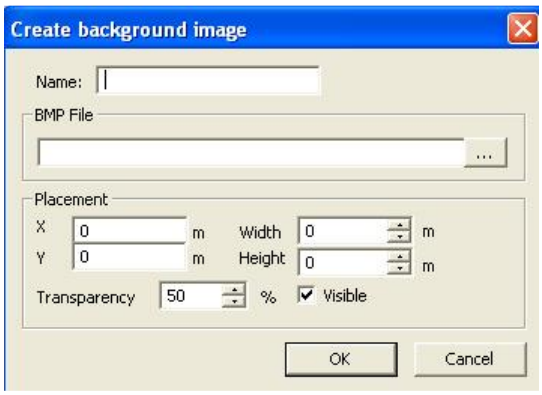
- *nGens* – a number of generations of erosion.
- *washCoef* – a coefficient about how strong does water flow affect terrain.
- *sedimCoef* – a sediment coefficient about how fast sediments sink down and stay.
- *sedimBase* – a sediment base about how much sediment is there from the beginning.
- *sedimEff* – a sediment effect, "wash out" resistance of terrain.
- *initRain* – strength of rain.
- *steadyRain* - How long does the rain last.
- *finalBlur* - a surface smoothing.

3.6 Background Image

To set background image:

1. In the V3 window, select *View > Panel of Objects*.
2. In the untitled drop-down menu, select *Background images* (F6 key).
3. Click LMB on the *New image* button.
4. In the *Create background image* dialog box, choose ***.bmp** file.
   NOTE: A **BMP** image format is only supported.
5. Set coordinates X and Y for top left corner of the background image
   NOTE: For the image covering whole map, set both the X and Y to the value of 0.

6. Set *Width* and *Height* of the image. For example, if the map has 10240x10240 meters and the image covers <u>whole</u> map, set *Width* and *Height* sizes to 10240.
   NOTE: You can use the several parts of the image together to cover the background, correctly setting the coordinates and sizes.



3.7 Named Zones

To access named zones:

1. In the **V3** window, select *View > Panel of Objects*.
2. In the untitled drop-down menu, select *Named zones* (F7 key).
3. Draw a selection box.
   NOTE: To name a zone one-click LMB on the selection.

Options:

- ***Go To...*** - center the view on a selected zone.
- ***Properties*** – open window (double-click LMB on the selection).
- ***Select area under zone*** – select area that is within the zone.
- ***Select objects in zone*** - select objects that are within the zone.

3.8 Named Objects

To access named objects:

1. In the **V3** window, select *View > Panel of Objects*.
2. In the untitled drop-down menu, select *Named objects* (F8 key).

Option:

- ***Go To...*** - center the view on selected object.

3.9 Surfaces (OFP)
(for *Operation Flashpoint* only)

To access surfaces:

1. In the V3 window, select *View > Panel of Objects*.
2. In the untitled drop-down menu, select *Surfaces (OFP)* (F9 key).
3. Draw a selection box.

Options:

- ***Terrain type*** – the type of the selected area.
- ***Surfaces*** - selected surface.
- ***Textures*** - selected texture.
  NOTE: If set to "*random selection*" it will randomly choose one of the available textures.
- ***Set texture onto area*** - set the selected texture on selected area.
  NOTE: The textures are set according to their probabilities and their definition.
- ***Set surface onto area*** - set the selected surface on selected area.
  NOTE: The surfaces are set according to their definition.
- ***Set terrain onto area*** - set the selected terrain on selected area.
- ***Change texture onto area*** - change the current texture in area with the selected texture.
- ***Texture Analysis…***

3.10 Woods (OFP)
(for *Operation Flashpoint* only)

To create/edit woods:

1. In the **V3** window, select *View > Panel of Objects*.
2. In the untitled drop-down menu, select *Woods (OFP)* (F10 key).
3. Drag a selection box on a map where you want place forest.
4. One-click LMB on the *Area forestation* button.
5. In *Create forest* dialog, set up following:
   - *Control parameters of forest* section:
     - Type of forest: - this defines a name of a forest type.
     - *"Smooth" convex angles* check box – self-explanatory.
     - *"Smooth" concave angles* check box – self-explanatory.
     - *Generate parts with bushes around forest* – self-explanatory.
     - *Cancel selected area after forest creation* – self-explanatory.
6. Click *OK* button.

NOTE: This tool for a creating of forests is obsolete and kept only for backwards compatibility in maps for *Operation Flashpoint*.

4. SCRIPTS

The V3 can use the script files ***.vis** (see the *Visitor Script Command Reference*).

5. PROJECT STRUCTURE

Naming Convention

The naming convention of the project matches to ***tag_projectname***:

- The "tag" presents to an author.
- The "project name" presents a project.

NOTE: The name should have no spaces or special characters.

Project Structure

The default **CA** tag means the **BI Studio** contents. Thus, the **P:\CA** directory has to keep these. You can keep your contents separately from the **BI Studio** contents and the other ones on the virtual **P:** drive.

1. Create the work directories:
   P:\<tag>\<tag_projectname>
   - \Data
   - \Source
     - \export
       - \images
       - \terrain
     - \import
       - \images
       - \terrain
2. Place the texture data into directory **\<tag_projectname>\Data**:
   - <texturename>_detail_co.**png** - the layer textures
   - <texturename>_detail_nopx.**png** - the normal maps for the layer textures
   - <texturename>.**rvmat** – the engine materials for the layer textures
   - ui_select_<terrainname>_ca.**png** - the image for the project presentation

NOTE: When *Bulldozer* is first start, it creates the directory **\Data\Layers**.
The ***Layers*** folder contains:

- The segments of the ***map texture*** (*Satellite Map*)
- The segments of the ***layer mask***
- The ***.rvmat** files for each segment of the ***map texture***

3. Place your image data into directory **\import\images**:
   - **layerlegend.png** - the reference colour file.
   - **sm_<mapname>_lco.png** - the ***map texture*** (*Satellite Map*).
     NOTE: The *Satellite Map* is a term that refers to both the actual satellite image of the Earth's surface and the other image like it.
   - **lm_<mapname>_lca.png** - the layers mask;
   - **layers.cfg** - the configuration file of the layer textures
4. Place a height map data, such as ***.xyz** and etc., into the directory **\import\terrain**.

Setup Stuff
You need stuff such as **buildings, plants** and etc. in directory **P:\CA** in order to work with.
If you will use stuff from your game, do following:

1. Download **ExtractPbo** and **DePbo** by Mikero from here.
   NOTE: There are other tools to extract **PBO** and unrap **config.bin**.
2. Extract the **ExtractPbo** where you want to be placed it.
3. Copy the **DePbo.dll**, following instructions in **readme.DePbo.txt**.
4. Extract the addon **Ca.pbo**, and also other ones, you need, from the directory **%game_installation%\Addons**.
5. Copy the contents of the **Ca** addon extracted into the directory **P:\CA.**
6. Copy the other addons extracted into the directory **P:\CA**.
7. Create another folder **P:\<tag>\CA**.
8. Open the **MS Notepad**.
9. In the Notepad window, enter the command: **xcopy *.cpp P:\<tag>\CA\ /S /Y**
10. Save the file as **copy_configs.bat** into the **P:\CA**.
11. In the Notepad window, change the command: **xcopy *.hpp P:\<tag>\CA\ /S /Y**
12. Save the file as **copy_headers.bat** into the **P:\CA**.
13. Close the **MS Notepad**.
14. Open the **copy_configs.bat** file. Wait until it is done.
15. Open the **copy_headers.bat** file. Wait until it is done.

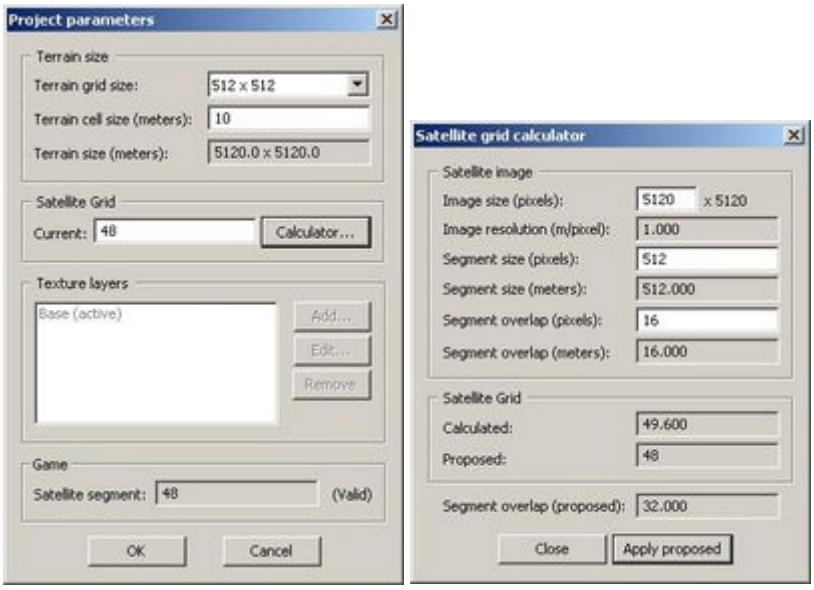
NOTE: You have to keep your contents with some **CA** ones together in single scope to access them. The structured **CA** data copied will be used by the **BinPBO** utility when your project is packed.

6. PROJECT SETUP

Setting up a terrain project:

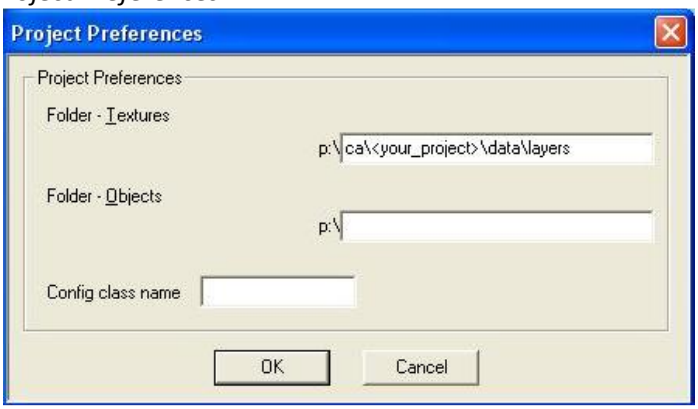
1. In the V3 window, select *Project > New* (CTRL + N)
2. In the *Project parameters* dialog box, set the following:
   - *Terrain grid size* (in vertices).
   - *Terrain cell size (meters)* - distance between the vertices in **X** and **Y** axis.
   - *Terrain size (meters)* = *Terrain grid size* x *Terrain cell size*, calculated automatically.

   Click LMB on the *Calculator* button.
   - In the *Satellite grid calculator* dialog box, set the **following** parameters:
     - ***Image size (pixels)*** - a size of the map texture (*Satellite Map*).
     - *Image resolution (meters/pixels)* = *Terrain size / Image size*.
     - ***Segment size (pixels)***
     - *Segment size (meters)* = *Segment size x Image resolution*.
     - ***Segment overlap (pixels)***
     - *Segment overlap (meters)* = *Segment overlap x Image resolution*.
     - *Calculated* (in cells) = (*Segment size - Segment overlap*) / *Terrain cell size*.
     - *Proposed*: (the rounded quantity of the cells)
     - *Segment overlap (proposed)*:
3. Click on the *Apply proposed* button
4. Click on the *Close* button.
5. In the *Texture layers* section set the area in which the ***layer textures*** are mapped.



(See *Making Satellite Texture and Mask* chapter)

6. Select *Tools* > *Project Preferences*.



The ***Folder - Textures*** field points a directory where following generated and stored by **V3**:

- Segments of a ***map texture*** (*Satellite Map*)
- Segments of a ***layer mask***
- The ***.rvmat** files for each segment of the ***map texture*** (for *ArmA 2 series*)

The ***Folder-objects*** field points a directory where the objects are stored, **P:** by default.

7. Click on the *OK* button.
   NOTE: These settings provide the import the ***map texture*** (*Satellite Map*) and the ***layer mask***.
   NOTE: *Layers* may be generated into another folder and packed into separate **PBO** file.
8. Select *Project > Save as*
9. In the dialog box, save the file **<project_name>.pew** into *P:\CA\<project_name>\Source*.

6.1 Terrain Grid and Terrain Size

Operation Flashpoint Series

NOTE: By default, for *ArmA Cold War Assault* (*Operation Flashpoint*) the ***terrain resolutions*** are:

- 50x50 meters – a value with least lag of a game engine, in meters
- **25x25** – a default value for a multiplayer mode, in meters
- **12.5x12.5** – a default value for a singleplayer mode, in meters
- 6.25x6.25 - a value with more lag of a game engine, in meters
- 3.125x3.125 - a value with most lag of a game engine, in meters

If unsupported cell size was selected, then nearest supported value is used instead.

NOTE: The **setTerrainGrid** scripting command introduced in *Operation Flashpoint: Resistance* v. 1.75. This sets the ***terrain resolution*** (in meters): more value means less the vertices for terrain rendering. The value of 12.5 corresponds to ***Terrain Detail: Normal*** in the *Video* options.
For *ArmA* series the ***terrain resolution*** is fixed and is determined by the terrain project. Thus, the **setTerrainGrid** scripting command sets the **terrain LOD**.

Parameters that determine your terrain:

- Terrain grid size
- Terrain cell size
- Terrain size
- Satellite Image Resolution
- Satellite Image Size

You can define the first three parameters by balancing this equation:
Terrain grid size x Terrain cell size = Terrain Size
The limitation is that the *Terrain grid size* must conform to one of the following values:
16, 32, 64, 128, 256, 512, 1024, 2048 or 4096 vertices.
Example: 512 vertices x 50 m = 25600 m; 1024 vertices x 25 m = 25600 m

ArmA Series
The sample size of a terrain (for the *Satellite Image Resolution* value of 1 m/1 pix)

Terrain Grid, verts	Terrain Cell, m	Terrain Size, m	Segment Size, m	Segment Overlap, m	Satellite Grid, cells	Segments per terrain
64	15	960	512	32	32x32	4
128	15	1920	512	32	32x32	16
256	15	3840	512	32	32x32	64
512	15	7680	512	32	32x32	256
1024	15	15360	512	32	32x32	1024
2048*	15	30720	512	32	32x32	4096
4096*	15	61480	512	32	32x32	16384

*not recommended for use because of long processing
Example: the terrain *Chernarus*

Terrain Grid, vertexes	Terrain Cell, m	Terrain Size, m	Segment Size, m	Segment Overlap, m	Satellite Grid, cells	Segments per terrain
2048	7.50	15360	512	32	64x64	1024

The values of a grid cell for DEM data from the *Global Data Explorer* are:
X-axis = 23.5539150311 m (~24); Y-axis = 30.8414811204 m (~32)
After the *Terrain Size* is chosen, you can define the *Satellite Image Resolution*. This can depend on the quality of a map texture (*Satellite Map*): 1 m/1 pixel, 2 m/1 pixel, 4 m/1 pixel and etc.
Define the *Satellite Image Size* = Terrain Size / Image Resolution.
Examples: 10240 m : 1 m/pix = 10240pix; 10240 m : 2 m/pix = 5120 pix
The five above values should be saved as they will come up again at during the creation of a terrain.

7. TERRAIN EDITING

There are several ways to edit a height map:

- ***Manually*** **(with "Surfaces (OFP)" (F9))** - you change a height of each vertex.
- ***Manually In Buldozer*** (see below)
- ***Import templates*** **(Project > Import Templates…)**
- ***Import a height map*** **(Project > Import Terrain from XYZ)** – you import the file of the ASCII format containing space delimited XYZ on each line, where X and Y is in UTM, and Z is in meters.

NOTE: During import you can align data to top or bottom left and set target data dimension to the crop data or the extend area.

- ***Import PNG Image*** **(Project > Import from Picture)** - import 8/16 bit colour PNG image.
  NOTE: *.pbl file must be presented in the same location. It is automatically created when you export your project into ***.png** file via *Project > Export Terrain into picture...* function.
  It is possible to make a height map in **V3** and then edit this in a raster V3.

NOTE: For the terrain import (and any large scale operations like this) it is recommended to disconnect the *Buldozer*, otherwise it takes much more time to process the map.

8. TERRAIN FORMATS

The V3 allows you either to create or import the terrain.
The existing locations can be recreated in V3 with the *GIS* data.
The typical source data include:

- The DTED or DEM elevation data
  NOTE: The V3 can't import of ***.dem** files. You can convert ***.dem** files to ***.xyz** files using the third-party software. The topic is not a subject of the manual so it will be described separately.
- The vector data as***.vmap** or ***.esri** shape files for roads, vegetation, and buildings
- **GeoTiff** or similar bitmap surface image.

Before can be used by the **V3**, the source data needs to be cropped to the desired size and convert into the following formats:

- The Elevation Data into **XYZ (ASCII triplet format)**.
- The Satellite Image (*Satellite Map*) or other texture data as 24-bit PNG in RGB format.
- The Vector Data as ***.esri** shape files.

The terrain import formats:

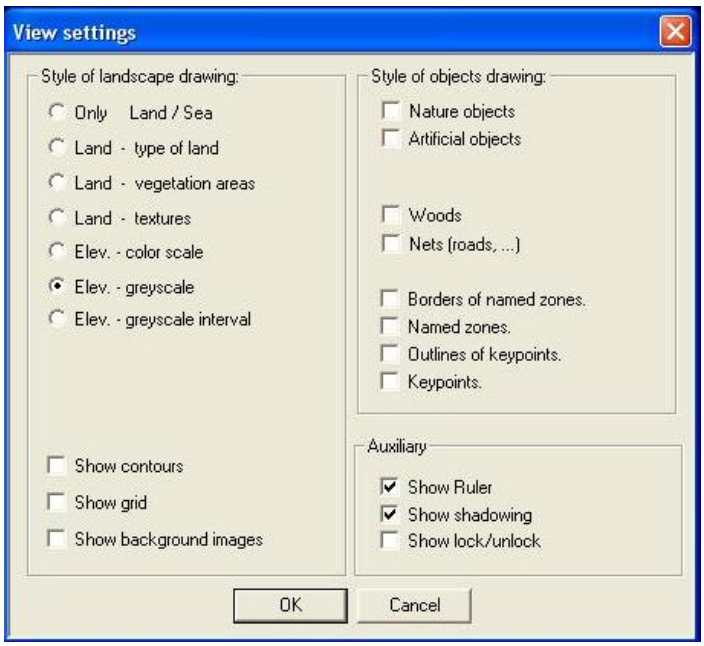
- ***.xyz** (the height map)
- ***.png** (an height map) used with a ***.pbl** file (a terrain configuration)
  NOTE: Each pixel of this image presents corresponding vertex of a terrain grid. Thus, this feature allows you to change a terrain by resizing the image and/or setting parameters in the ***.pbl** file.

To import a ***.png** file with ***.pbl** file:

1. *Project > Import Terrain from picture*.
2. Go to **CA\<your_project>\Source\terrain**
3. In the folder ***terrain***, open **<your_terrain>.pbl** file
   NOTE: The **<your_terrain>.png** have to be in the same folder for ***.pbl** file points to it.

To import of ***.xyz** file:

1. *Project > Import Terrain from XYZ*.
2. Go to **CA\<your_project>\Source\terrain**
3. In the folder ***terrain***, open **<your_terrain>. xyz** file
4. Click the *Show contours* button and so on
   NOTE: You can change contour range using ***Actual preferences*** tool, where it's possible to set both contour interval and minimum contour (in meters).
   The colors of a sea, terrain elevations and contours can be set in:
   View > Define configuration > Colors - height tab.
   The visible terrain elements can be set in *View > View settings* or directly by the buttons in the main toolbar.



The Map Texture (*Satellite Map*) and Layer Mask Import

NOTE: During import of the data the *Buldozer* should be disconnected from the **V3**.

You need to import from *Source* folder the following:

- The **layers.cfg** file
- The Satellite Map (the ***map texture***) - **sm_<map_name>_lco.png**
- The Layer Mask - **lm_<map_name>_lca.png**

NOTE: You can use the same file **mapLegend.png** for any project.

NOTE: In *Data* folder the following files for each of the ***layer textures*** should be prepared:

- <maptag>_<texture_name>_detail_co.paa - the ***layer texture*** with a ***normal map*** together covers area of the ***map texture*** and replaces **MCO** texture (if any) on close range.
- <maptag>_middle_mco.paa - the optional texture covers area of the ***map texture*** on middle range.
- <maptag>_<texture_name>_detail_nopx.paa- the ***normal map*** for the ***layer texture***
- <maptag>_<texture_name>.rvmat – a material for the engine

The data have to correspond definition of so-called clutter (grass, plants or stones) generated on respective surface, unless the surface is overlaid by some model's Roadway **LOD**.

To import “satellite map” and layer mask do so:

1. Select *Tools* > *Import satellite & mask* command
2. In the *Select layer configuration file* dialog, open the file **layers.cfg**
3. In the *Save .rvmat files as* dialog, choose the *Text* item
4. In the *Select satellite map* dialog, open the file **sm_<map_name>_lco.png**
5. In the *Select layer mask* dialog, open the file **lm_<map_name>_lca.png**

The *Importing Satellite Data* box will display the import progress. After import, the *Layers* folder should be fined in the directory P:\CA\<your_project>\Data. The segments of the ***map texture*** and of the ***layer mask*** and also ***.rvmat** files for each segment of the ***map texture*** are stored in this folder.

NOTE: It is not necessary to delete its content when you regenerate the segments. The **V3** replaces the changed segments. The new ***.png** files will be converted to ***.paa** files when *Buldozer* is started. Before you do so, it is recommended to save the project since it bears actual ***UV*** coordinates for the segments.

9. TERRAIN IMPORT

The map has to include an elevation data, a ***map texture***, a ***layers mask***, and a basic introduction to the features of the V3.

1. Select *Project* > *Open*
2. Set the *File* type to **XYZ** format and go to the folder ***Source*** in a project to open the ***.xyz** file.

NOTE: It takes some time to process the file, and then a dialog will display information about the ***.xyz** file. Ensure that the properties match to your values.

3. Click *OK* button
4. Save the project to *P:\CA\<project_name>\Source\<project_name>.pew*

NOTE: If you use the *Save As* command instead of the *Save*, you will need to manually append the **PEW** extension to the file name. Otherwise the file will be saved without an extension.

To set the project preferences:

1. Select *Tools > Project Preferences*
   NOTE: You need to only edit the preference ***Folder - Textures***.
2. In the field ***Folder - Textures*** put the directory *CA\<project_name>\data*.

To set the project parameters:

1. Select *Tools > Project Parameters*
   NOTE: This command appears when the project preferences have been set.
2. Choose option from drop down menu ***Terrain grid size*** **(a terrain resolution)**
   NOTE: If a terrain is imported from ***.xyz** file, the ***Terrain grid size*** option displays the properties of ***.xyz** file and is locked.
3. In the *Texture Layer* section, select the *Base (Active)* item
4. Click the *Edit* button to set the area of the layer texture mapping.
   NOTE: The options are: the size of the terrain cell multiplied by x1, x2, x4, and x8.
   Example: If a size of a terrain cell is 8 m, the options are: 8x8, 16x16, 32x32, and 64x64.
5. Click the *Calculator* button
6. Enter the size of the map texture (in pixels) into the ***Image size (pixels)*** field.
   NOTE: Leave default values of the *Segment size* and *Segment overlap*.
   You will see a calculated and proposed value of *Satellite Grid*.
7. Click *Apply Proposed* button.
8. Click *Close* button.
9. Click *OK* button to exit the *Project Parameters* dialog box.
10. Save the project as **<project_name>.pew** file

10. MAP TEXTURE AND LAYER MASK

After you set the project preferences and parameters, you can import the map texture and the layer mask. The V3 uses value of the *Satellite Grid* to cut these images into the tiles that conform to rules of Direct X image size and will allow texture streaming:

1. Select *Tools > Import Satellite + Mask…*
   NOTE: Ensure that you start in *Source* folder of your project.
2. Open the **layers.cfg**
3. In *rvmat selection* dialog box, choose *Text* option (if you want to reserve editable ***.rvmat** files)
4. Click *OK* button.
5. In *Select Satellite Map* window, open ***.png** file.
6. In *Select Layer Mask* window, open ***.png** file.
   NOTE: The importing may take a time. The progress bar might halt but allow it to continue working. You can monitor actual progress by looking into *Layers* folder of your project where the V3 stores the tiles created. When the processing is done, the progress bar will disappear.
   TIP: Tune a surface with a small map first and if you are satisfied with the results, proceed with a large map.
7. Save the project.

If you want to retexture already existing map you need perform steps 2 to 7.

11. TERRAIN PREVIEW WITH REAL TIME VIEWER (BULDOZER)

Once the import finished, you can view the terrain in a ***real time viewer (Buldozer)***.

NOTE: When *Buldozer* is in focus, your mouse cursor will be inactive. Use *Alt+Tab* keys to switch between *Buldozer* and other applications.

1. Select *Project > Connect To Buldozer*

2. Once *Buldozer* starts, it will call the utilities that will convert the images from **PNG** format into **PAA** format of *Direct X* compressed file.

NOTE: Depending on the size and resolution of your map data, the process may take some time. When the process is completed, the command prompt window will disappear and you will be able to see your map in *Buldozer*.

NOTE: The initial point of view will be display an area in the far northwest corner of the map, facing north. You might see some badly matched or stretching the map texture but this is normal since it is outside of an actual map area.

In the V3 window you can click the MMB anywhere on the map to set the camera position in *Buldozer* window.

12. SURFACE REPRESENTATION

The surface is represented by a pair of the textures covering the terrain:

- The map texture (*Satellite Map*)
- The layer mask

The textures have the **PNG** format. These are divided into segments when are imported to the **V3**.

Each segment of a *layer mask* is converted to four full colors during the import process.

The map texture provides the basic color for the terrain on far range. As a terrain can be visible beyond the range that objects are, the object representations are included on the surface.

Each segment of these textures overlaps its neighbors.

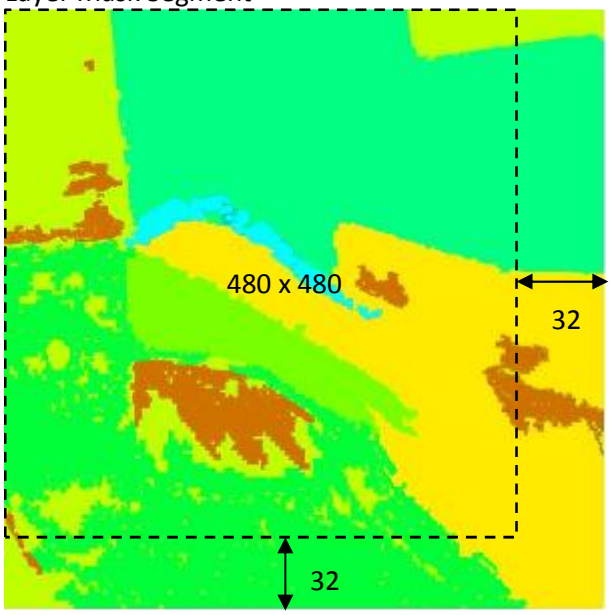
Both the layer mask and the layers defined in the configuration file determine the layer textures to display the surface at close range and other properties.

The layer legend is accompanied with a configuration file, defining conversion from the RGB colors to layers. Configuration file defines which color represents each the ***layer***.

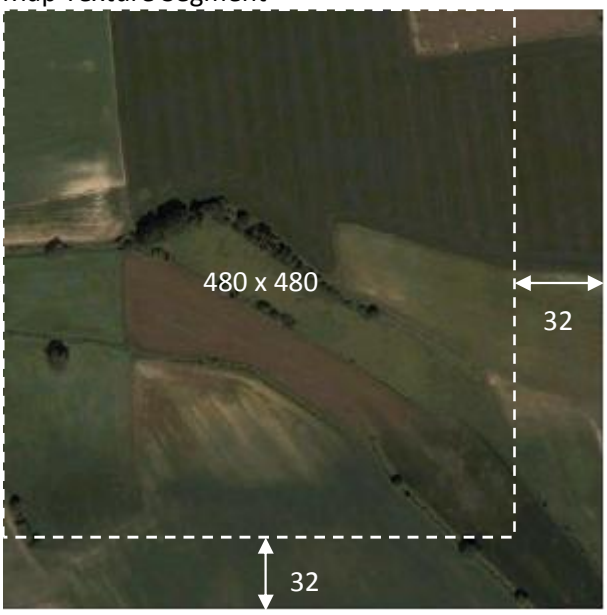
Example: Here are segments of the ***layer mask*** and of the ***map texture*** with size of 512 x 512 pixels.

NOTE: The segments are covering the terrain from top to bottom and from left to right.

Layer Mask Segment



Map Texture Segment



The layer mask is processed as an RGB image, and each pixel of the image is interpreted as following:

- more matching color in the layer legend is found
- based on nearest left and right basic surface the corresponding surface blend is used

The processing the images:

In V3 like the *Photoshop*:

- Edit a map texture and save it as **sm_lco.png**.
- Edit a layer mask and save it as **lm_lco.png**.

NOTE: You can use either a texture type **_lco** or **_draftlco**.

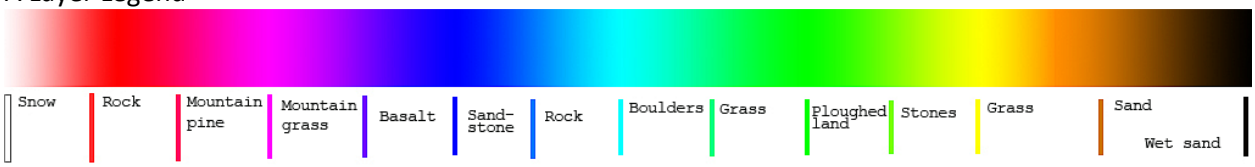
In the V3:

1. Import the map texture and layer mask
2. Preview the result in *Buldozer*

13. LAYER LEGEND

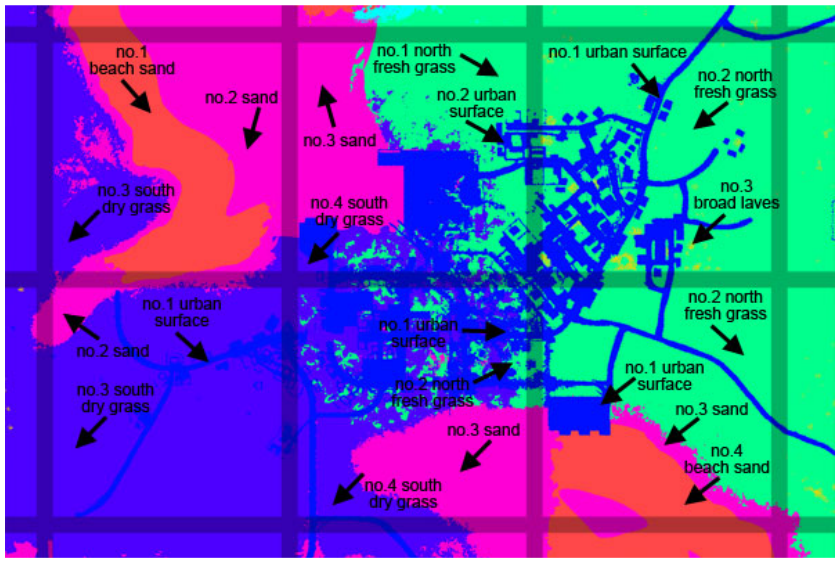
The V3 uses **layerslegend.png** as the **RGB** color reference for a layer mask.

A Layer Legend



NOTE: This can be created using a color gradient of any image V3 such as the *Photoshop*.
NOTE: The **V3** uses the color spectrum of **RGB** color reference. You can use names of the color fractions.
NOTE: The <u>same</u> layer can be represented by multiple colors which blend the layers.

The Layer Mask



The Map Texture

14. MAP TEXTURE

The ***map texture*** is a skin that covers a terrain as a set of the overlapping segments and represents a terrain surface.
Cutting and overlay of the segments are controlled by a ***satellite grid***.
NOTE: If you experiment with the ***map texture*** and you need to regenerate it often, you may use the suffix **_draftlco,** which causes the binarization to use more fast (but less accurate) conversion of the generated segments to a **PAA** format.
Delete **_draftlco.paa** content from the *Layers* folder if you change suffix of source raster's to **_lco**.
Each ***layer texture*** is represented:

- At close range by a **_co (*color only*)** type and a **_noxx (*normal map*)**.
- At middle range by **_mco** type only.

NOTE: To create the map texture, see the TAGorial
Supported image formats
For an input:

- JPG
- TGA (24 bit / 32 bit with alpha channel)
- PNG (with or without alpha channel)
- PAA
- PAC

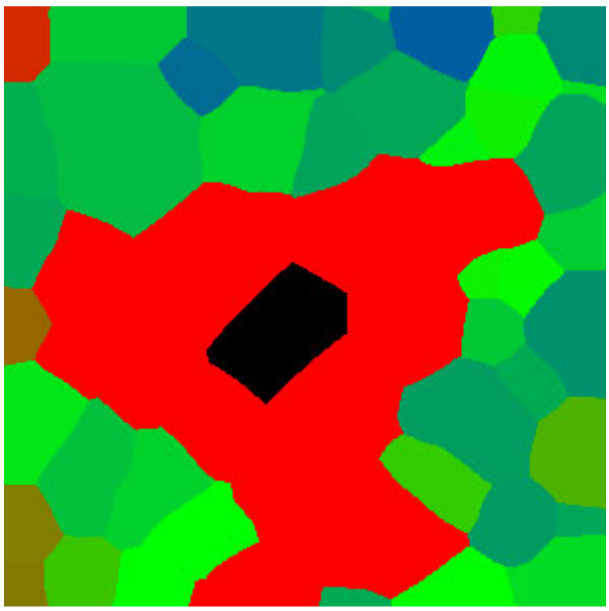
NOTE: All the input images must have resolution $\mathbf{2^n \times 2^n}$ (e.g., 512x512).
Largest size of the image commonly supported by BI's game engines is 2048x2048, in pixels.
In future, a support of 4096x4096 or even larger could be possible. It is already supported in *TexView* 2.

For an output:

PAA/PAC	A format is defined in TexConvert.cfg
TGA	32 bit RGB format with *Alpha* channel
PNG	RGB format with *Alpha* channel

15. LAYER MASK

A ***layers mask*** is a skin that covers a terrain as a set of the overlapping segments and represents a placement of ***layer types***.
A size of a ***layers mask*** would be the same as the size of a ***map texture***.
Each ***layer*** within a segment of a ***map texture*** uses its own color defined in the file **layers.cfg**.
This method of layer defining restricts a segment of the ***map texture*** up to four ***layer types***.
All four ***layer types*** can be blended together within one pixel of the ***layer mask***, ground clutter based upon the dominant ***layer type***.
Each segment of a ***map texture*** can have up to four ***layer types*** placed within it, and each of them uses its own texture material defined in a ***.rvmat** file.
While importing of a ***layer mask***, all the colors convert to four basic ones. Thus, a ***layer mask*** is represented by black, red, green and blue colors. A color conversion is depended on a color priority. In the *Black - Red - Green - Blue* scale, a color priority increases from right to left, so the black color has the highest priority, and the blue color has the lowest priority. This means that the absence of the colors with higher priority will cause the conversion of the colors with lower priority to the colors with a higher priority.
To prevent unwanted conversion of the base colors, you have to provide representation of all the base colors in each segment of a ***layer mask*** using a following color scheme, for example:



NOTE: To create the ***layer mask***, see the TAGorial

16. LAYER DEFINITIONS

16.1 Representing Layer Textures

During import of a ***map texture*** and ***layer mask*** the V3 regenerates a definition of its own texture material for each segment of a ***map texture*** that lists the ***layer textures*** to be used. A position of the ***layer textures*** is defined in a segment of a ***layer mask***, which contains the values of four base colors: **Black RGB (0, 0, 0), Red RGB (255, 0, 0), Green RGB (0, 255, 0), Blue RGB (0, 0, 255).**

Each ***layer texture*** has its own color representation in the ***layer mask***. The colors required for importing a ***map texture*** and a ***layer mask*** **are** set in a **layers.cfg**.

The **layers.cfg** describes the ***layer mask***:

- It defines the ***layer textures*** to be used and their texture materials (**RVMAT**).
- It defines a ***layer legend***
- It defines the color representations

layers.cfg

```
//Textures
class Layers {
  class sand {
    texture = "ca\<your_project>\data\sand_detail_co.png"; //the layer texture
    material="ca\<your_project>\data\sand.rvmat"; //the description of the layer texture
  };
class grass {
    texture = "ca\<your_project>\data\grass_detail_co.png";
    material="ca\<your_project>\data\grass.rvmat";
  };
  class city {
    texture = "ca\<your_project>\data\city_detail_co.png";
    material="ca\<your_project>\data\city.rvmat";
  };
  class bed {
    texture = "ca\<your_project>\data\bed_detail_co.png";
    material="ca\<your_project>\data\bed.rvmat";
  };

};

class Legend {
```

```
    picture ="ca\<your_project>\Source\ layerslegend.png";

    class Colors {
        //Colors must correspond to texture names
            sand  [] = {{255,255,0}};
            grass [] = {{0,255,0}};
            city  [] = {{0,0,255}};
            bed   [] = {{99,55,0}};
    }
};
```

16.2 Segment Overlapping

The segments of a ***map texture*** and a ***layer mask*** overlap on their edges to avoid artifacts caused by texture filtering. This needs to share border on the edges, for example, of 16-pixels.

16.3 Covering Map Texture

On close range the ***map texture*** is covered by the ***layer textures***. Each the ***terrain cell*** can be covered by a hundred (10x10) of the instances of any ***layer texture*** at all. Therefore, actual size of a ***layer texture*** dependents on the size of the ***terrain cell***.

Example:

Given the size of the ***layer texture*** of 1000x1000 pixels:

- if the ***terrain cell*** has the size of 10x10 meters then each the pixel of the ***layer texture*** covers 1 millimeter of the ***terrain cell***
- if the ***terrain cell*** has the size of 15x15 meters then each the pixel of the ***layer texture*** covers 1.5 millimeter of the ***terrain cell***

17. OBJECTS

Object Template Definitions

To define templates you have to insert the natural and artificial **P3D** objects into their own panel:

- *Tools* > *Nature Objects*
- *Tools* > *Artificial Objects*

Depending on the list, in which object is inserted, it will be shown or hidden when a particular filter is turn on/off. Clicking *Add/Browse* button the *.**p3d** objects can be inserted into lists.

In the V3, objects exist as templates defined with name, model, ranges of random orientation and size. In *Nature/Artificial Objects Definition* window, you can change name, set properties and randomization, pitch and facing of an object.

NOTE: The objects have to be deleted from the map before their templates might be deleted from list.

Basic Operations

To navigate around a map:

- One-click MMB - point a cursor (camera) location
- Hold down RMB - pan a map
- Press Ctrl + J - get a cursor (camera) location

To insert objects:

1. Select *View* > *Panel of Objects*
2. Select an object category from the drop down list
3. Select an object
4. One-click LMB on the map

To copy objects:

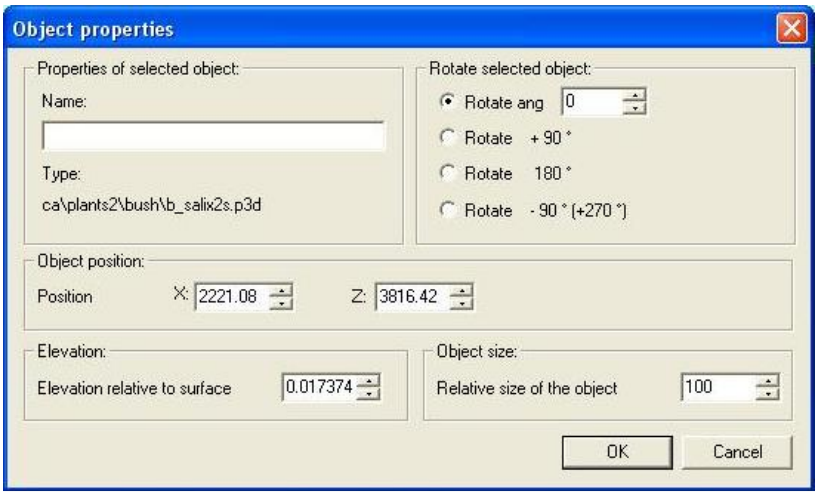
1. One-click LMB on the object
2. Select *Edit* > *Copy* (Ctrl+C)
3. One-click MMB to place the V3 cursor (a white square) on a map where you want
4. Select *Edit* > *Paste* (Ctrl+V)

NOTE: You can copy the object templates from one project into another project:

1. Open a target project
2. Select *Project > Import Templates…*
3. In the *Open* dialog box, browse to a ***.pew** file of a source project and open it. All the object definitions of the source project will have entered into the corresponding lists of the target project.
4. Select again *Project > Open…*
5. In the *Open* box, browse to the ***.pew** file of the source project, you just imported templates from, and open it.
6. In the work window of the source project, select the objects placed on the map you want.
7. Select *Edit > Copy* (Ctrl+C).
8. Go back to the target project: *Project > Open…*
9. In the *Open* box, browse to a ***.pew** file of the target project and open it.
10. One-click MMB to place the V3 cursor on a map where you want.
11. Select *Edit > Paste* Relative (Ctrl+V).
    NOTE: If you copy the objects from the same map as in the target project, and you want that they will be placed at the same location, you need to select *Edit > Paste Absolute* (Shift+V).

To edit objects and areas:

Select object/area	One-click LMB on an object/ area. **NOTE:** If you place the V3 cursor over object and press O key, object will be highlighted and selected in the panel of objects.
Select objects/areas	Hold down LMB and move the mouse over objects/areas.
Add object/area to selection	hold down Ctrl + one-click LMB on an object/area.
Remove object/area from selection	Hold down Shift + one-click LMB on an object/area **NOTE:** You can deselect all the objects by one-click LMB on an empty space.
Move an object	Hold down LMB on the object and move the mouse where you want.
Open *Object properties* dialog box	Double-click LMB on an object. **NOTE:** You can do so by one-click LMB on an object to select it and then press *Enter* key.



To delete objects on the map:

1. One-click LMB on an object
2. Press *Delete* key

Alternative way of object deleting:

1. Start *Buldozer*
2. Hover the V3 cursor (a white box) on the object
3. One-click LMB on this object, the selection arrow (a vertical white arrow) will appear over object.

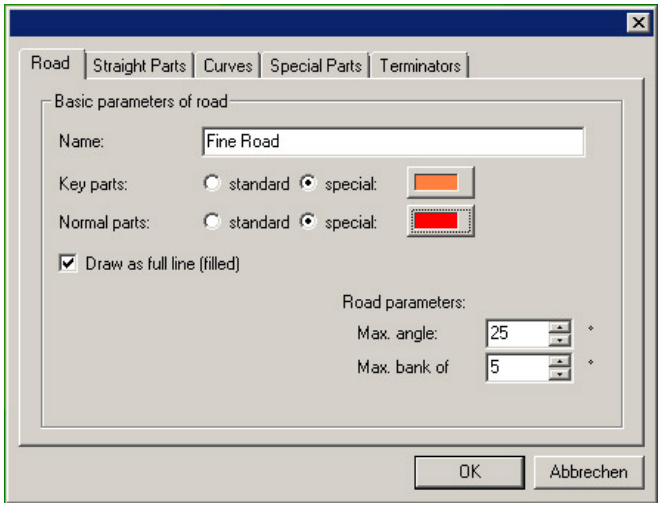
4. Press Alt+Tab keys to switch from the *Buldozer* to the **V3**.
5. Press *Delete* key

To name object selection:

1. Select objects
2. Select *View > Named Selections Panel*
3. One-click RMB in list of selections to open context menu.

To create road type:

1. Select *Tools > Roads...*
2. Click *Add*... button
3. On tab *Road*, name a road
4. On tabs: *Straight Parts*, *Curves*, *Special Parts*, and *Terminators*, add new road parts



On each the tab, click on *Browse* button and navigate to *P:\ca\roads2* to select a road part.

Road extensions

Straight parts	Curve parts	End parts
• _6 • _12 • _25	• _10 25 • _10 50 • _10 75 • _10 100	_konec

To place a road type on a map:

1. In the panel of objects, select *Road networks* item
2. One-click on the map
   - ***Type of key part*** - step 1: select straight part of a list
   - Click the *Next* button
   - ***Key part*** - step 2: select key part
   - Click the *Next* button
   - ***Parameters of key part*** - step 3: *Key part*
   - Click the *Next* button
   - ***Create key point*** - step 4: click the *Finish* button
3. Start a building of a road

18. BULDOZER

The *Buldozer* is a ***real-time viewer*** (**RTV**) which connects with the V3 to render a terrain in 3D space. This is the engine adjusted to operating without a simulation.

18.1 Setup

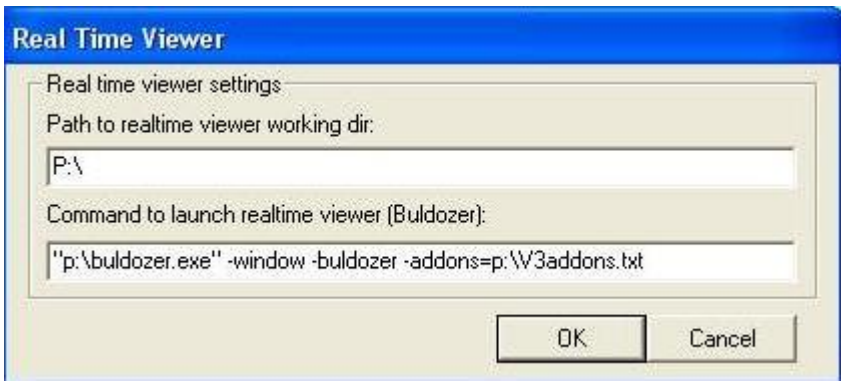
You can customize **RTV**:

1. Run the V3
2. Select *Tools > System Preferences* to set the path to the **RTV** in working directory (**P:**). All the path indications will be relative to this path.
   NOTE: If something does not work, you should check the path.
3. Define the call parameters for **RTV**:
   "P:\buldozer.exe" [-window] –buldozer [-cfg=PathToConfig] -addons=\V3addons.txt
   NOTE: Commands in squad brackets [] are optional. Leave [] away when using these commands.

RTV Parameters:

-window	It starts **RTV** in window mode instead of full screen.
-cfg=PathToConfig	It forces **RTV** to use a certain configuration file. Example: My Documents\ArmA2\ArmA2OA.cfg By default **RTV** uses **Buldozer.cfg** located there, but you may use your own configuration file located wherever you want.
-addons=\V3addons.txt	It contains a list of add-ons and configurations of them that are used when **buldozer.exe** runs in *buldozer* mode. Example: addons[]={"ca\", "ca\data\", "ca\UI\", "ca\UIFonts\"}; **NOTE:** • The path must end with backslash sign (\), otherwise it will be considered as file, not path. • This is referring to unpacked data within your working directory (**P:**), not to ***.pbo** files in game installation. You might get error massages if your content is not unpacked correctly. • The ***.txt** file must be located in the root (**P:**).
-connect=pipe\<pipe_name**>**	It creates and uses named pipe. **NOTE:** It is useful for a debugging. It is possible to not specify the viewer ***.exe**. This tells **V3** it should only create the pipe and listen to any connections on it. Example: -connect=pipe\Visitor **NOTE:** This is useful for the external viewer launching. The options other than this are ignored when it is used.
-maxmem=1024	It defines a memory amount that can be used by the **RTV**.

The default setup parameters of the *Buldozer*: *Tools > System Preferences …*



18.2 Control Customization

To access controls:

- When the **RTV** window is opened, press **F1**
- In the main menu of a game:
  - Choose *Opitons > Controls*
  - *In the Controls* window, in the *Show* drop down list, choose the *Buldozer controls* item.

18.3 Camera Control

To connect the **RTV** to the V3: select *Project > Connect to Buldozer* (CTRL + F7) or click the red exclamation button (!).
NOTE: When the **RTV** is started for the first time or you change any textures (regenerating surface segments, altering objects textures), it will convert **PNG**/**TGA** to **PAA** format. If application does not respond, let it finish its job, do not terminate it.
To disconnect the **RTV** press *Alt+F4* keys.
TIP: To switch between the V3 and the **RTV** press *Alt+Tab* keys.

Camera Controls

Keyboard	Mouse	Description
Insert	-	Switch view
Q/PgUp	-	Upward move
Z/PgDn	-	Downward move
Numpad “0”	-	Reset view
Numpad “2”	-	Downward rotate
Numpad “4”	-	Left rotate
Numpad “5”	-	Look free
Numpad “6”	-	Right rotate
Numpad “8”	-	Upward rotate
Numpad “+”	-	Zoom in relative to the cursor
Numpad “-“	-	Zoom out relative to the cursor
“Arrow UP”	move forward	Self-explanatory
“Arrow DOWN”	move backward	Self-explanatory
“Arrow LEFT”	move leftward	Self-explanatory
“Arrow RIGHT”	move rightward	Self-explanatory

NOTE: To speed an action, hold down the *Shift* + (one of above keys).

18.4 Terrain Editing

S	Switch a selection type (objects/terrain).
H	Show terrain (vertex).
T	Show texture.
U/I	Raise a terrain vertex by 1 m/5 m
J/K	Lower a terrain vertex by 1 m/5 m
F5	Magnetize points
F6	Magnetize plans
F7	Magnetize fixed Y
Space	Select

18.5 Editing in the *Visitor 3*

Select object	Place the cursor over an object and then one-click LMB on it. **NOTE:** If you select objects in *the* **RTV**, they are selected in the V3 and vice versa.
Include object/area into selection	Hold down *Ctrl* key and one- click LMB on an object/area.
Exclude object/area from selection	Hold down *Shift* key and one-click LMB on an object/area. **NOTE:** You can deselect all the objects by one-click LMB on an empty space.
Move object	Hold down LMB on selected object and move a mouse.
Rotate object	Hold down Ctrl + LMB on selected object and move a mouse. In the **RTV** window, hold down RMB on selected object and move a mouse. **NOTE:** A rotation origin is defined by the cursor position.
Up object	• Hold down LMB on selected object, press *Q* key. • Hover the cursor over a selected object, keep the left Ctrl key + LMB, and move the mouse.
Down object	• Hold down LMB on selected object and press *Z* key. • Hover the cursor over a selected object, keep the left Ctrl key + LMB, and move the mouse. **NOTE:** Use *Y* key for European keyboard layout, instead.

NOTE: To get an object view at night or day press *N* key to turn on/off **FLIR** filter, respectively.

18.6 Editing with *Buldozer*

Sometimes, it is necessary to handle edit area. This is done with the V3 in combination with **RTV**.
The 2D-view in the V3 and the 3D-view in **RTV** are synchronized so any changes made in one will be transmitted to the other.
To do so, select *Project > Connect to Buldozer*.
NOTE: Your mouse cursor will disappear when the **RTV** window is appeared.

- Use *Alt+Tab* keys to switch to other windows
- Use *Alt+F4* keys to close **RTV**

When the **RTV** is loaded it will be display an area in the top-left corner of a window, facing north.

19. DATABASE

A project uses its own database of terrain objects. The database is divided into three categories for organization within the V3.
NOTE: These categories have no impact on simulation in a game.
The objects are local to the project. Any object is associated with its **P3D** model and stores additional information for displaying in **2D** such as icon style, and values of the placement randomization.

20. MAP CONFIGURATION

You have to design a configuration file (*config.cpp*) for a terrain:

- In the ***superclass*** *CfgPatches* enter a display name for a terrain that will appear in the menu of the map selection.
- In the *Global Position* section enter **UTM** values for a terrain's north, south, and west extents. These values are embedded into the map correlation and also to set correct values for the grid shown in the 2D.
- Enter the *Geographic Coordinates* for the south west corner in the **decimal degrees (ddd.dddddd)** rather than **degrees minutes, seconds (dd mm ss.sss)**. This is used for simulation of star maps, and sun position based on the current date and your position on the Earth's surface. It doesn't need to be very accurate.
- In the *Surfaces* section you can define up to 4 surface (layer) types for a terrain.
  Give a surface type a name with no spaces or special characters such as: grass, sand, mud, etc.
  Choose colors that will be used to represent a surface type when you create a ***layer mask***.
  NOTE: Each surface needs a unique color.

Select a base surface type to inherit from. Choose the most sensible description.

- A surface type for grass should inherit from *<tag>_land_grass_ **
- A surface type for sand should inherit from *<tag>_land_sand_ **
- A surface type for mud could inherit from *<tag>_land_mud_ **

You can add clutter objects to each surface type. You can edit the clutter characteristics later.
Repeat the steps for each surface type that you want to define on a terrain.
Save the file into the directory: <your_project>\Source\config.cpp.

21. EXPORTING PEW TO WRP

The **WRP** is a file format optimized for ArmA series.
To export **PEW** to **WRP**:

1. Ensure that the *Buldozer* is connected to the **V3** and a terrain is visible in the **RTV** window.
   NOTE: Some data are handled by the *Buldozer* during the exporting.
2. Select *Project > Export World…* and browse to a root of a project folder.
   NOTE: The file must be named the same as the project folder: *tag_project.wrp*.
3. Once the export is complete, you may close the *Buldozer* and the **V3**.

> The ***.wrp** file contains the map itself. It is generated by *Buldozer* along with a *.**hpp** file.
> The *.**hpp** file defines map names and appearance of 2D map symbols in game. In **config.cpp** file, this is included into the ***class*** *Names* via **#include** directive or directly by a designer. The ***Key points*** tool in the **V3** is used to insert those data.

22. EXPORTING OF MAP LAYOUT

To get a data of object placement on terrain, you can export a map as image.
To improve visualization of objects you can do following.

Terrain

1. Select *View > Define configuration...* (CTRL+F)
2. In tab *Colors – height*:
   - Set *Minimal/Maximal ground height* to gradient from white to 50% gray.
   - Set *Color of contours* to some less distinct shade.
   - Set *Elevation interval style* so that waterline could be used as reference for painting coast. It is better to entirely switch off contours or select broader interval of 10-50m.
3. Turn off the drawing features that are not needed such as a grid.

Objects
When selecting vegetation, for artificial shadows of trees or painting of roads, you can use object symbols in the V3.
For better selection of objects in the image V3, e.g. *Photoshop*, it is useful to have same color for an object border and its body:

- *Tools > Nature objects...* – it allows adjust colors of natural objects. You may either choose the same color for all or use different colors for broadleaf and coniferous species. You may also use ellipse instead of rectangle symbol.
- *Tools > Artificial objects...* - it allows adjust colors of artificial objects. You can use a position of artificial objects, especially when painting surfaces in cities. Some objects can be selected (e.g. using script) and added to selection. This allows hiding of object groups regardless of their type.
- *Tools > Roads...* - it allows adjust colors of road types.

22.1 Export Map as Image

1. Select *Project > Export Map as image...*
2. Choose **EMF** type (by default).
3. Save the file into the folder: P:\CA\<project_name>\Source\export\images

NOTE: It is impossible to export image in a big resolution as **BMP** type.
The image resolution should be the same as *Terrain size* plus the size of *Blue Edge*, visible at the left and at the bottom of a map in the V3. Later the *Blue Edge* will be cut out.
A width of the *Blue Edge* has the size of a terrain cell in pixels:
Image size / Terrain grid size = Terrain cell size

22.2 Pre-Processing of Image for Map

You need to convert **EMF** to **PNG** type. In the V3 installation, there is utility **EmfToPng.exe** for the job:

1. Copy this utility into folder containing your ***.emf** file (*Source**export**images*).
2. Select the ***.emf** file and then drag-and-drop it on the **EmfToPng.exe**

NOTE: In the *Photoshop*, you can open the **PNG** image of up to 40960x40960 (in pixels).
The **PNG** image exported would not match a ***map texture*** by size. Therefore, you need to cut out the *Blue Edge* at the left and at the bottom of the image.

23. PACKING ADDON

To pack the terrain into **PBO** file, you need to have the following:

- **config.cpp**
- the header file *.**hpp** (if this content is not directly embedded into the **config.cpp**)
- ***.wrp** file
- All the textures in **PAA** format
- All the *.**rvmat** files

If you use your custom objects, you would pack them and add them to:
%ArmA_installation%\@tag_addon_name\Addons\<your_objects>.pbo.
NOTE: The **BinPBO** utility packs all the contents of an ***addon***. Therefore, keep there only needed files.
Packing Project:

1. In the root game directory, create a mod folder, e.g. **@MyMods**: **%game_folder%\@MyMods**.
2. In the mod folder, create another folder **Addons**: **%game_folder%\@MyMods\Addons**.
3. Open the **BinPBO**: *Start > All Programs > Bohemia Interactive > Tools > BinPBO Personal Edition*.
4. In the ***Addon source directory*** setting, choose the project folder, e.g. **P:\TAG\TAG_MyMap**.
5. In the ***Destination directory*** setting, set the folder, e.g. **%game_folder%\@MyMods\Addons**.
6. Click the LMB on the ***Options*** button.
7. In the ***List of files to copy directly*** setting, delete the ***.wrp** entry.
8. In the ***Path to temporary folder*** setting, set the folder, e.g. **P:\TEMP**.

NOTE:

- If you will pack a project again, the process would take less time than at first one, only changed files are converted.
- The utility ignores some file formats and folder names by default (it does not copy them from a project folder into a temporary one). If you want the files to be packed, you have to manually copy them into corresponding directories within the temporary folder.

9. Uncheck the check box **Use source path**.
10. In the ***Path to project folder*** setting, set the directory, e.g. **P:\TAG**
11. Click the LMB on the **OK** button.
12. Click the LMB on the **Pack** button.
    NOTE: Wait until the ***Ready*** entry appears again at the bottom of the dialog box.
13. After **BinPBO** has finished the **TAG_MyMap.pbo** and **TAG_MyMap.log** files will be placed in the mod folder, e.g. **%game_folder%\@MyMods\Addons**.

24. TESTING ADDON

Add your addon to a game:

- In case the ArmA 2, add it via the shortcut, e.g. **"%game_folder%\arma2.exe" -mod=@MyMods**
- In case the ArmA 2 OA, add it via the **Expansions** dialog box from the **Main** menu, e.g.
- In the both cases, you can use the ArmA launchers.

NOTE: Before placing an addon there, be sure, a game is exited. In the case, a new addon will be found automatically when a game is run.

Testing the map:

1. Start the game
2. In the *Main* menu, press *Alt/Ctrl+E*
3. Select a map
4. Click *Continue*
5. In the mission editor, select *Edit in 3D world*
6. View a terrain, using W/A/S/D keys to move, Q/Z keys to up/down, and RMB to free see.

NOTE: If you cannot see your map in the map selection, a game crashes after you attempt to preview mission on your terrain or you cannot see textures, check all paths in **config.cpp** and ***.rvmat** files in **\Data** folder. Make sure referenced files exist in the specified directories.

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