Master

ArmA II v1.11 & OA/CO v1.62

TERRAIN EDITOR
Visitor 3 Personal Edition for ArmA II
(BI Tools v2.5.1)

The manual assumes that you have to run the terrain editor.
TIP: To access the terrain editor while reading this manual, open the terrain editor then switch between these pressing the left *Alt+Tab* keys.
NOTE: The abbreviations used here:

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

Contents

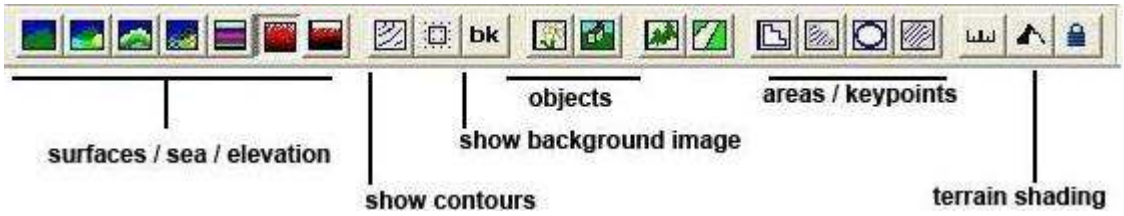
INTRODUCTION

The *Visitor3* is terrain editor delivered *by Bohemia Interactive* studio with deferent package versions:

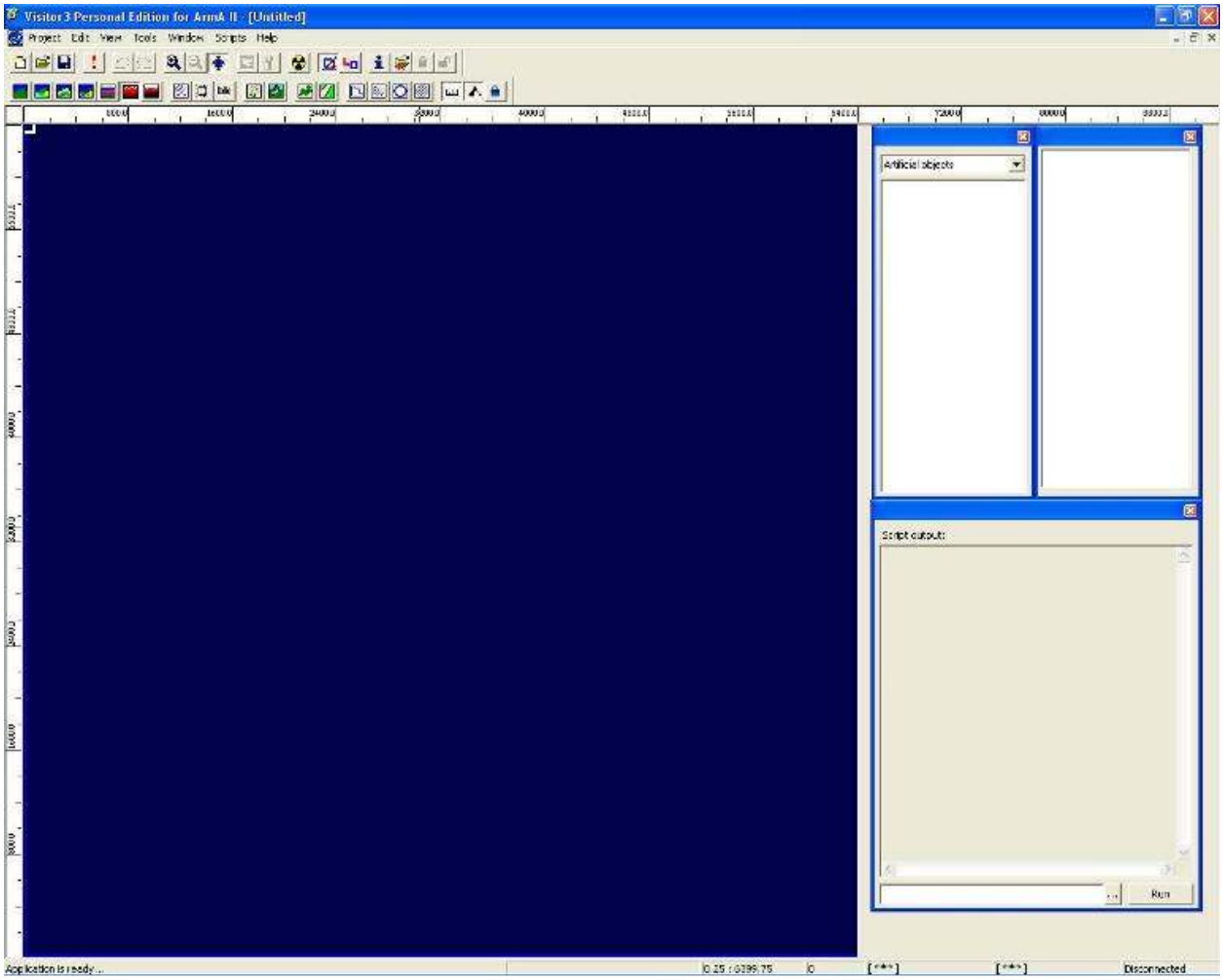
The package versions	BI Games
BI Tools	ArmA (Armed Assault)
BI Tools 2 and BI Tools 2.5	ArmA / ArmA 2
BI Tools 2.5.1	ArmA / ArmA 2 / Operation Arrowhead

1. INTERFACE

Main toolbar



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



2. TOOLS

2.1 Natural Objects

The natural objects are defined here. The *Natural objects* button is used to hide or show them on a map.
To access the natural objects, select *Tools > Natural Objects*
Options:

- ***Add/Browse…*** - the option adds an object, browse the opening list to select the **P3D** model you want to use.
  NOTE: the maximum name length of artificial objects has to be up to 50 characters.
- ***Randomize size interval*** – a model size will be randomly set in the given interval when placed in *Visitor*.
- ***Randomize angle interval*** – a model angle will be randomly set in the given interval when placed in *Visitor*.
- ***Randomize orientation interval*** – a model facing direction will be randomly set in the given interval when placed in *Visitor*.

NOTE: Randomization during insertion occurs as well for objects placed by a script.

2.2 Artificial Objects

The artificial objects are defined here. The *Artificial objects* button is used to hide or show them on a map.
To access the artificial objects, select *Tools > Artificial Objects*

- ***Add/Browse…*** - the option adds an object, browse the opening list to select the **P3D** model you want to use.
  NOTE: the maximum name length of artificial objects has to be up to 50 characters.
- ***Randomize size interval*** – a model size will be randomly set in the given interval when placed in *Visitor*.
- ***Randomize angle interval*** – a model angle will be randomly set in the given interval when placed in *Visitor*.
- ***Randomize orientation interval*** – a model facing direction will be randomly set in the given interval when placed in *Visitor*.

NOTE: Randomization during insertion occurs as well for objects placed by a script.

2.3 Roads

Types and parts of a road are defined here. *Crossroads* are road parts which need to have suitable road types defined for each of their ending direction.
To define a *Road* type:

1. Go to *Tools > Roads…*
2. In untitled dialog, one-click LMB the ***Add***… button
3. In next untitled window, input a road settings
   - *Road* – the tab defines main settings of this road type.
   - *Straight Parts*– the tab defines the straight parts of a road type.
     NOTE: Those parts have a certain length, for example: 6.25, 12.5 or 25 meters.
   - *Curves* – the tab defines the curved parts of a road type.
     NOTE: Those parts have a certain radius, for example: 25, 50, 75 or 100 meters.
   - *Special Parts* – the tab defines parts with special appearance like a T-shape.
   - *Terminators*– the tab defines parts that end a road.
     NOTE: Those parts have the suffix “konec”.
4. One-click LMB on OK button to close the window with road settings
5. One-click LMB on OK button to close the window with defined *Roads* and defined *Crossroads*

NOTE: A name of a new road type will appear within *Road networks* list in *Panel of Objects* toolbox.

2.4 Forests

Contents of a forest are defined here.
To define a forest type:

1. Go to *Tools > Forests…*
2. In *Forests* dialog, 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 forest outline
     - *Color*: standard/special checks – these define a color of forest objects
   - *Forest objects* section – self-explanatory
     - *Square-fill:* – this defines the forest objects within square zone.
     - *Square-:*– this defines the forest objects on borders of square zone.
     - *Triangle (+* – it is unknown.
3. One-click LMB on ***OK*** button to close the *Forest definition* dialog.
4. One-click LMB on ***OK*** button to close the *Forests* dialog.

NOTE: A name of a forest type will appear within *Woods (OFP)* list in *Panel of Objects* toolbox.
The number of forest types, that are used, significantly affects performance (especially the CPU load).

2.5 Project Parameters

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

2.6 Project Preferences

The option defines a path to textures and objects (if these stored in a specific place) and other settings:

- ***Folder – Textures*** field defines a path to the folder where all landscape textures are stored.
- ***Folder - Objects*** field defines a path to the folder where all objects used in *Visitor* are stored.

NOTE: All paths are saved relative in the map, so you have to maintain folder structure.

2.7 Object Manager

There are only two functions.
NOTE: *Visitor* must not be connected to *Buldozer* when using these functions.
In case size of LOD resolution or LOD geometry of a model changed, these functions are useful to give *Visitor* a updated object description or to fix object shifts in vertical axis, including recalculation of all objects to relative elevation to surface =0.

2.8 Replace Objects

The option deletes or replaces all instances of an object (models) from the map.

3. EDITING MODES

3.1 Artificial Objects

To access artificial objects:

1. View > Panel of Objects
2. Select *Artificial objects* (F1) from the drop-down menu
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 roads.

3.2 Natural Objects

To access natural objects:

1. View > Panel of Objects
2. Select *Natural objects* (F2) from the drop-down menu
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 forests.

3.3 Road Networks

To create a key part of road:

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

NOTE: You need to click *Show roads* button on the view toolbar to see created road parts on a map.

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, 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:
  - Deleting or adding 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 section to the road
- *Right Curve* - add the selected right curve section to the road
- *Special* - add the selected special section to the road

3.4 Key points

To access key points:

1. View > Panel of Objects
2. Select *Key points* (F4) from the drop-down menu
3. One-click LMB on the map where you want to place the key point

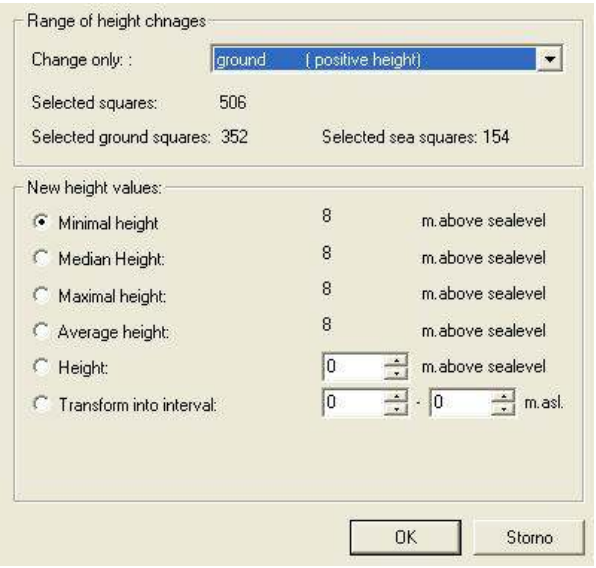
NOTE: Same options as in *Named Zones* editing mode (see below).

3.5 Terrain vertices

To access terrain vertices:

1. View > Panel of Objects
2. Select *Terrain vertices* (F5) from the drop-down menu
3. One-click LMB on the map where you want to place the terrain vertex

Change height…



- *Change only* - show only up when the selection has sea and land points.
  - *ground (positive height)* - only points over sea level will be changed.
  - *sea (negative height)* - only points below sea level will be changed.
- *Minimal Height* - all points will set to the height of the lowest point of selection.
- *Median Height* - all points will set to the median height of selection.
- *Maximal Height* - all points will set to the height of the highest point of selection.
- *Average Height* - all points will set to the average height of selection.
- *Height* - all points will set to this height.
- *Transform into interval* - take the current height profile of selection and stretch it into the given interval.

Erosion:

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

3.6 Background Images

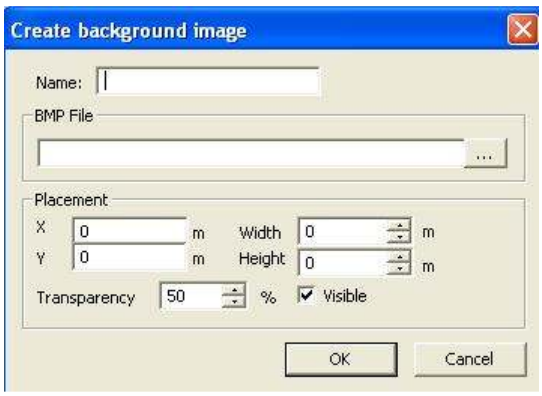
To access background images:

1. View > Panel of Objects
2. Select Background images (F6) from the drop-down menu

NOTE: Only BMP format is supported.

To set the background image In the *Create background image* dialog:

1. Choose ***.bmp** file.
2. Set coordinates X and Y for top left corner
   NOTE: For the image covering whole map, set both to 0.
3. Set *Width* and *Height* of the image.
   Example: If the map is e.g. 10240x10240 meters and the image covers whole area, set *Width* and *Height* sizes to 10240.
   NOTE: You can use a few smaller images together to cover whole area, if the coordinates and sizes are set correctly.



3.7 Named Zones

To access named zones:

1. View > Panel of Objects
2. Select Named zones (F7) from the drop-down menu

To name a zone one-click LMB on the selection box.
Options:

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

3.8 Named objects

To access named objects:

1. View > Panel of Objects
2. Select Named objects (F8) from the drop-down menu

Option:

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

3.9 Surfaces (OFP)

To access *OFP* surfaces:

1. View > Panel of Objects
2. Select Surfaces (OFP) (F9) from the drop-down menu

Options:

- ***Terrain type*** – the type of selected terrain.
- ***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 current texture on selected area.
- ***Set surface onto area*** - set current surface on selected area.
  NOTE: The textures are set according to their probabilities.
- ***Set terrain onto area*** - set current terrain on selected area.
  NOTE: The surfaces are set according to their definition. The same for the textures.
- ***Change texture onto area*** - change texture in area to current selected texture.
- ***Texture Analysis…***

3.10 Woods (OFP)

To create/edit *Woods (OFP)*:

1. Go to *View > Panel of Objects*
2. Select *Woods (OFP)* (F10) from the drop-down menu
3. Drag a selection box on a map where you want place forest.
4. One-click LMB an *Area forestation* button.
5. In *Create forest* dialog, set up follow:

- *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 to close the *Create forest* dialog.

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

4. SCRIPTS

Visitor 3 allows you to use scripts. Script files have the extension **.VIS**. For all commands see the *Visitor Script Command Reference*.

5. PROJECT STRUCTURE SETUP

It is important to store a project in the correct location.
P:\CA\ < project_name> folder
The naming of the project folder matches convention is *tag_projectname*:

- The "tag" should be a short term which refers to you.
- The "project name" is a term that describes the current project.

The folder name should have no spaces or special characters, and only one underscore between the tag and project name.
This naming convention must be adhered to for all the add-ons that you create, not only for maps.

1. Unpack content of **buildings.pbo, misc.pbo, plants.pbo** and **rocks.pbo** into **P:\CA** directory (by default) in order to be able to work with data in the real-time viewer *Buldozer*.
   NOTE: Do not the same with **roads.pbo** such as *ODOL* road model is not suitable for use in *Visitor*. Instead, use the *MLOD* road model supplied with the *BI Tools*.
2. Create directories:
   - P:\CA\< project_name >
   - P:\CA\< project_name >\Data
   - P:\CA\< project_name >\Source
3. Place in *P:\CA\< project_name >\Data* folder your surface texture files (the suggested format):
   - the textures <maptag>_<texturename>_detail_co.png.
   - the normal maps for the textures <maptag>_<texturename>_detail_nopx.png.
   - the image of map project ui_selectisland_<mapname>_ca.png
   - the files <texture_name>.rvmat (for *ArmA II series*)

When *Bulldozer* is first start, it creates the *Layers* folder In directory P:\CA\< project_name >\Data.
This folder contains

- segments of the surface map ("satellite map")
- segments of the layer mask
- the ***.rvmat** files for each segment of the surface map (for *ArmA II series*)

generated by *Visitor*

4. Place in *P:\CA\< project_name >\Source* folder the following
   - Your reference file **layerlegend.png**
   - Your surface map ("satellite map") **sm_<map_name>_lco.png** (the suggested format).
   - Your layers mask **lm_<map_name>_lca.png** (the suggested format).
   - Your file **layers.cfg**
5. Create directory P:\CA\< project_name >\Source\Terrain
6. Place in the *Terrain* folder your source map files, for example, a high map ***.xyz**.

6. PROJECT SETUP

1. Go to *Project > New (CTRL + N)*

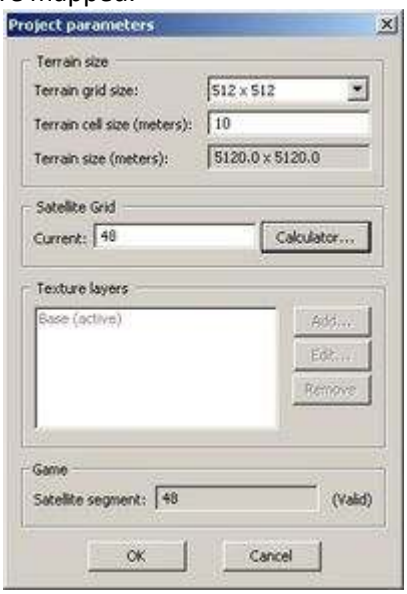
Project parameters dialog:

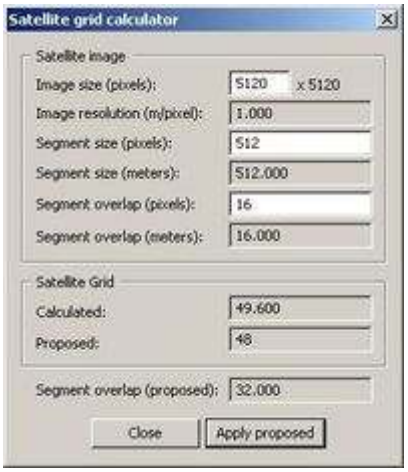
- *Terrain grid size* (elevation vertices).
- *Terrain cell size (meters)* is distance between the elevation vertices in **X** and **Y** axis.
- *Terrain size (meters)* = *Terrain grid size* x *Terrain cell size*. The result is calculated automatically.
- *Calculator* button.

Satellite grid calculator dialog:

- *Image size (pixels)* is corresponding to size of your surface (so called "satellite") map.
- *Image resolution (meters/pixels)* = *Terrain size* / *Image size*. The result is calculated automatically.
- *Segment size (pixels)*
- *Segment size (meters)* = *Segment size x Image resolution*. The result is calculated automatically.
- *Segment overlap (pixels)*
- *Segment overlap (meters)* = *Segment overlap x Image resolution*. The result is calculated automatically.
- *Calculated (cells)*: = (Segment size (m) - Segment overlap (m)) / Terrain cell size (m). The result is calculated automatically.
- *Proposed*: = The result is calculated automatically.
- *Segment overlap (proposed)*: = The result is calculated automatically.

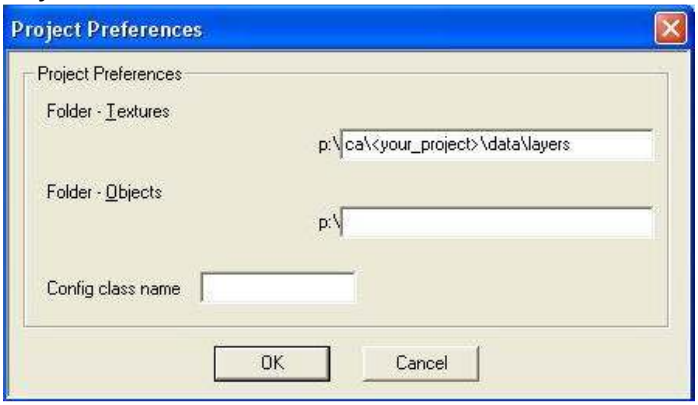
2. Press *Apply proposed* and *Close* buttons.
3. Set 40 x 40 meters value in *Texture Layers*. It is the size of square into which the detailed textures are mapped.





(See *Making Satellite Texture and Mask*)

4. *Tools* > *Project Preferences*.



Folder - Textures field:
Specify path to folder, into which
- The surface map ("satellite map") segments,
- The layer mask segments,
- The files <texture_name>.rvmat (*ArmA II series*)

will be generated by *Visitor***.**

5. Click *OK* button.
   NOTE: This setting is important for importing the surface map ("satellite map") and the layer mask.
   NOTE: Textures may be generated to different folder and packed into separate **PBO** file.
6. *Project > Save as* **<your_project>.pew** into **P:\CA\Source** (by default).

6.1 Terrain Size and Grid

Before starting up *Visitor*, the first step is to determine your map planning values.
There are five values that need to be locked in before you continue.

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

We can figure out the first three values by balancing this equation:
Terrain grid size x Terrain cell size = Terrain Size
The only limit here is that the *Terrain grid size* must conform to the sizes allowed by *Visitor*.
This can be 16, 32, 64, 128, 256, 512, 1024, 2048 or 4096 vertices.
Example:

512 vertices x 50m = 25,600m 1024 vertices x 10m = 10,240m 2048 vertices x 25m = 51,200m

Once we have chosen terrain size we can also plan the satellite image resolution. This can depend on the quality of your satellite image, and should be 1, 2, 4, 8, 16, or 32 m/px. You need to be aware of how large this final satellite image will be, which so Terrain size / Image resolution = Satellite Image.
It is recommended 25000px as an upper limit. The processing times for an image this large can be quite long, and the resulting PBO add-on file size can be over 1GB.
Examples:

10240m ÷ 1m/px = 10240px 51200m ÷ 4m/px = 12800px 25600m ÷ 8m/px = 3200px

These five planning values should be marked down somewhere and saved as they will come up again at various times during the map creation process.

7. TERRAIN EDITING

You have several ways to edit your height map:

- ***Manually* (like "Surfaces (OFP)" (F9))** - you change each of vertices individually.
- ***Import templates* (Project > Import Templates…)**
- ***Import a height map* (Project > Import Terrain from XYZ)** - ASCII file format containing space delimited X Y Z on each line, where XY is UTM and Z is in meters.
  NOTE: During import you can align data to top or bottom left and set target data dimension to crop data or extend area.
- ***Import PNG Image* (Project > Import from Picture)** - import 8 / 16 bit PNG image
  NOTE: PBL *config* must be present (it's created automatically when you export PNG file in the same location).
- In *Buldozer* (see below)

NOTE: for import terrain operation (and any other large scale operations like this) it's recommended to disconnect *Buldozer* otherwise it takes really long time to process the map.

8. TERRAIN IMPORT

Visitor allows you create the terrain yourself but it allows you import one.
Existing locations can be recreated in *Visitor* provided the correct *GIS* data.
Typical source data includes:

- DTED or DEM elevation data
  NOTE: *Visitor 3* can't import of DEM files. But you can convert DEM files to XYZ files using third party software. This topic is not the subject of this manual, so it will be described separately.
- Vector data (VMAP or ESRI shape files) for roads, vegetation, and buildings
- **GeoTiff** or similar bitmap surface image

Before it can be used by the *Visitor*, source data needs to be cropped to the area of interest and changed into the following formats:

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

Formats of imported files:

1. ***.xyz** (the high map). It is created by special software, the high map generators.
2. ***.png** (the terrain image) with ***.pbl** file (the terrain parameters). They are created by Visitor when it exports a terrain into picture.

Import of ***.png** file with ***.pbl** file:

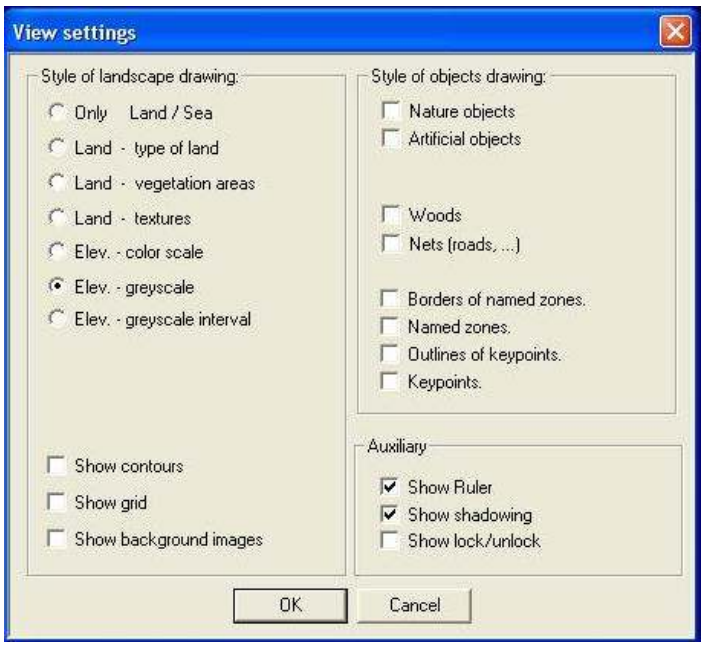
- *Project* > *Import Terrain from picture*.
- browse **CA\<your_project>\Source\Terrain**
- select and open **<your_terrain>.pbl** file
  NOTE: The **<your_terrain>.png** have to be in the same folder, for ***.pbl** file points to it.

Import of ***.xyz** file:

- *Project* > *Import Terrain from XYZ*.
- browse **CA\<your_project>\Source\Terrain**
- Select and open **<your_terrain>. xyz** file

TIP: ***Visitor*** can also export terrain to **PNG**, using menu *Project > Export Terrain into picture...*
Sometimes it is handy to make raw terrain in *Visitor* and later smooth or alter in some raster editor.

- Click *Show contours* icon
  NOTE: You can change contour range using ***Actual preferences*** tool, where it's possible to set both contour interval and minimum contour (in meters).
  Colors of sea, terrain elevations and contours can be set in
  View > *Define configuration* > *Colors - height* tab.
  Visible terrain elements can be set in *View* > *View settings* or directly by the buttons in main toolbar.



The surface map ("satellite map") **and layer mask import**

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

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

- surface map **sm_<map_name>_lco.png**
- layer mask **lm_<map_name>_lca.png**
- file **layers.cfg**
- **mapLegend.png** file (not necessary to alter this file in other projects)

NOTE: In ***Data*** folder these files for each texture should be prepared:

- <maptag>_<texture_name>_detail_co.paa - a detailed texture with normal map together replaces the surface map and MCO map segment on close range;
- <maptag>_<texture_name>_detail_nopx.paa- normal map for detailed texture
- <maptag>_<texture_name>.rvmat
- <maptag>_middle_mco.paa - an optional map segment replaces the surface map on middle range.

These surfaces have corresponding definition of so-called clutter (grass, plants or stones) generated automatically on respective surface by the game engine, unless the surface is overlaid by some model's Roadway **LOD**.

To import:

1. *Tools* menu > *Import satellite & mask* command
2. The *Select layer configuration file* dialog: In the *Source* folder select **layers.cfg** file and press *Open* button.
3. *Rvmat selection* dialog: In the *Save .rvmat files as:* field **Binary** default value. Press **OK** button.
4. *Select satellite map* dialog: Select surface map and press **Open** button.
5. *Select layer mask* dialog: Select layer mask and press **Open** button.

The *Importing Satellite Data* box will display the import progress. After import, you should see *Layers* folder in the directory **P:\CA\<your_project>\Data**. The surface map segments and layer mask segments **(*.png)** and *.**rvmat** files for every surface map segment are stored in this folder.

NOTE: It is not necessary to delete its content when you regenerate the segments. *Visitor* is capable to regenerate and replace only changed segments. All the new ***.png** files should 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. COMPILING TERRAIN

You need to compile and test the map for the first time, to verify that everything is working properly so far. This will only include surface map, elevation data, and a layers mask to define detail textures and clutter, and will include only a basic introduction to the most important features of *Visitor 3*.
Visitor 3 reads XYZ elevation data (see XYZ Height field).

1. Start Visitor 3: *Start > All Programs > Bohemia Interactive > Tools > Visitor 3*
2. Start a new terrain with the XYZ. Choose Project > Open. Change the file type to XYZ then browse to your project's source folder to find the XYZ height map.
3. It can take some time to process the file, and then a dialog will pop up and display information about the XYZ file. Ensure that the properties displayed exactly match your planning values. If they don't, something is wrong and you will have export a new XYZ height map with correct values. Click OK and a new terrain project will be started.
4. Immediately save the project to

P:\CA\tag_projectname\source\tag_projectname.pew

NOTE: If you use the *Save As* command instead of just *Save*, you will need to manually type the PEW extension at the end of the filename or it will save a file without any extension.

10. SETTING UP PROJECT PREFERENCES

Project preferences tell *Visitor* where to store all the data it will create when it processes the satellite and mask image. It is critical to set this before importing any imagery.

1. Tools > Project Preferences. There are three blank fields, and you only need to edit the first one, leaving the other two blank.
2. Insert the path CA\tag_projectname\data in the first field.
3. Save the PEW.

11. SETTING UP PROJECT PARAMETERS

The project parameters dialog controls the underlying construction of the map and must be set up correctly for each map project based on:

- terrain size,
- satellite texture size,
- Terrain grid resolution.

If you are setting parameters for a terrain that was imported from XYZ, the first section for terrain size will display the XYZ properties and will not allow you to change any values.

1. Find the texture layer list in the bottom section, and look for the entry called *Base (Active)*. Select it, then, click the Edit button and ensure that the texture size is 50m or the next lowest value. The options will always be multiples of your terrain the grid spacing, so if your terrain grid spacing is 8 m, your options will be 8, 16, 32, and 64. In this example, 32 fits the rule.
2. In the middle section, click the *Calculator* button to open the satellite grid calculator.
3. Enter your “satellite image” size in pixels into the first field. The other two values, *Segment size* and *Segment overlap* should both remain at 512 and 16 pixels respectively.
4. You will see a calculated and proposed *Satellite Grid* value. Click *Apply Proposed* (nothing visible happens) and then *Close*.

NOTE: The *Satellite Grid* value is now set correctly.

5. Click *OK* to exit the *Project Parameters* dialog.
6. Save the PEW.

12. SURFACE MAP AND LAYER MASK

Once your preferences and parameters are set, and the PEW is saved, you can import satellite and mask images for processing. *Visitor 3* will use the *Satellite Grid* value you applied in the *Project Parameters* dialog to cut the large images into small tiles that conform to Direct X image size rules and will allow texture streaming.

1. Go to *Tools > Import Satellite + Mask…*

NOTE: Ensure that you start in the correct project's source subfolder. Browse back a few steps to ensure you are in the right project before selecting the layering file.

2. Select the **layers.cfg** for your project and open it
3. In rvmat selection dialog, check *Text* option (if you want to reserve ***.rvmat** files for editing) and click *OK* button
4. In Select Satellite Map window, select ***.png** file and open it
5. In Select Layer Mask window, select ***.png** file and open it
   NOTE: The import process can be very time consuming because of the huge amount of data being processed. Therefore tune your surface with small map first and If you are satisfied with the results, proceed with the large map. The progress bar might halt in some circumstances but allow it to continue working. You can monitor actual progress by looking into your project's data\Layers subfolder where *Visitor 3* is storing all of the tiles that are being created.
6. When the processing is done, the progress bar will disappear.
7. Save the ***.pew** file.

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

13. PREVIEWING TERRAIN WITH REAL TIME VIEWER (BULDOZER)

Once process has finished you can view the map in *Buldozer*.

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

1. Launch *Buldozer* from Visitor's menu, *Project > Connect To Buldozer*.
2. When *Buldozer* starts, it will call other utilities that will convert any PNG images to Direct X compressed file formats, which are saved with a **PAA** file extension.

NOTE: Depending on the size and resolution of your satellite data, this can take between 10 minutes and 3 hours.

When all the processing is complete, the command prompt window will disappear and you will be able to see your terrain in *Buldozer*.

The initial view in *Buldozer* will be displaying an area in the far northwest corner of your terrain, facing north. You might notice some badly matched or stretching satellite textures but this is normal since it is outside of the actual terrain area. To see your actual map area, rotate the camera in *Buldozer* with Numpad “4” or “6” and turn the camera around. In *Visitor* you can also click with the middle mouse button anywhere in the map to move the camera position in *Buldozer*.

14. SURFACE REPRESENTATION

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

- Surface Map (“Satellite Map”)
- Layer Mask

PNG format is used for both textures. Both textures are split into segments when imported to *Visitor*. Each *layer mask* segment is converted to 4 full colors during the process. Each segment overlaps its neighbors.

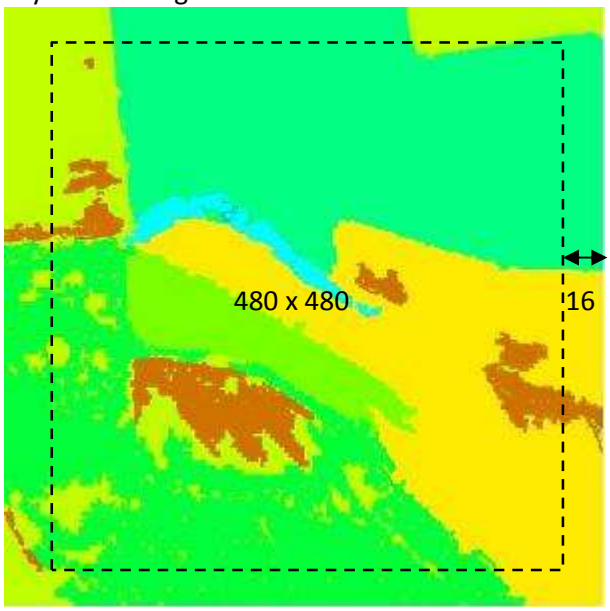
The *surface map* provides the basic color information for displaying terrain on far range. As terrain can be visible beyond the range that objects are, representations of objects are all included on the *surface map*.

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

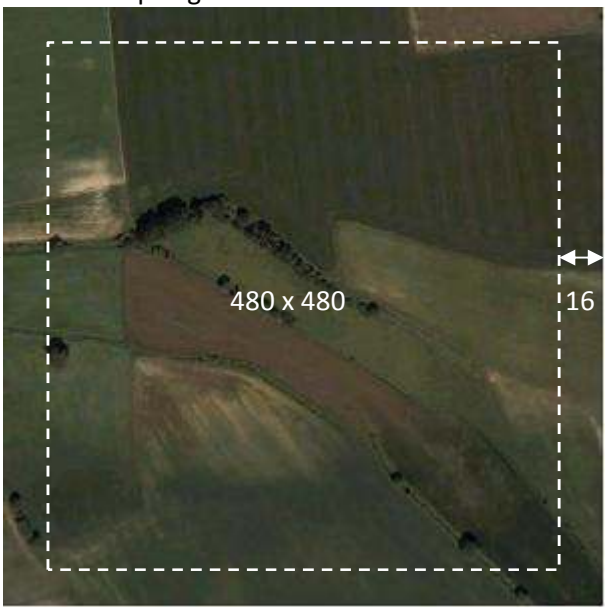
The *layer legend* is accompanied with a configuration file, defining conversion from RGB to layers. Configuration file defines which color represents a layer.

Examples for the layer mask segment and the corresponding surface map segment. Both segments are 512 x 512 pixels in amount:

Layer Mask Segment



Surface Map Segment



Layer mask is processed as an RGB image. Each pixel of the map image is interpreted as follows:

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

Editing cycle: (editing is usually done in Photoshop)

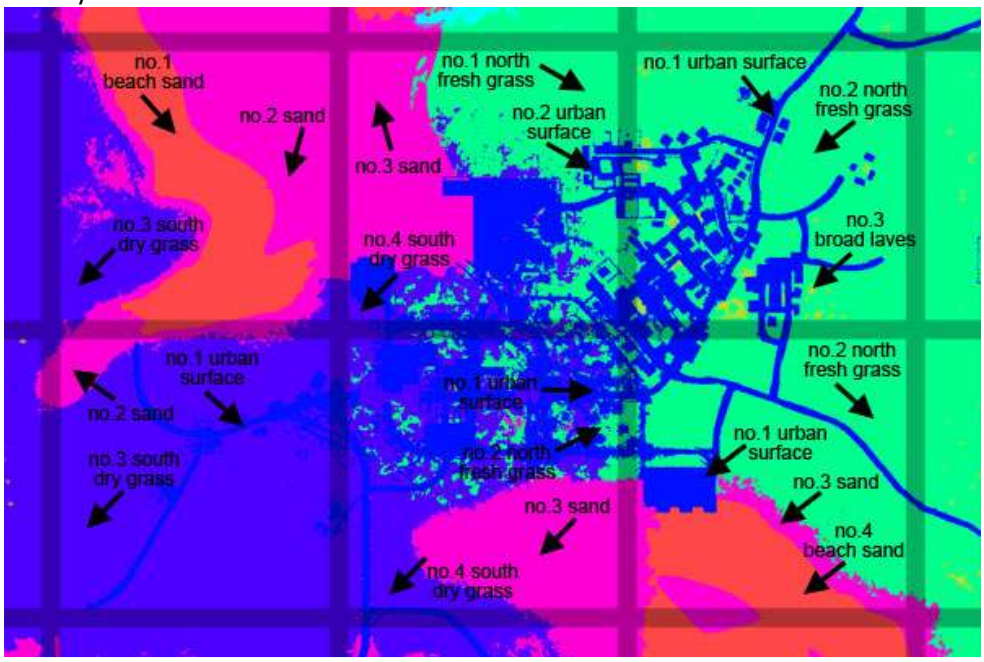
1. Edit a *surface map* in Photoshop (sm_lco.png).
   NOTE: You need to use either a texture type **_lco** or **_draftlco**.
2. Edit a *layer mask* in Photoshop (lm_lco.png).
   NOTE: You need to use either a texture type **_lco** or **_draftlco**.
3. *Tools > Import Satellite + Mask*,
4. Select **layers.cfg**
5. Select sm_lco.png
6. Select lm_lca.png
7. Run *Buldozer* to check the result

15. LAYERS LEGEND

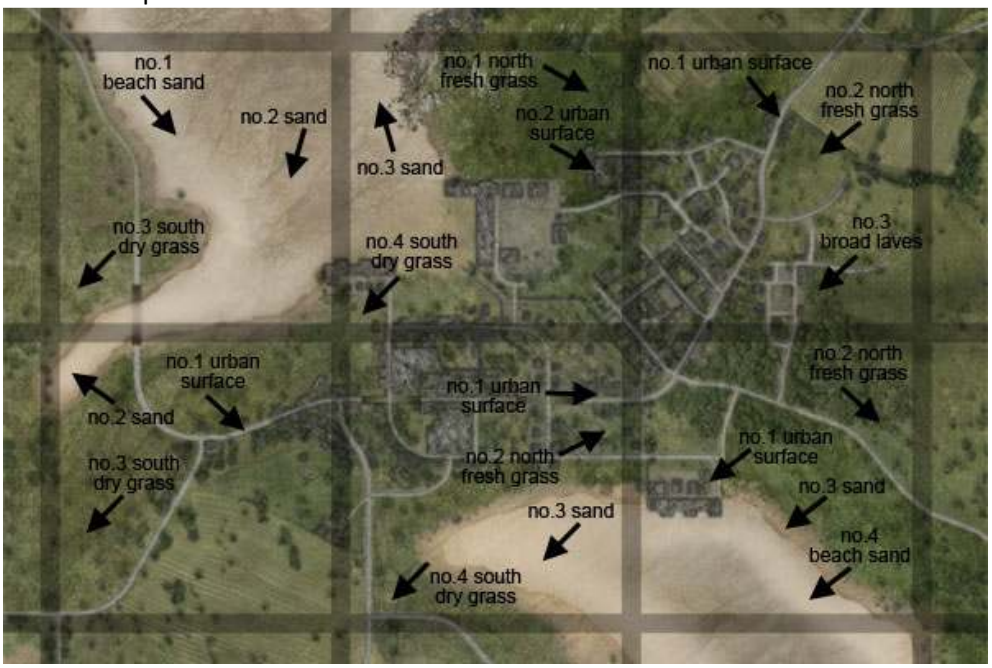
Visitor uses **layerslegend.png** as **RGB** reference for a layer mask.
Example of a layer legend, it can be created using gradient in *Photoshop*.

NOTE: ***Visitor*** uses the color spectrum of **RGB** reference. You can use names of the color fractions.
NOTE: The same layer can be represented by multiple colors which blend the layers.

Example of the layer mask



Example of surface map



16. SURFACE MAP

Surface map is a big texture mapped onto terrain as a group of overlapping segments. Their cutting and overlay is controlled by value of *Satellite grid* in the *Project Parameters* box.

To prepare the surface map use a **PNG** picture of the same size which has been input for the *Satellite Grid* calculation.

TIP: If you experiment with the surface map and you need to regenerate it often, you may use **_draftlco** suffix which causes the binarization to use faster but less accurate conversion of generated segments to **PAA** format.

Delete **_draftlco.paa** content of *Layers* folder when you change suffix of source raster's to **_lco** suffix.

Each texture is represented:

- At close range by a **color only (_co)** texture type and a **normal map (_no**)**.

- At middle range **_mco** texture type only. This is a greyscale texture that is multiplied with the *surface map*.

17. LAYER MASK

Size of the layers mask should be the same as the size of the surface map.
TIP: It is optimal that you produce the layer mask using the surface map copy. You should follow the gradient depicted in **layerslegend.png**.
The colors in layers mask should be discrete to avoid any artifacts on surface map. You need to use only 4 colors on each single segment of the layers mask. It is because of the color conversion of the layers mask segments into 4 full **RGB** shades (**black, red, green, blue**).
NOTE: It is better to first fit the layer mask with just 4 colors (black, red, green, and blue). After segmentation you can add other colors to each layer mask segment so as you will know where they are cut. You need to add colors so that within single segment will be up to 4 colors generally and the added colors are not like to these that already are on segment.
For game engine use, each layer mask segment uses its own palette that is unrelated to the *layer legend*.
Each layer within a surface map segment uses a color based upon the order in which the layers are defined in the configuration file.
Colors are used in the following order:

- Black (000000),
- Red (FF0000),
- Green (00FF00),
- Blue (0000FF).

This method of defining layers restricts each *surface map* segment to a maximum of four different layer types. All 4 layer types can be blended together within one pixel of the *layer mask*, Ground clutter appears to be placed based upon the dominant layer type.
There are several **RVMAT** configurations for each segment, each defining a *PixelShaderID*.
Each combination of layer types within each of the satellite grids within single segment requires its own **RVMAT**.

18. SURFACE DEFINITIONS IN layers.cfg

18.1 Representation of surface types by a layer mask

Visitor during import of surface map and layer mask regenerates its own material definition for each segment it cuts and processes. It lists the detail textures to be used; the position is defined in the layer mask segment. The layer mask segment contains only discrete values of 4 basic RGB colors:

- Red RGB 255,0,0
- Green RGB 0,255,0
- Blue RGB 0,0,255
- Black RGB 0,0,0

Composition of the layers within each of the layer mask segments may differ. If the layer mask should be edited as a whole then there must be more than these 4 basic RGB shades present on the surface map for representation of all the layers.
Each material has its own **RGB** values, which are used in the layer mask. These **RGB** values must be set for every layer in **layers.cfg**, which is required for importing the surface map and the layer mask in *Visitor*.
RGB values in **layers.cfg** must correspond to shades used in the layers mask.
Class <texturename> defines a texture images and them own sets of the detailed textures.
The configuration file describes the layer mask. It defines what layer legend is used, and it also defines materials for surface.

```
//Textures
class Layers
{
  class sand
  {
    texture = "ca\<your_project>\data\sand_detail_co.png"; //the texture image
    material="ca\<your_project>\data\sand.rvmat"; //the detailed textures
  };

  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}};
  }
};
```

18.2 Overlapping of the surface map and the layer mask segments

The segments must overlap on their edges to avoid artifacts caused by texture filtering. This needs to share border on the edges, for example, 16-pixel. It is important to watch the extent and number of layers in segments, especially where there are more surfaces combined on area of few segments. You need to keep the extent of layers, which are not present on both adjacent segments, outside the shared borders in order to avoid strange interpretation of the layer mask during the segment generation.

19. OBJECTS OF MAP EDITOR

Inserting objects into the list - object template definitions

You need insert the nature and artificial objects into the corresponding panel:
Tools menu > *Nature Objects /> Artificial Objects*. Depending on the list in which model is inserted, it will be hidden or shown when particular filter is activated, and there is no other functionality in this classification. Objects (*.**p3d**) can be inserted into lists by clicking *Add/Browse* button. In *Visitor* objects exist as object templates defined by their template name, model, ranges of random orientation and size on insertion.
In *Nature / Artificial Objects Definition* box, it is possible to change name, draw properties and size of randomization, pitch and facing of selected object.
NOTE: Deleting object templates from list are possible only if those objects have deleted in the map.
Navigation over map:

- One-click MMB - point the cursor location.
- Hold down RMB - pan a map.
- Press Ctrl + J - get the cursor location.

Inserting objects into the map:

1. *View* > *Panel of Objects*
2. In untitled box select the category of objects from drop-down list then select object
3. One-click LMB on the map.

Copying objects:

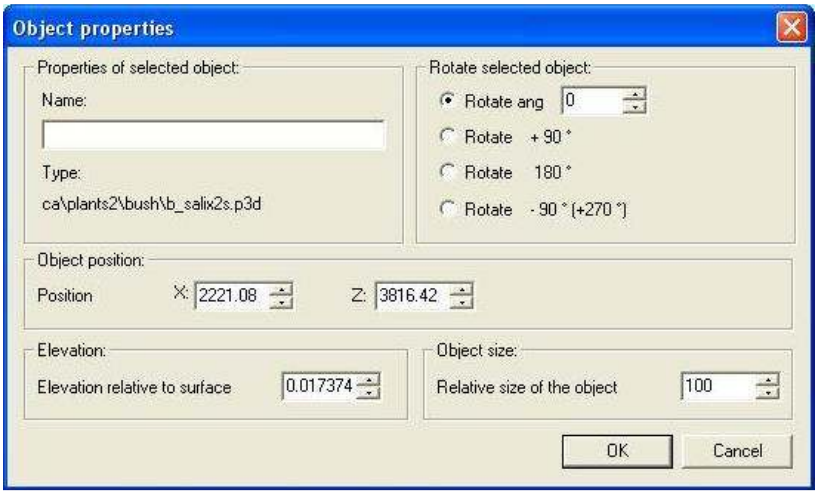
1. One-click LMB on the object to select him
2. Menu *Edit* > item *Copy* (Ctrl+C)
3. One-click MMB to place the editor cursor on a map where you want place the copied object
4. Select *Edit* > *Paste* (Ctrl+V)

NOTE: You can copy objects to target project from a source project:

1. Open a target project
2. Go to *Project* > *Import Templates…*
3. In box *Open*, browse to a ***.pew** file of the 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. Go to *Project* > *Open…*
5. In box *Open*, 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 objects placed on the map, you want
7. Select *Edit* > *Copy* (Ctrl+C)
8. Go back to target project: *Project* > *Open…*
9. In box *Open*, browse to a ***.pew** file of the target project, and open it.
10. One-click MMB to place the editor cursor on a map where you want to place the copied object.
11. Select *Edit* > *Paste* Relative (Ctrl+V)
    NOTE: If you copy objects from such a map what is in the target project, and want that they will place at the same location, then you need to select *Edit* > *Paste Absolute* (Shift+V).

Editing objects and areas on the map:

1. One-click LMB on an object/ area - select object/area
   TIP: If you place mouse cursor over object and press O key, object will be highlighted and selected in panel of objects.
2. Hold down LMB while move the mouse over objects/areas - select objects/areas
3. Hold down Ctrl + one-click LMB on an object/area - including object/area to selection
4. Hold down Shift + one-click LMB on an object/area - excluding object/area from selection
   NOTE: You can deselect all the objects by one-click LMB on a map
5. One-click LMB on an object to select it then hold down LMB on this object and drag the mouse – move an object
6. Double-click LMB on an object - open *Object properties* dialog. You can do the same by one-click LMB on an object to select it then press *Enter* key.



Deleting objects on the map:

4. One-click LMB an object on the map
5. Press *Delete* key

Alternative way to delete object:

- Start Buldozer
- Hover editing cursor (the white box) on the object.
- One-click LMB on this object, the selection arrow (the vertical white arrow) will appear over object.
- Press Alt+Tab keys to switch from *Buldozer* to *Visitor*.
- Press *Delete* key

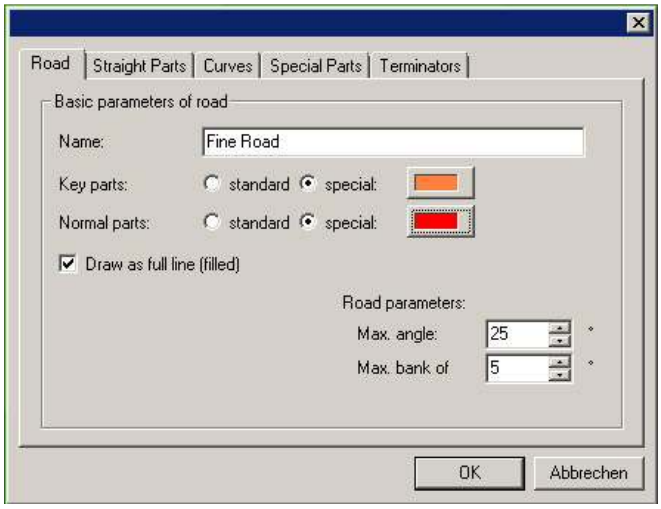
Named selections

When objects are selected, it is possible to name this selection.

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

Creating roads

1. *Tools > Roads...* item
2. Click *Add*... button
3. On tab *Road*, name a road
4. On tab *Straight Parts*
5. On tab *Curves*
6. On tab *Special Parts*
7. On tab *Terminators*



Then go through all the categories like "Straight parts", "Curves", etc. and add new road parts. Once a category is selected, click on "*Browse*…", navigate to "P:\ca\roads2" and select **asf1_6**.
Road extensions

Straight parts	Curves	Ends
• _6 • _12 • _25	• _10 25 • _10 50 • _10 75 • _10 100	_konec

1. Select *Road networks* from the panel of objects
2. One-click on the map
   - ***Type of key part*** - step 1: Select *Straight part of > Next*
   - ***Key part*** - step 2: *Select key part > Next*
   - ***Parameters of key part*** - step 3: *Key part > Next*
   - ***Create key point*** - step 4: Press *Finish*
3. Start building your road

Buldozer has the habit of crashing if new content is added to the Panel of Objects, so make sure to set up all the objects you want to use before starting *Buldozer* on big island projects where loading the terrain in Buldozer takes 5-10 minutes.
Now add some stuff like roads, buildings, bushes to the terrain. Use Buldozer to fine-tune.

20. EDITING IN BULDOZER

Buldozer is a real time viewer which connects with *Visitor* to give you a 3D render of your terrain area. This is really just the rendering engine operating without any simulation.

20.1 Setup Customization

You can customize bulldozer.exe:

1. Run *Visitor*
2. *Tools > System Preferences* to set the path to the **real time viewer (*Buldozer*)** in working directory (standard is **P:**). All path indications will be relative to this path.
   NOTE: If something does not work as expected you should check there first.
3. Define the call parameters for *Buldozer*:
   "P:\bulldozer.exe" [-window] –buldozer [-cfg=PathToConfig] -addons=ArmaAddons.txt
   NOTE: Commands in squad brackets [] are optional. Leave [] away when using these commands.

   Parameters:
   -window – the parameter starts Buldozer in window instead of full screen mode.
   -cfg=PathToConfig – the parameter forces Buldozer to use a certain configuration file.
   For example: C:\Documents and Settings\<user_name>\My Documents\ArmA2\ArmA2OA.cfg
   By default *Buldozer* uses **Buldozer.cfg** located there, but you may as well use your own configuration file located wherever you fancy.
   -addons=ArmaAddons.txt – the file containing list of add-ons which are used when arma2oa.exe runs in Buldozer mode. Particularly useful for UI elements required for your work in Buldozer (the arrow marker, the box cursor), as well as for other unnecessary things like skies or clutter. Content of ***.txt** file is referring to unpacked data on your working disc (P:\), not to PBOs in game installation. ArmaAddons.txt must be located on the root of disk **P**. It is a list of add-ons, configurations of the listed add-ons will be used. E.g. if you want to see correct clutter settings for edited world, its folder must be mentioned in p:\ArmaAddons.txt.

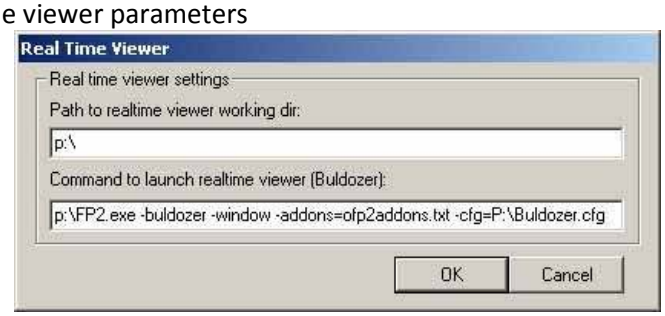
Example of file ArmaAddons.txt with paths to addons

```
addons[] =
{
  "ca\", "ca\data\", "ca\UI\", "ca\UIFonts\"
};
```

NOTE: the path must end with backslash \, otherwise it will be considered as file, not path.

-connect=pipe\<AnyNameYouLike> - the use named pipe and specify its name.
NOTE: Useful especially when debugging. Not required for end-users.
-maxmem=1024 – the parameter defines amount of memory that can be used by the viewer.

Typical setup of real time viewer parameters




```
d:\%armapath%\ your_armagame.exe -buldozer -window -addons=ofp2addons.txt -maxmem=1024
```

-connect - It is possible not to specify the viewer ***.exe**. This tells *Visitor* it should only create the pipe and listen to any incoming connections on it.

```
-connect=pipe\Visitor
```

This is handy when launching the viewer externally. Options other than **-connect** are ignored when used this way.

20.2 Buldozer Customization

You can customize the controls of *Buldozer*:

- by pressing **F1** in *Buldozer*
- by browsing *Controls > Buldozer* in Arma2 OA.

NOTE: You might get some errors if your content is not unpacked correctly.

20.3 Camera Control

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

keyboard	mouse	description
Q/PgUp		Upward move
Z/PgDn		Downward move
NOTE: You can increase the speed of action by pressing the *Shift* together with the above these.		
Numpad 8		Upward rotate
Numpad 2		Downward rotate
Numpad 4		Left rotate
Numpad 6		Right rotate
Numpad "+"		Zoom In Relative To Box Cursor
Numpad "-"		Zoom Out Relative To Box Cursor
	move mouse	Pan
Shift +	move mouse	Quick Pan

20.2 Terrain Editing

- Press *S* - switch between object and terrain edit modes
- Press *H* key - turn on/off the arrow marker for marking of a terrain vertex nearest to the editor cursor.
- Press *U/I* - Raise a terrain vertex by 1 meter/5 meters.
- Press *J/K* - Lower a terrain vertex by 1 meter/5 meters.

20.3 Objects Editing

- Press *S* - switch between object and terrain edit modes
- Place the box cursor over an object then one-click LMB– select object.
  NOTE: If you select objects in *Buldozer* then they are selected in *Visitor* and vice versa.
- Place the box cursor over an object and one-click LMB to select it then hold down RMB while mouse is moved - rotate object.
  NOTE: Origin of rotation is defined by the position of the box cursor.
- Place the box cursor over an object and hold down Ctrl + one-click LMB on an object/area - including object/area to selection
- Place the box cursor over an object and hold down Shift + one-click LMB on an object/area - excluding object/area from selection
  NOTE: You can deselect all the objects by one-click LMB on an empty place of a map
- Hold down LMB on selected objects and move the mouse sideways - move selected objects.
- Hold down RMB on selected objects and move the mouse sideways - rotate selected objects.
  NOTE: Origin of rotation is defined by the position of the box cursor.
- Hold down LMB on selected objects and press *Q* key - move selected objects upward.
- Hold down LMB on selected objects and press *Z* key (**Y** key for European layout) - move selected objects downward.

NOTE: Press **N** to turn on/off FLIR filter. Thus, you can get an object view at day or night.

20.4 Editing with *Visitor3* and *Buldozer*

While much can be done with shape files, sometimes it is necessary to edit specific areas by hand. This is easily done with *Visitor3* in combination with *Buldozer*. The 2D view in *Visitor* and the 3D view in *Buldozer* are synchronized so any changes made in one view will be transmitted to the other view.
Buldozer is the 3D viewer that will enable you to view the terrain in real time.
To activate it, select *Project > Connect to Buldozer*.
Buldozer is really just the game engine, so your windows mouse cursor will disappear when the *Buldozer* window is in focus.
To restore focus to other windows in your taskbar, use Alt+Tab.
To close *Buldozer*, use Alt+F4.
When Buldozer first loads, it will be displaying an area in the far North West corner of your terrain, facing north. You might notice some badly matched or stretching satellite textures but this is normal

since it is outside of the actual terrain area. To see your actual map area, rotate the camera in *Buldozer* with Numpad “4” or “6” and turn the camera around.

21. VISITOR3 OBJECTS DATABASE

Each Visitor3 project uses a database of objects. These objects are local to the project, but each object must be associated with a unique P3D model. The visitor object stores additional information for displaying in Visitor's 2D map such as icon style, and it also include placement randomization values which are used when you place the object manually in Visitor3. The database is divided into three categories, but this is only for organization within the Visitor3 workspace, these categories have no impact on simulation within VBS2.

Objects Database: Manual Entry

To add new objects to the database, click Tools and then select the best category for the type of objects you want to include: Nature Objects, Artificial Objects or Road Objects. The object definition dialog will open and you can use the Add/Browse... button to create new object by selecting P3D models from the P: drive. You can edit the appearance of the objects here (colour, shape, border color) and also the randomization properties.

Objects Database: Import From Other Project

A shortcut for setting up a new objects database is to import it from an existing PEW file that already has a database setup the way you want it. Use Project > Import Templates... and browse to another PEW file. The database from the target PEW will be imported to your current project.

22. MAP CONFIGURATION

You have to design and create a configuration file (*config.cpp*) for your terrain. It guides you through each section and helps you enter the correct information.

Enter a display name for your terrain that users will see in editor menu.

In the *Global Position* section, enter UTM values for your 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 map view.

Enter the *Geographic Coordinates* for the south west corner in 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 types for your terrain.

Give your surface a simple name with no spaces or special characters such as: grass, desert, swamp, etc. Choose mask colors that will be used to represent this surface type when you create you’re the layer mask.

NOTE: Each surface needs a unique color.

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

- A surface for grass should inherit from <tag>_land_grass_low or <tag>_land_grass_high.
- A surface for desert should inherit from <tag>_land_sand_*
- A surface for swamp could inherit from <tag>_land_mud or <tag>_water_shallow.

You have an option to add clutter objects to each surface that you create. Add the clutter models that you think will be appropriate for this surface; it is easy to edit the clutter characteristics later.

Repeat steps for each surface that you want to define on your terrain. When you have completed creating surfaces, click the save button to write a tag_projectname\source\config.cpp. You can edit this file later to make changes.

This has been created: tag_projectname\config.cpp

23. EXPORTING PEW TO WRP

WRP files are optimized terrain areas that are formatted for ArmA 2 series.
To export PEW to WRP:

1. Ensure that *Buldozer* is running and your terrain is visible in the viewer
   NOTE: Some map data is handled by *Buldozer*, so when exporting a map project to WRP format, *Buldozer* must be running and displaying the terrain.
2. Project > Export World… and browse to the root of your project folder.
   NOTE: This file must be named the same as the project folder:
   tag_project.wrp
3. Once the export is complete, you can close *Buldozer* and *Visitor*.

WRP file contains the map itself. It is generated by *Buldozer* along with **HPP** file. **HPP** file is included into *Names* class of the map's parameters **config.cpp** file using **#include** operator. It defines map names and appearance of 2D map symbols in game. *Key points* tool of *Visitor* is used to insert those data.

24. EXPORTING OF PROJECT LAYOUT

Best way to get the data about placement of objects on terrain is export an image of a map. To improve visualization of objects you can do following.

Terrain

1. *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 beaches. It is better to entirely switch off contours or select broader interval of 10-50m.
3. Turn off features of drawing that are not needed, e.g. grid.

Objects

When selecting forest surface based on vegetation, for artificial shadows of trees or painting of roads, you can use symbols of objects in *Visitor*. For better selection of objects in Photoshop, it is useful to have same color for object border and its body:

- *Tools > Nature objects...* – the option allow adjust colors of natural objects in project. 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 > Roads...* - the option allow change color of road types.
- *Tools > Artificial objects...* - the option allow adjust colors of artificial objects in project. You can use of 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.

24.1 Export Map As Image

1. *Project > Export Map as image...*
2. Choose **EMF** file type by default.
   NOTE: It is impossible to export image in big resolution as **BMP** file type.
   Resolution should be the same as ***Terrain size*** plus the size of *blue edge* (TM)', visible on left and bottom side of the map in *Visitor*.

Later the *blue edge* will be cut out; it needs to add because output of whole map in same resolution as texture is needed.
Width of *blue edge* (TM) is the size of a terrain cell in pixels of surface map.
To learn this, you can do following:
Image size / Terrain grid size = Terrain cell size in pixels

24.2 Pre-processing of image exported for map

You need convert **EMF** to **PNG** file type. In the *Visitor* folder, there is utility **EmfToPng.exe** for this job:

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

NOTE: You can open created **PNG** size up to 40960x40960px in *Photoshop CS* and higher.
The **PNG** image exported would not match your surface map by size. You need to cut the *blue edge* from left and bottom edge of the image.

25. PACKING A MAP

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

1. **config.cpp** (+**HPP**),
2. **WRP** file,
3. Textures in **PAA** format
4. All the relevant **RVMAT** files.

If you use your custom objects in the map, you should pack them and add them to:
%ArmA2 directory%\@tag_addonname\Addons\<your_project> folder.
NOTE: Structures described here reflects working customs of ***BI***. Public utility used to pack **PBO** files packs all the content of a designated add-on folder (in this case the <your_project> folder), therefore it is wise to keep clean "packing" version separated and keep there only needed files.
TIP: If you cannot see your map in map list, game crashes after you attempt to preview mission on your terrain or you cannot see surface textures, check all paths in **config.cpp** and ***.rvmat** files in *Data* folder. Also make sure that any referenced files exist at the specified location.

26. CREATING A ARMA 2 ADD-ON

You need to package the map into *ArmA 2* -ready format. This will store the configuration file, the terrain WRP, and all of its imagery into a single PBO file, similar to a zip archive.

1. Launch the PBO Packing Utility from Start > All Programs > Bohemia Interactive > Tools > PBO packer.
2. Click the Browse button and select your project folder. The PBO will be created with the same filename as the project folder. For example, if you have a terrain in bia_kettlevalley20km then PBO packer will produce a bia_kettlevalley20km.pbo add-on.
3. Leave the packing options at default (these are explained later), and then click the *Pack* button. **NOTE:** Once again, this can be a lengthy process depending on the size of your “satellite image”. Progress information is written into the console and it will report when packing is complete.

The PBO packer has two options which you may sometimes need to use.
The first option, *Force Rebin* purges the temp folder. Normally converted data is stored in a temporary location so the first time you pack a map might take two hours, but if you pack again without making any changes, it should take less than 5 minutes. This is convenient if you are only making small config changes, you have no need to repack all of the satellite imagery again, only changed files are converted again. This is very rarely used.

27. TESTING A TERRAIN IN GAME

Once the PBO packer has created an add-on (PBO file type) it can be found at P:\export. To test it you need to move this file into your ArmA 2 installation. The default add-on folder location is:
C:\Program Files\Bohemia Interactive\ArmA 2\AddOns
Before placing your add-on here, shut down ArmA 2 if it is running. When you restart ArmA 2 it will automatically find the new add-on and include it into the available content. When a new terrain area has been added, it will be available in the list of terrains for the mission editor.

1. Exit ArmA 2 if it is currently running.
2. Find your new terrain add-on in P:\export
3. Copy the add-on PBO file to your ArmA 2 installation's ArmA 2\ AddOns.
4. Restart ArmA 2.
5. From the *Main* menu press **Alt+E (Ctrl+E)**.
6. Find your new terrain area in the list of available maps, select it and click *Continue*.

7. In the mission editor, select *Edit in 3D world*
8. Control the editor camera using WASD direction keys, Q and Z for altitude, and right mouse button, you can move around your whole terrain area and inspect textures and elevation to see if you are happy with the general look.

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