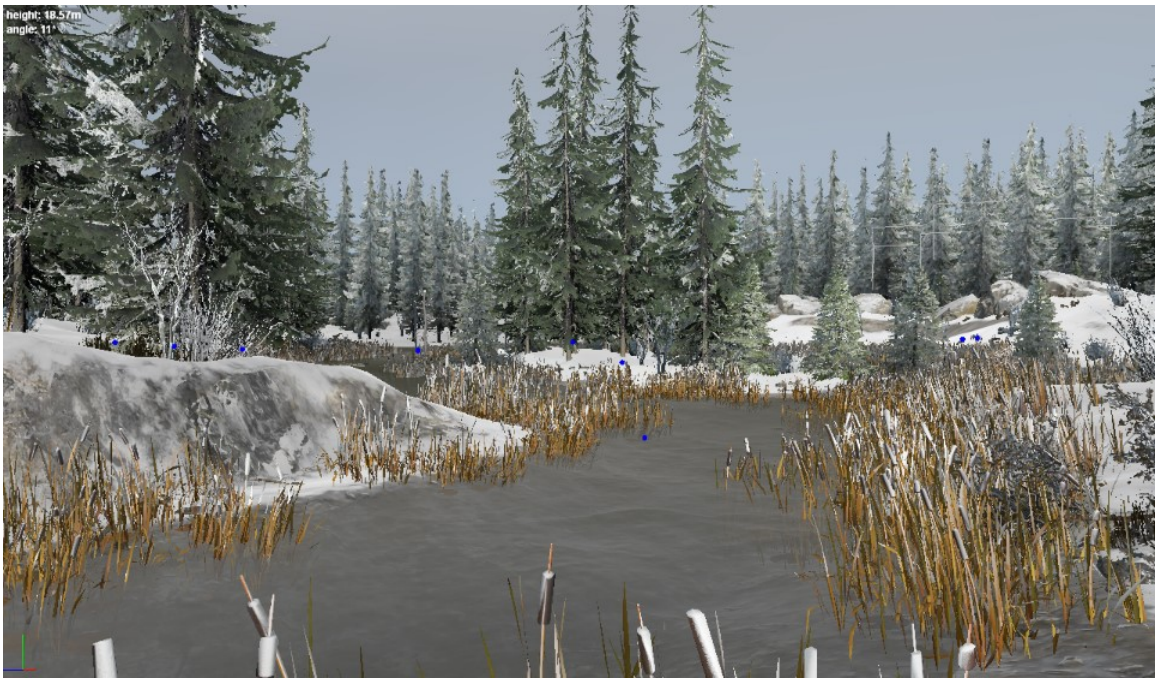
SnowRunner™ Editor Guide

Version 0.9.1 ALPHA of June 26, 2020



Contents

1. Introduction

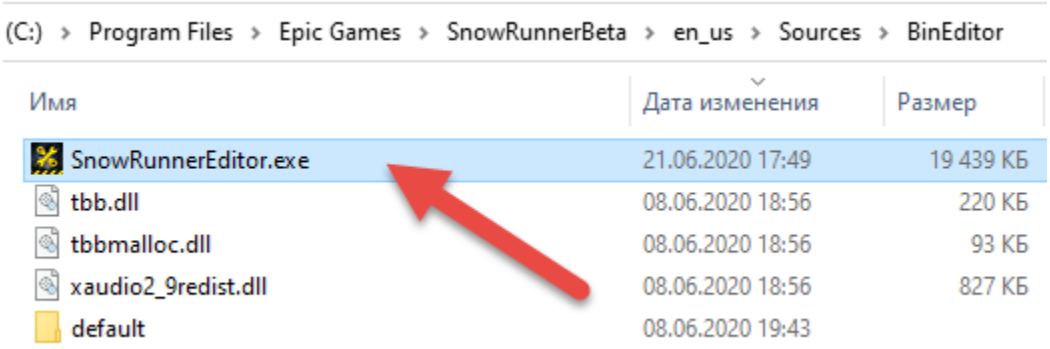
This guide provides an overview of basic operations necessary to create a map mod with SnowRunner™ Editor. Along with it, brief instructions on viewing trucks are also provided.

NOTE: SnowRunner™ Editor and ability to play on custom maps created using it are currently available only on a Public Test Server (PTS) version of the game. For more details on the PTS version of the game, see https://forums.focus-home.com/topic/49107/pc-public-test-realm-for-patch-5-0-is-open

2. Installation and First Launch

The Editor is installed along with the game itself. You can find it in the folder of the installed game, typically at the following (or similar) directory:
C:\Program Files\Epic Games\SnowRunnerBeta\en_us\Sources\BinEditor

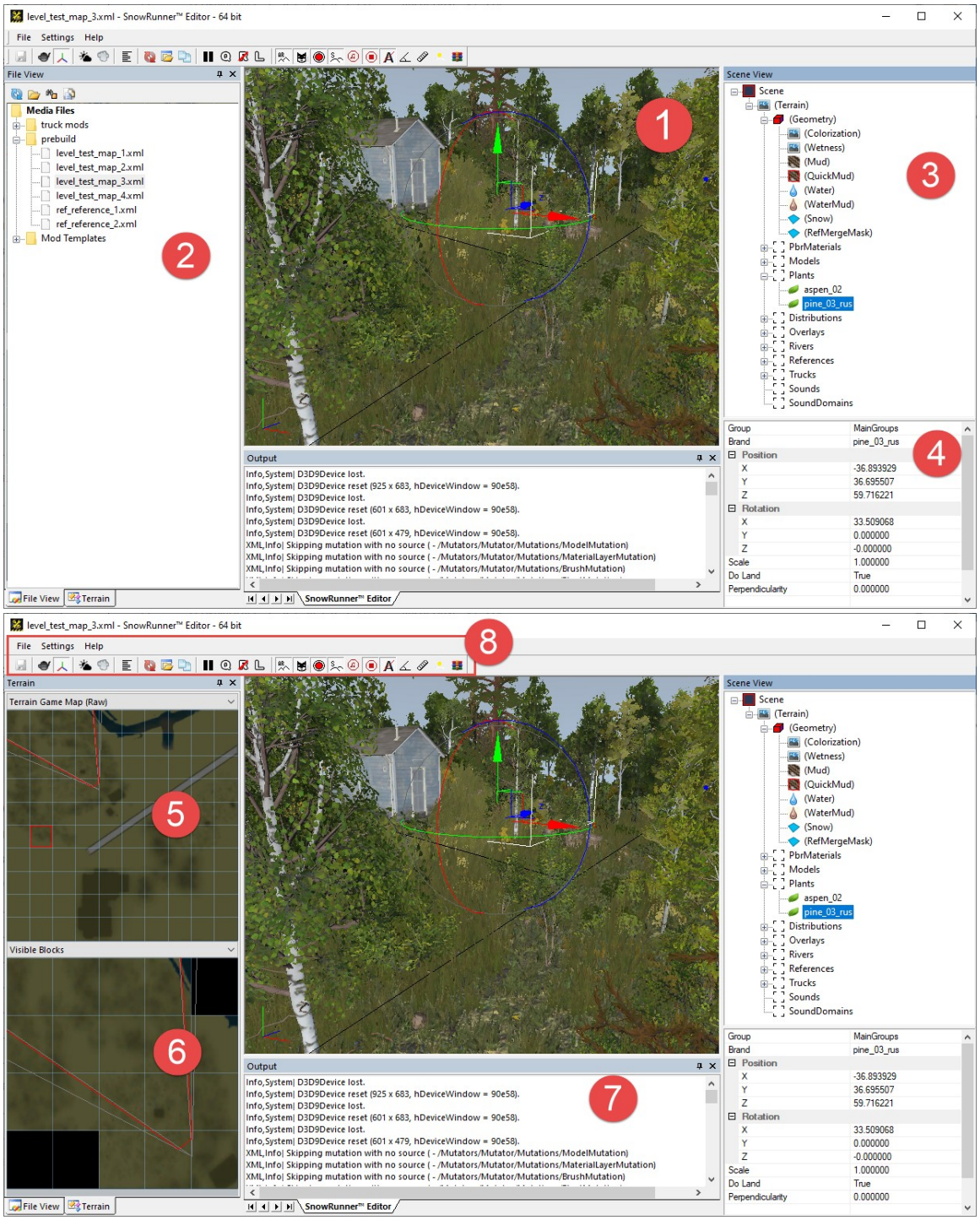
To open the Editor, you need to launch **SnowRunnerEditor.exe** in this folder:



No configuration is necessary, you can just launch it.

IMPORTANT: Currently, if you open the Editor, you will not be able to open the game at the same time. If you need to open the game, you will need to close the Editor first.

3. UI Overview

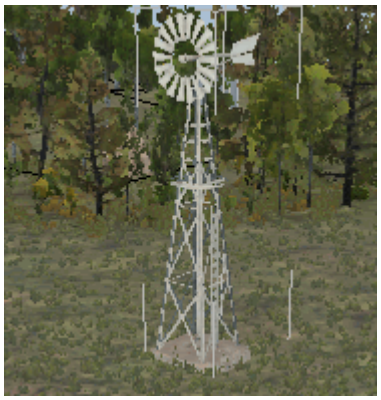


The UI of the editor consists of the following:

1. The **main panel (scene window)** - displays the part of your scene. Here you perform the main operations with the content of the scene: add new objects, move and rotate them, paint the terrain using various brushes, and so on.
2. **File view** panel - this panel works as a library that contains all maps and references. Double-click on the file in the panel will load the corresponding map.
3. **Scene View** panel (upper part) - displays the list of objects on the scene, both physical and auxiliary. Objects can be selected both in the main panel (scene window) and using the **Scene View** list, after expanding its hierarchy. Along with objects, this hierarchy contains a set of various brushes in the **Scene > Terrain > Geometry** section (see below).
4. Lower part of the **Scene View** panel (properties of a selected object) - this panel displays and allows you to modify the properties of a selected object.
5. Minimap (upper part of the **Terrain** panel) - displays the current view of the level minimap.
6. Visible blocks (lower part of the **Terrain** panel) - displays visible blocks of the terrain, depending on the direction of the camera on the scene.
7. Log (the **Output** panel) - All system messages and editor errors are displayed here.
8. Above all these panels, the menu bar and toolbar are displayed.

3.1. Toolbar buttons

Button	Name	Shortcut	Description
	Save	CTRL + S	Saves the map and updates the **data.stg** file.
	Wireframe	CTRL + W	Enables/disables rendering of the map in the wireframe mode.
	Grid	CTRL + G	Shows/hides the planar grid.
	Night		Enables/disables the night mode. In the night mode, you can see how your level looks at night (lights, etc).
	Fog		Enables/disables the fog.
	Statistics	CTRL + T	Shows/hides the graphics statistics of the level: camera position, camera direction vector, amount of Draw Indexed Primitives (DIPs, “drawcalls”), faces, models, and so on.
	Reload Resources	CTRL + R	Reloads models, textures, settings of the materials, XML classes, XMLs of the map and its references, and

			other meta-data.
	**Open File**	ALT + SHIFT + O	Displays a dialog that allows you to quickly find and open a file from the **Media** folder.
	**Duplicate selected**	CTRL + D	Duplicates the object selected in the Editor.
			Pauses/enables the default animations that may exist for the models in the Editor. For example, if you add the windmill model, and then disable and enable this option and Rebuild the level, you will see the animated windmill:  It can be also used when viewing Trucks (see 11.3. Viewing XML file of the Class).
	**Quick mode**		Enables/disables the Quick Mode in the Editor. This mode allows you to rebuild your map faster. If this button is activated, then the grass will not be calculated during the rebuild and there will be no grass in the terrain blocks that were rebuilt.
	**No references**		If this button is activated, the Editor will ignore references during the rebuild of the map. The map will not contain visuals of the references if this mode was enabled before the rebuild.
	**Local transform**	CTRL + L	There are two coordinate modes for controlling objects: local and global. If you enable the **Local transform** mode, then the axes of an object will correspond to its position. If you disable this mode, then the axes along which you can move the object will correspond to the coordinate grid of the entire map.

	**Enable autorebuild terrain**		Enables/disables the auto-rebuild of the terrain. If this option is activated, the terrain will be rebuilt each time you switch from one brush to another.
	**Show Distribution mask**		Shows/hides the distribution mask in the main view of the Editor when the particular distribution is selected. For details on distributions and their masks, see 5.7. Adding Multiple Objects via Distribution.
	**Show colored brush circle**		Enables/disables the highlighted circle below the mouse pointer when the particular brush is selected.
	**Show snow**		Shows/hides the snow coverage of the level in the Editor.
	**Show all sound domains**		When this option is enabled, the Editor displays all sound domains on the level. By default, they are hidden until selection in the **Scene View** panel.
	**Hide Strings**		Shows/hides the names of the objects displayed next to them in the main window of the scene.
	**Show Heightmap Angles**		Displays the map of heightmap angles for the level.
			Enables/disables the **Ruler** tool, which allows you to create splines and measure distances. After enabling the tool, you can add points to the ruler spline by right-clicking and selecting **Add before** and **Add after** in the context menu. The spline works similarly to the mechanism of overlays (see 5.8. Adding Overlays).
			It allows you to increase or decrease the brightness of the preview of the level in the appearing dialog. It is used for previewing the level in the Editor only. Particularly, it is useful to decrease brightness when working with snowy levels.
	**Pack terrain**		Packs your map and generates the .zip and .pak files. For details, see 6. Packing a Map

3.2. Camera Controls

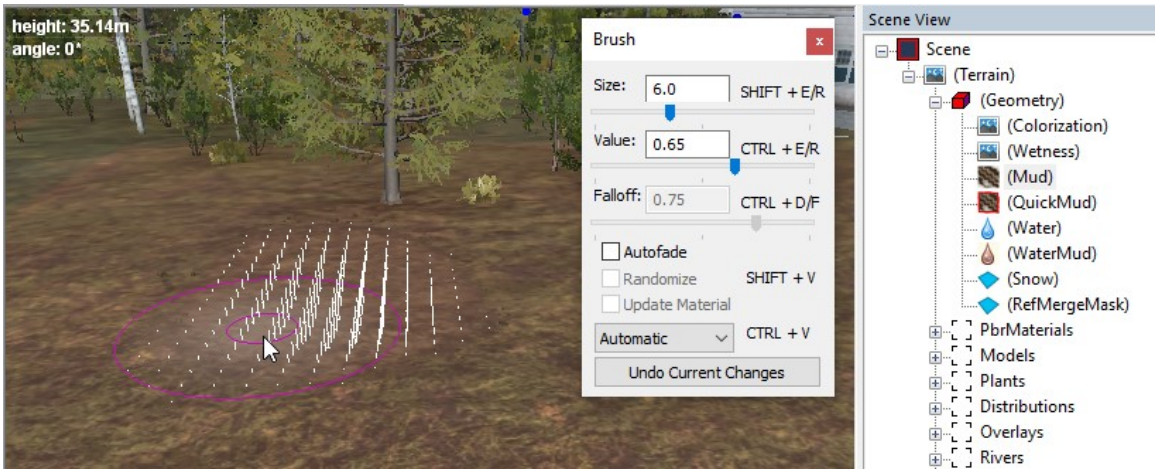
- Left-click – select an object
- Left-double-click – fly to an object
- Right-click – context menu
- Mouse wheel – zoom in/out relative to the object under cursor

- Left mouse drag – rotate around the object under cursor
- Ctrl + Left mouse drag – strafe the camera
- Shift + Left mouse drag – pan the camera
- Alt + Left mouse drag – rotate around the center of the selected object

NOTE: However, when a brush is selected, the left-click and right-click behavior is different, see below.

3.3. Typical Brush dialog

Brushes of various types are frequently used in the Editor. They allow you to add the mud, snow, paint layers of the materials, paint distribution maps for plants, and so on. When you will be painting with a brush, the **Brush** dialog will appear within the main panel of the scene. The particular properties (modes of the brush, etc) displayed in this dialog depend on the particular brush. However, most of the brushes look pretty similar:



Painting with the brush is typically performed by pressing and holding the right mouse button while moving the mouse. By pressing the left mouse button, you can apply the changes.

Typically, brushes have some universal settings:

- **Size** - the size of the brush in meters.
- **Value** - the force of the brush and the direction vector for changes after painting. It can be set to a negative value. For example, for a brush of heights, positive values will raise the terrain up, negative values will lower it.
- **Falloff** - specifies the softness of the border of the brush. For example, 0 - a brush with absolutely hard edges, 1 - changes from the brush begin to fade immediately from the center of the circle of the brush.
- **Autofade** - the automatic attenuation mode of the brush, that depends on the direction of the drawn line. Useful for drawing ruts and working with mud.

- **Randomize** - random spread of brush values in a given range. That is, the brush will randomly change the values of force and direction. Useful for creating chaotic unevenness.

NOTE: For some brushes, the range of the **Value** slider is from **0** to **1**. Typically, in this case, the brush will paint its content when the **Value > 0.50** and remove its content when the **Value < 0.50**. However, the default value for such brushes is typically **0.50** and the brush will not do anything until you change this value.

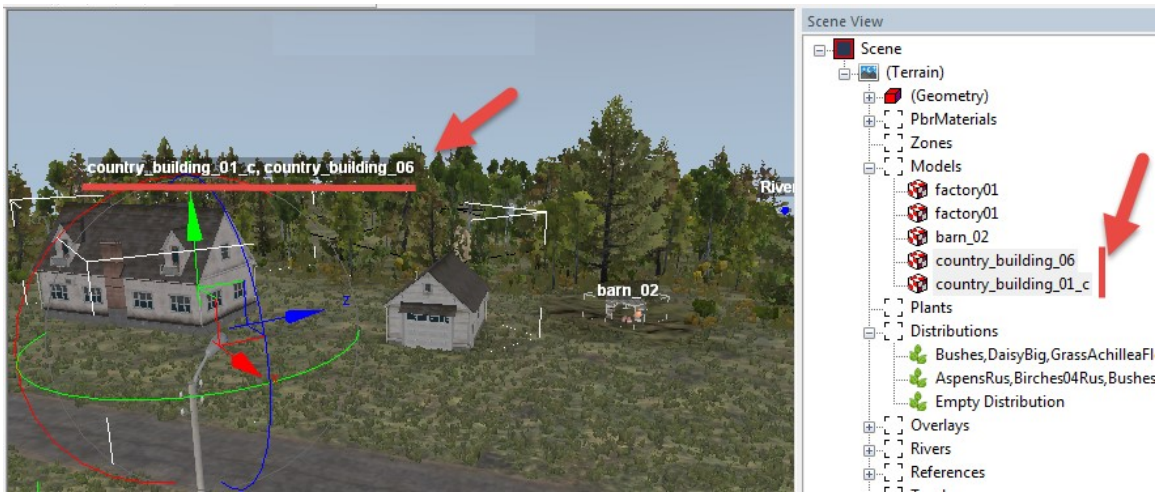
Typically, to apply your changes after using the brush, you left-click on the terrain (or deselect the selected section in the **Scene View** panel) and rebuild the terrain. You can either enable the **autorebuild terrain** option (see 3.1. Toolbar buttons above) or manually rebuild the terrain. To manually rebuild the terrain, right-click the scene window and select **Rebuild Terrain** or **Rebuild visible / Selection** (to rebuild only visible or selected areas).

Undo Current Changes in the **Brush** dialog - discards the current changes during painting, reverts all changes made after the most recent right-click.

The **Geometry** section with the **Scene View** panel contains a lot of brushes. For their descriptions, see 5.2. "Geometry" Brushes for Terrain below and its subsections.

3.4. Selection of Multiple Objects

The Editor supports the selection of the multiple objects of the same type (e.g. Models, Plants, etc.)
To select multiple objects, hold CTRL while clicking on them (either in the main window or in the **Scene View** panel). Objects will be displayed as selected in the **Scene View** panel, and names of the selected objects will be displayed in the main window next to the pivot, which is common for the selected objects:



To select adjacent objects in the **Scene View** panel, hold SHIFT while selecting them.

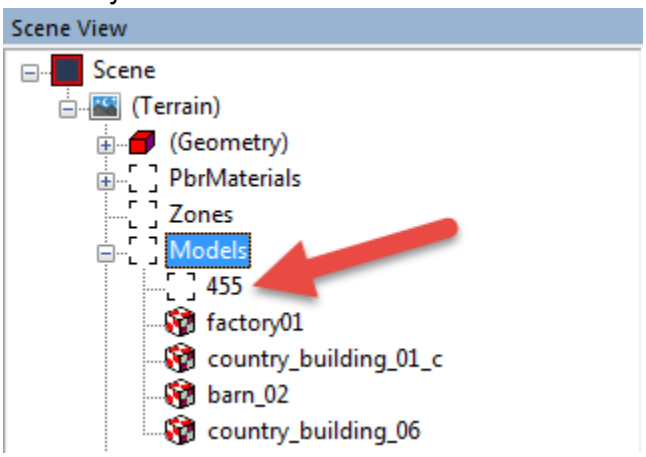
3.5. Groups & Copying Them Between Maps

When you are working with objects in the Editor, you can use Groups as categories for them in the hierarchy of objects. These groups can contain only objects of the same type (e.g. only models, or only plants, etc.).

For example, you can add a group for a set of buildings:

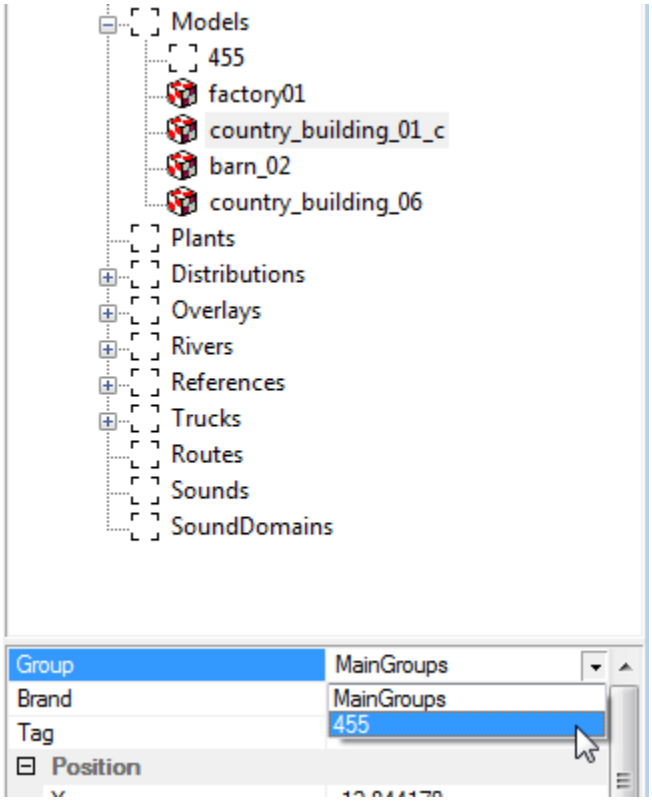
To add a group and assign an object to it:

1. Right-click the necessary section in the **Scene View** hierarchy (e.g. **Models**) and select **Add Group** from the context menu.
2. After doing this, the group with the few digits as a name will appear in the hierarchy.

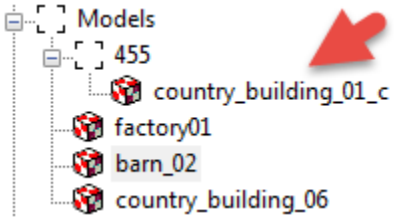


3. If necessary, you can change the name of the group in its **Name** field (at the lower part of the **Scene View** panel, while the group object is selected).
4. Now, to assign necessary objects for a group, for each such object:
    a. Select it in the **Scene View** panel.

b. In the object properties, in the **Group** field, select the group you have created.

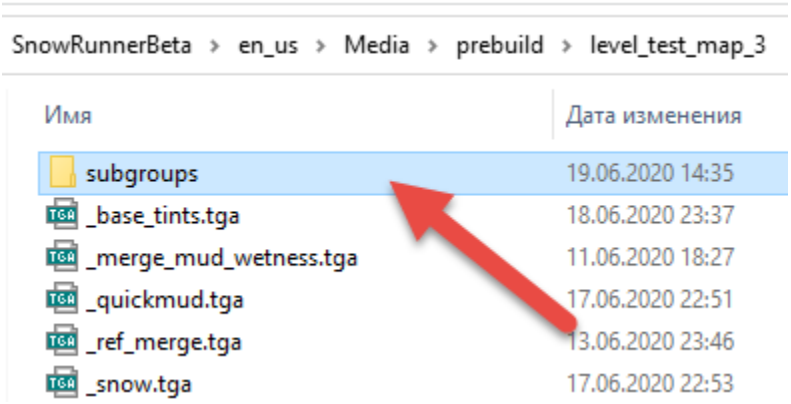


c. After doing this, the object will be moved to the group.



The main goal of groups is to help you organize objects.
However, when objects are in the group it is easier to select multiple objects from them (see 3.2. Selection of Multiple Objects above).

Moreover, after the creation of the group and assigning objects to it, you can copy all the objects from this group to another map.
This is possible because information about objects added to the group are saved to a separate file in the **subgroups** directory with the folder of the level (see 4. File Paths and Naming below).



So, you can copy the file corresponding to your group from this directory to the **subgroups** directory of another level. After that, the objects from this group will appear at this level, when you open it in the Editor.

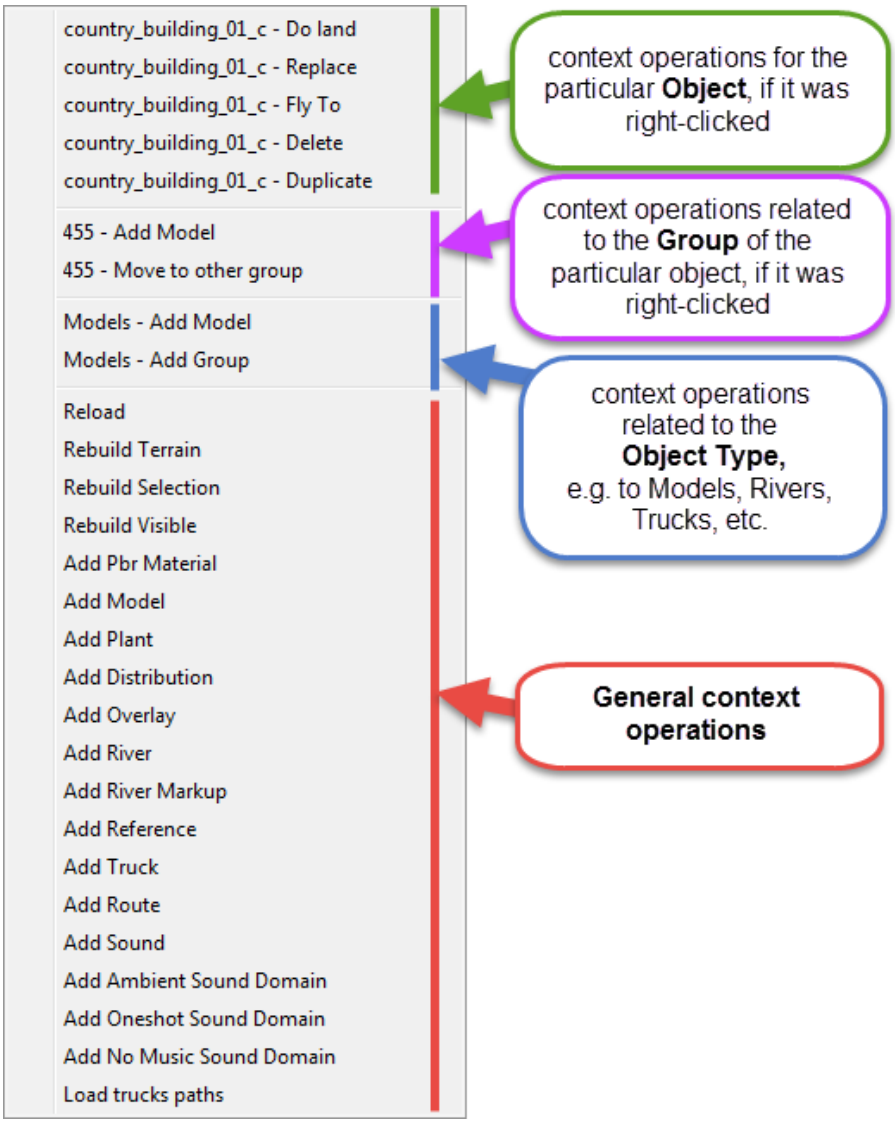
NOTE: Objects from the copied group will appear in the new map at the same positions they have on the initial map.

3.6. Typical Context Menu

Right-clicking in the main window of the scene or the section/object in the **Scene View** panel will open the context menu.

NOTE: However, when a brush is selected, right-click behavior is different, see 3.3. Typical Brush dialog above.

The list of commands within a context menu depends on what particularly you have performed a right-click. If you have right-clicked an object, the commands related to this object will be displayed in the upper part of the menu, with the name of this object as a prefix (e.g. “**country_building_01_c**” in the picture below). If this object belongs to a group, then below them the operations related to groups will be displayed, with the name of this group as a prefix (e.g. “**455**” in the picture below). If you have clicked the particular object or a section of the particular type in the **Scene View** panel, then the operations related to this type of object will be listed, with the name of this object type as a prefix (e.g. “**Models**” in the picture below). And, also, the list will contain the list of general context commands (e.g. **Reload**, **Rebuild Terrain**, etc.) below all other commands.



The list of most frequently used commands is listed below:

Command	Description
Reload	Reloads the terrain. Any unsaved changes will be lost.
Rebuild Terrain	Rebuilds all terrain of the map, applies all changes that you have done to its properties (heights, references, etc.), and refreshes the appearance of the level in the Editor.
Rebuild Selection	Similar to **Rebuild Terrain**, but rebuilds only selected terrain blocks, which is faster. You can select multiple terrain blocks by holding CTRL and left-clicking the terrain in the main window of the scene.
Rebuild Visible	Similar to **Rebuild Terrain**, but rebuilds only terrain blocks currently visible in the main window of the scene, which is faster.

Add Pbr Material	Adds a new PBR Material, see 5.3. Assigning PBR Materials to Terrain.
Add Model	Adds a new Model, see 5.5. Adding Models.
Add Plant	Adds a new standalone Plant, see 5.6. Adding Plants.
Add Distribution	Adds a new Distribution (e.g. massively planted trees, rocks, etc.), see 5.7. Adding Multiple Objects via Distribution.
Add Overlay	Adds a new Overlay (e.g. road, wires, etc.), see 5.8. Adding Overlays.
Add River	Adds a new River object, see 5.9. Adding Rivers and Water Objects.
Add River Markup	Add a new River Markup object (a sound area for the river), see 5.9.2. Adding River Sounds via "RiverMarkup".
Add Reference	Adds a new Reference, see 5.10. Adding References.
Add Truck	Adds a new Truck, see 5.11. Adding Trucks.
Add Sound	Adds a new Sound, see 5.12. Adding Sounds.
Add … Sound Domain	Adds a new Sound Domain of the particular type, see 5.13. Adding Sound Domains.
… - Fly To	Moves the camera to the right-clicked object, zooms it, and selects it.
… - Delete	Deletes the right-clicked object from the map. You cannot undelete it after that.
… - Duplicate	Duplicates the selected object.
… - Replace	Replaces the right-clicked object with another object.

3.7. Main Menu

The **File** menu:

- **Close File** - the system prompts you whether or not the changes should be saved, saves them if you select so, and then closes the opened file.
- **Reload File From Backup** - allows you to reload your scene from automatically created backup (you can select it in the appearing dialog). Please note that backup contains only the XML file of the level, files of textures are not backed up.
- **Save** - saves your changes (CTRL + S).

- <list of recently opened files> - allows you to open them.
- **Exit** - exits from the Editor.

The **Settings** menu:

- **Ignore Warnings** - enabling this option will hide warnings and errors that are generated while working with the Editor. If this option is enabled, the "**CAUTION! Error messages are disabled.**" label is displayed at the top of the main window of the scene. If it is disabled, errors and warnings will be displayed as new dialog windows. Even if they are hidden, you can find them in the log, which is displayed in the **Output** panel.
- **Show Snow By Up Vector** - this option enables the snow cover effect for models and plants on the scene, according to their texture settings.

The **Help** menu:

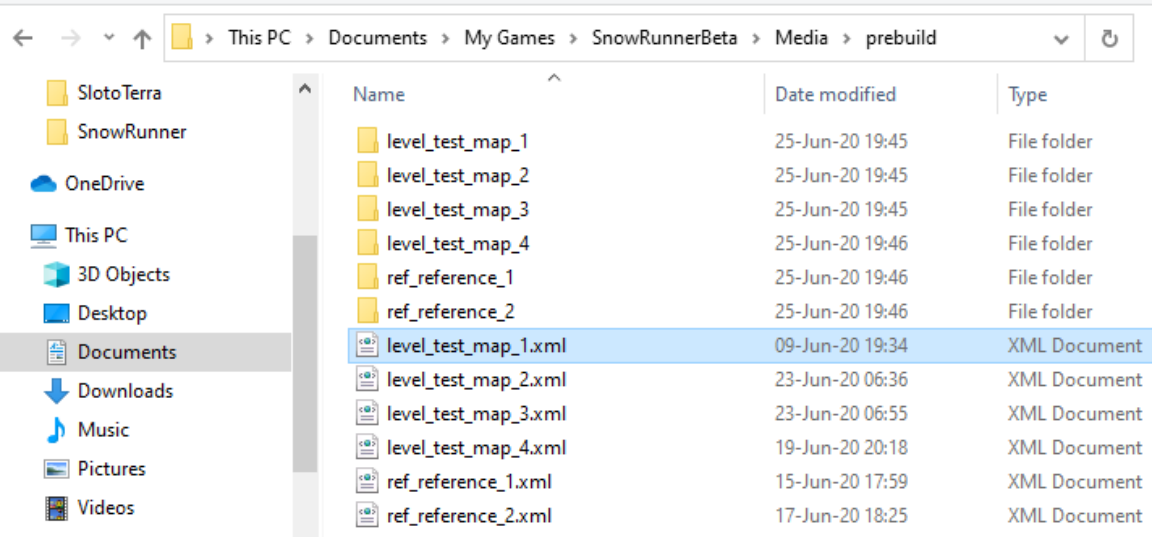
- **Guide** - opens the guide for the Editor.

4. File Paths and Naming

4.1. File Paths

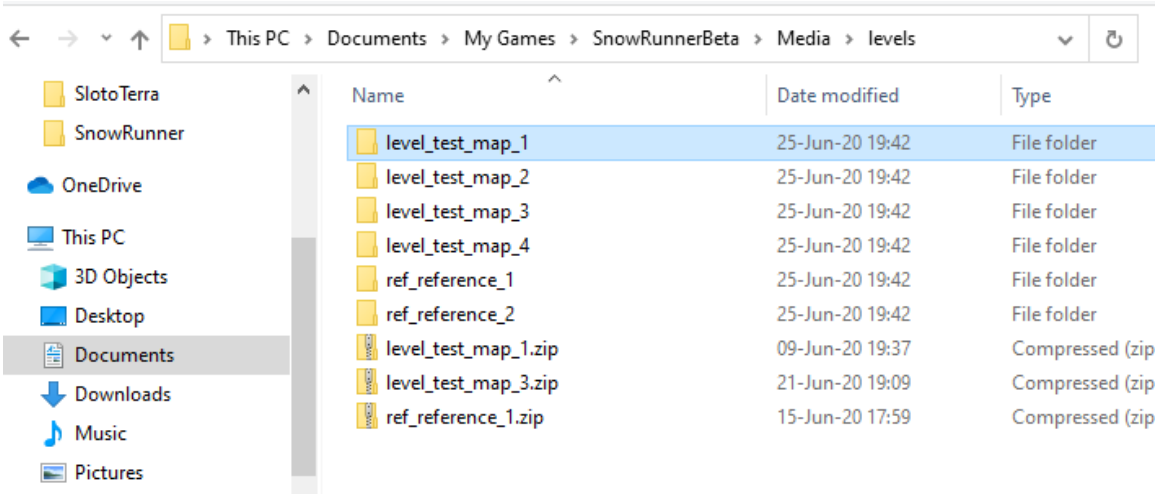
Source files of the levels and references are stored in the **Media\prebuild** folder, which is created in the **Documents\My Games\SnowRunnerBeta** folder.

Full path to it is typically similar to the following:
C:\Users\<name_of_user>\Documents\My Games\SnowRunnerBeta\Media\prebuild



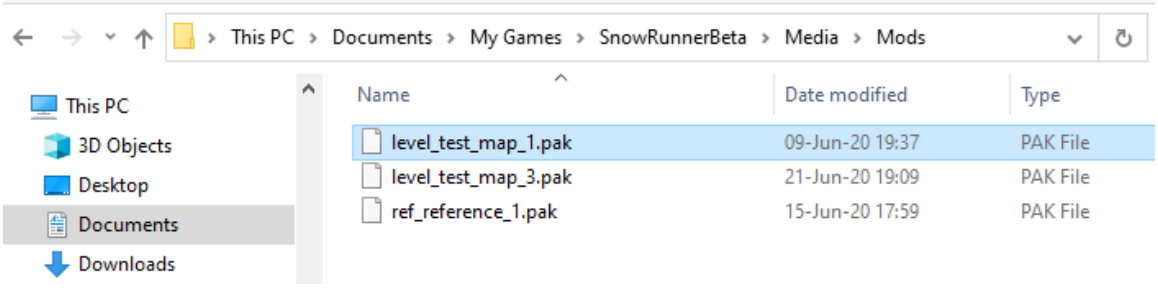
The main file of the level here is the **<name_of_the_level>.xml** (e.g. **level_test_map_1.xml**). This particular file you need to click in the **File View** panel of the Editor to open the corresponding map. The folder with the same name (e.g. **level_test_map_1**) contains all additional source data of the level, its source textures, and so on.

The compiled level files generated by Editor and their **.zip** archives prepared for uploading to mod.io are stored in the **Media\levels** folder:



Each folder of the level contains the **data.stg** file, which contains all binary information of the level and a set of compiled files for textures as **.dds** files. The **data.stg** file is updated each time you save the level.

When you pack the level in the Editor, the system, along with the **.zip** file (see above), also generates the **.pak** file for this level. It is automatically copied to the folder, where all local mods of the game are stored, i.e. to the **Media\Mods** folder.
For example:
C:\Users\<name_of_user>\Documents\My Games\SnowRunnerBeta\Media\Mods



For more details on packing, see 6. Packing a Map.

4.2. Naming conventions

- Names of levels must start with the **level_** prefix.
- Names of references must start with the **ref_** prefix.

5. Creation of a Map

In general, the process of creating a map is the following:

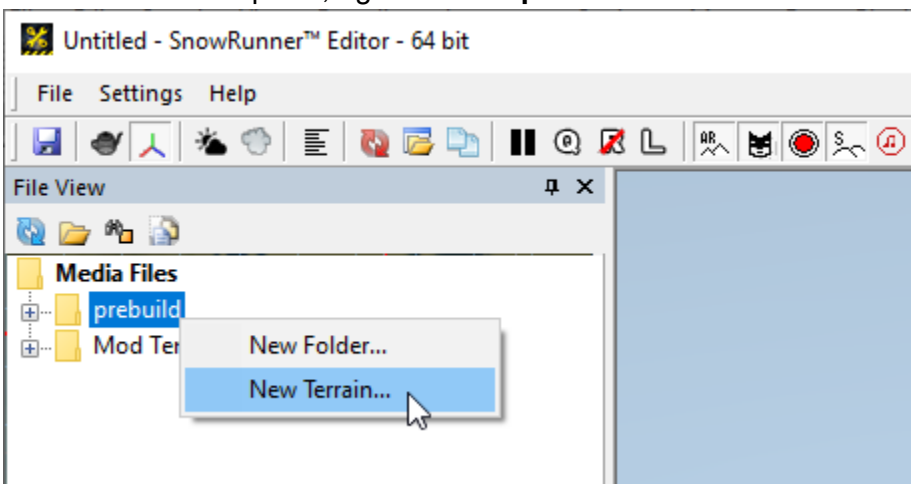
1. Create a new terrain.
2. Modify the terrain:
    a. Create the necessary height differences on it, smooth it in the right places, and so on.
    b. Assign the necessary PBR materials and use their layers to paint the terrain.
    c. Add mud and/or snow areas.
    d. Add rivers and other water objects.
    e. Add plants, either as single standalone plants or massively via Distributions.
    f. Add various overlays: roads, wires, etc.
    g. Add various models: buildings, light poles, etc.
    h. Add zones: garages, fuel stations, etc.
    NOTE: In the alpha version of the Editor zones are unavailable, they will be added later.
    i. If necessary, add some external maps as references.
    j. Add trucks and select one truck as Active.
    k. Add sounds and sound domains.
3. Pack your map to .pak and .zip files.
4. Test your map locally in the game.
5. Publish your map to snowrunner.mod.io

The sections that follow describe some of these operations in more detail.

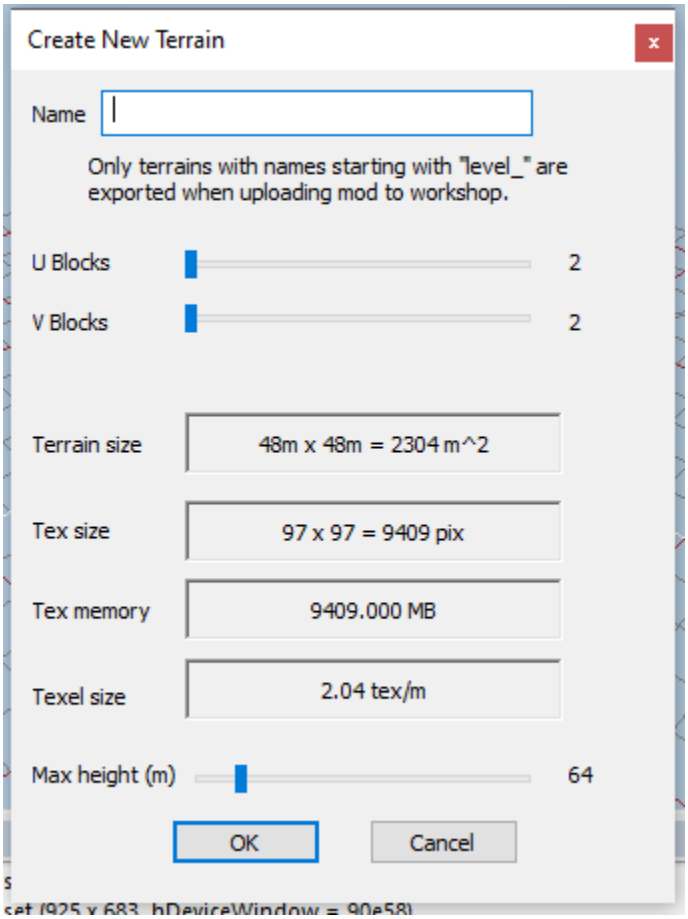
5.1. Creation of a Terrain

To create terrain:

1. In the **File View** panel, right-click the **prebuild** folder and select **New Terrain** in the list.



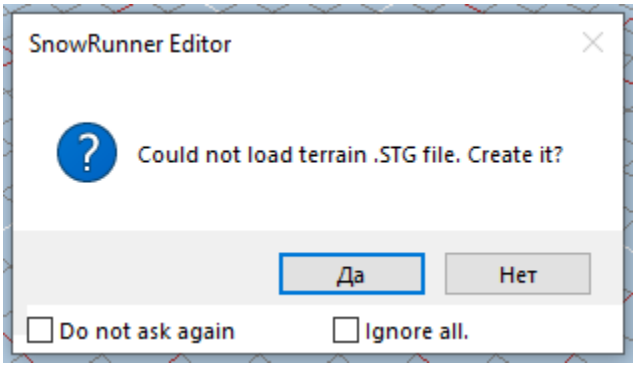
2. In the appearing window, specify the main parameters of the new map:



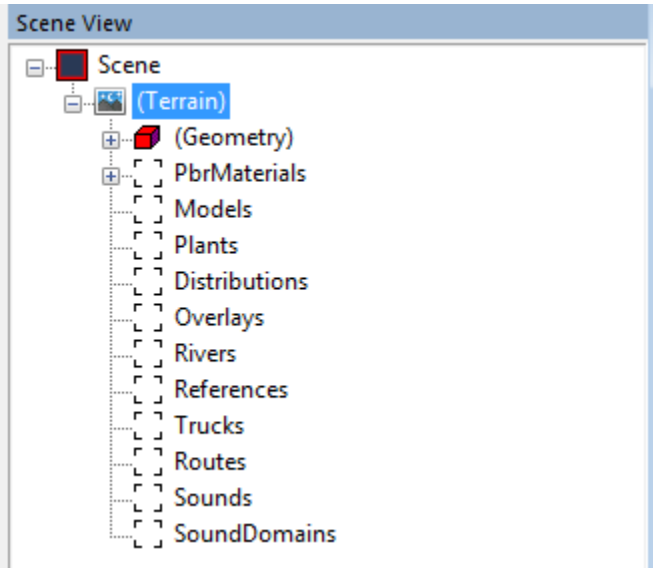
The parameters are the following:

- **Name** - the name of the map.
  Names of levels must start with the **level_** prefix, references must start with the **ref_** prefix.
- **U Blocks** and **V Blocks** - allow you to specify the dimensions of the map (the width and length), in blocks. Each block is equal to 24 meters.
  - **U Blocks** - the number of blocks along the X-axis.
  - **V Blocks** - the number of blocks along the Z-axis.
- **Max height (m)** - the maximum height of the level.

When creating a new terrain, the system creates a new data.stg file and prompts about that.
Answer **Yes**.

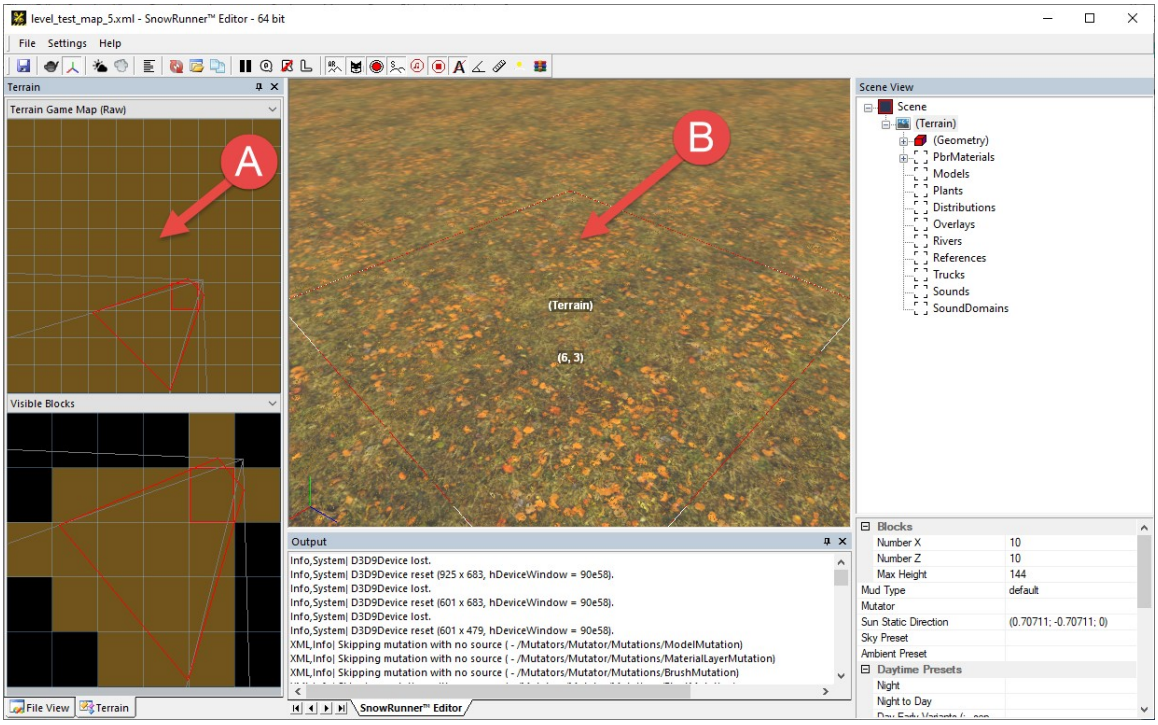


If the creation of the initial terrain was performed successfully, you will see that the **Scene View** panel now contains the following hierarchy:



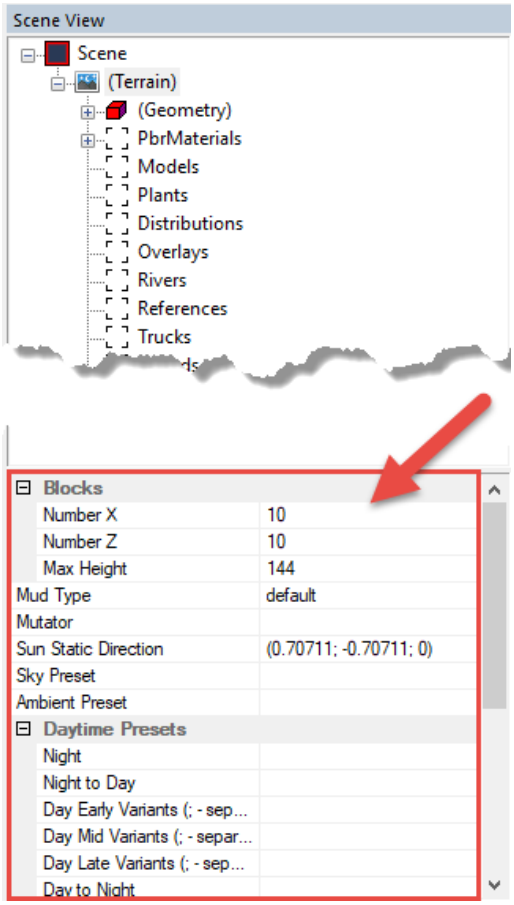
The **Terrain** section there contains subsections that correspond to both tools (brushes) that you will use during editing terrain and all objects that you will add to the terrain.

However, the main window of the editor will display only the grid and the initial terrain will be not visible. To display the terrain, double-click the terrain preview in the **Terrain** panel on the left (**A**). After doing this, the terrain will be displayed in the main window (**B**).



5.1.1. Terrain Properties

If the **Terrain** section is selected in the **Scene View**, you can see the parameters of the terrain in the lower part of the **Scene View** panel:



In this panel, you can view the information about the size of the map in blocks (which is not editable) and specify such parameters as daytime presets, sky preset, sound preset (**Ambient Preset**), and so on.

The parameters are the following:

- **Blocks** section:
    - **Number X** - the number of blocks along the X-axis. Maximum value: 84
    - **Number Z** - the number of blocks along the Z-axis. Maximum value: 84
    - **Max Height** - the maximum height of the level.
- **Mud Type** - currently not used.
- **Mutator** - allows you to specify the ID of the mutator that will be applied to all references imported to this map (to meet its settings). For more details, see 5.10.3. Usage of Mutators below.
- **Sun Static Direction** - sets the direction of the *static* sun. The word “static” is important here, since the light from this static sun will be baked into the lightmap (shadows from it will not change during the day). Static lightmap shadows are rendered at the distance greater than 50 meters from the camera. At the distance that is less than 50 meters - more sincere dynamic shadows are used. These dynamic shadows change simultaneously with the change of the daytime presets

in the game, according to the direction of the “dynamic” sun (the **SunDir** parameter in the daytime preset). For info on daytime presets, see below.

- **Sky Preset** - preset for the sky on the level. The existing sky presets can be found in the **[media]\classes\skies** folder of the **initial.pak** archive.
  Possible values:
  - **sky_ru_02** - sky of Taymyr
  - **sky_us_01** - sky of Michigan
  - **sky_us_02** - sky of Alaska.
- **Ambient Preset** - the name of the file with sound presets for the environment of the map (“ambient sounds”). In particular, there are presets of sounds for specific weather and terrain, including river sounds. Files with presets are stored in the **initial.pak** archive, inside the **\[media]\classes\ambients** directory. Since we cannot edit the **.pak** file by standard means, in this field we simply specify the name of the preset that is most suitable for our map. Therefore, the available values for this field are as follows:
  - **snd_amb_us_autumn** - autumn preset
  - **snd_amb_us_winter** - winter preset
  - **snd_amb_ru_summer** - summer preset
- **Daytime Presets** section - specifies presets for lighting and time of day:
  - **Night** - night
  - **Night to Day** - dawn
  - **Day Early Variants** - morning
  - **DayMidVariants** - midday
  - **DayLateVariants** - after midday
  - **DayToNight** - sunset

  The existing daytime presets can be found at the **[media]\classes\daytimes** folder of the **initial.pak** archive. Presets with the “a” suffix (e.g. “day__1a_ru_02” for “day__1_ru_02”) correspond to the “cloudy weather” variant of the preset.
  For example, the following presets are used for levels (the same IDs are the possible values for these fields):
  Taymyr:

Night	night_ru_02
NightToDay	night_to_day_ru_02
DayEarlyVariants	day__1_ru_02;day__1a_ru_02
DayMidVariants	day__2_ru_02;day__2a_ru_02
DayLateVariants	day__3_ru_02;day__3a_ru_02
DayToNight	day_to_night_ru_02

  Alaska:

Night	night_us_02
NightToDay	night_to_day_us_02
DayEarlyVariants	day__1_us_02;day__1a_us_02
DayMidVariants	day__2_us_02;day__2a_us_02
DayLateVariants	day__3_us_02;day__3a_us_02

DayToNight day_to_night_us_02

Michigan:

Night night_us_01

NightToDay night_to_day_us_01

DayEarlyVariants day__1_us_01;day__1a_us_01

DayMidVariants day__2_us_01;day__2a_us_01

DayLateVariants day__3_us_01;day__3a_us_01

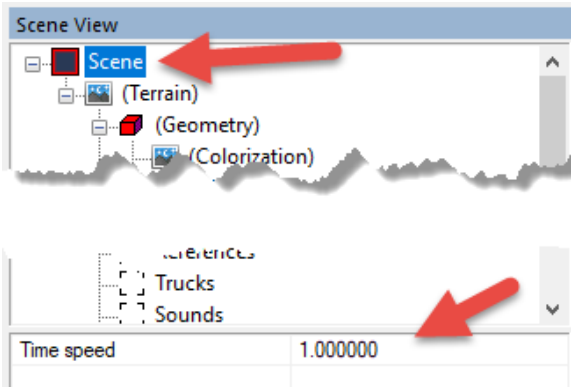
DayToNight day_to_night_us_01

NOTE: Mixing presets from different levels can result in an unpredicted result.
NOTE: Please be accurate while entering IDs of the **Daytime Presets**. Entered values must not contain spaces (spaces in these values may result in a crush).

- **Daytime Presets** > **Force** section - allows you to set one particular daytime preset for the level. This preset will not change with the game time. The section contains the following fields:
  - **Name** - the name (ID) of the daytime preset, see above.
  - **Night Factor** - the lighting condition in the specified preset: “Day”, “Night”, or “Night to Day”. This setting is necessary for the game logic that is related to the daytime. Using this value, it will be able to identify what time of the day should be used for the specified preset.
- **Description level** section - currently not used.
- **Extrudes To Wetness** - sets the humidity of the hidden mud (the more it is, the more liquid the dirt will be and the harder it will be to drive).
- **-threshold** - parameter for cutting minor mud. Recommended values are in the [0.05-0.2] interval:
  - For winter: 0.2
  - For warm seasons: below 0.15 (the best variant is 0.05).

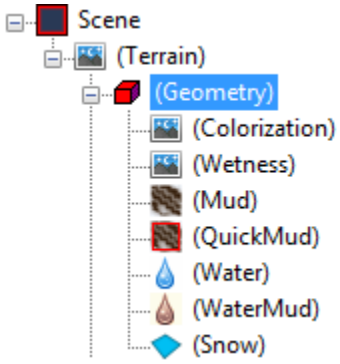
5.1.2. Scene Properties

After selecting the **Scene** section in the **Scene View** panel, you are able to set the speed of the in-game time that will be used for the scene in the lower part of the panel.



5.2. “Geometry” Brushes for Terrain

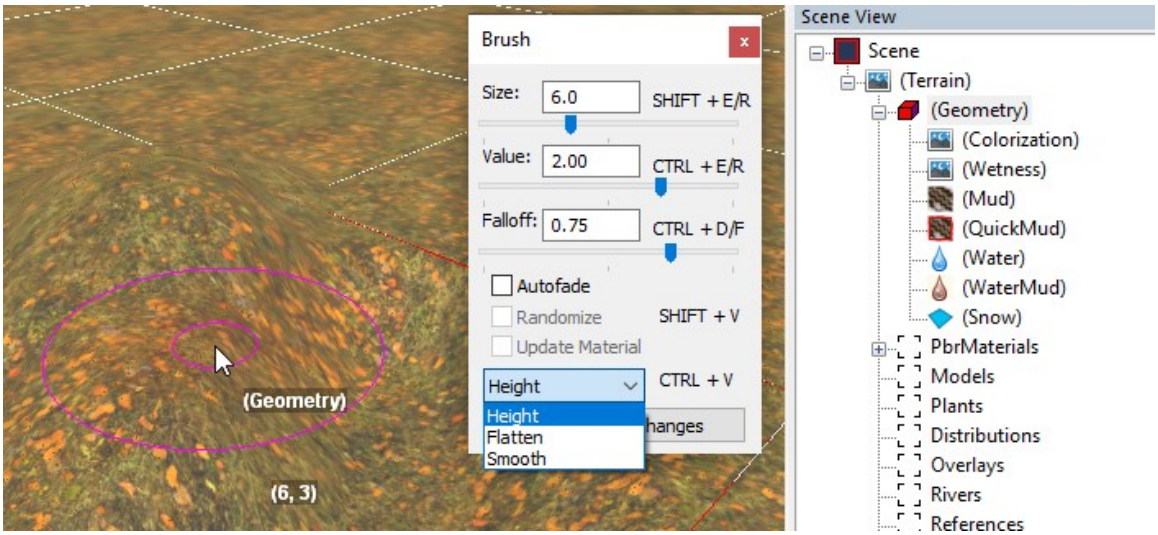
Geometry is the subsection of the **Terrain** section in Scene View.



When you select the **Geometry** node (or any of its sub-nodes) in the **Scene View**, the terrain editing menu (brush panel) of a certain kind will appear in the main panel of the Editor.

The **Geometry** section includes tools for working with the terrain surface.
Roughly speaking, by choosing the **Geometry** node or its sub-nodes - we select a brush with which we will work with the terrain surface.

Painting, using the selected brush, is performed by pressing and holding the right mouse button while moving the mouse. By pressing the left mouse button, you can apply the changes. For details on typical **Brush** dialog, see 3.3. Typical Brush dialog above.



When working with the **Geometry** brush itself (when the **Geometry** node itself is selected in the **Scene View** panel), you can edit heights and the geometry of the terrain. In the drop-down list, you can select one of the three operating modes:

- **Height** - Lowering or raising the surface. If the brush value is negative, recesses will be created on the terrain. If positive, bulges will be created.
- **Flatten** - Flattening of the surface alignment. I.e., the brush allows you to create flat surfaces when you hold the right mouse button. The height in the center of the brush is used as the height of flattening when you click the right mouse button.
- **Smooth** - smoothing for height differences. Smoothing occurs when the right mouse button is pressed. We recommended to set the Falloff value close to 0 for this brush.

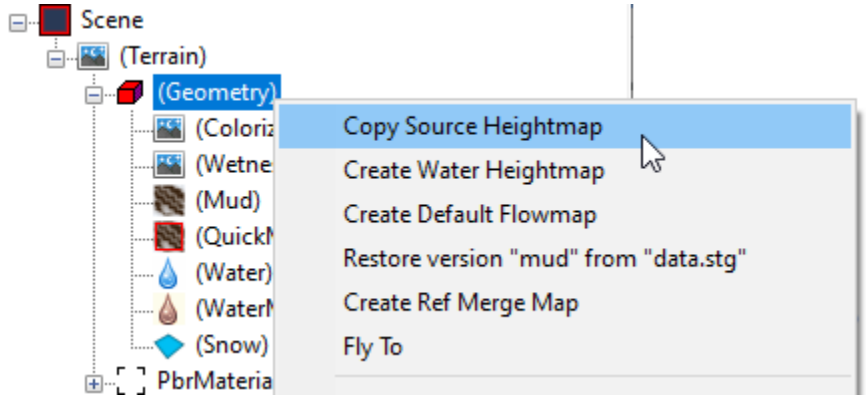
After setup of the brush, you can change the terrain surface by moving the brush and holding the right mouse button.

NOTE: Along with manual creation of the terrain, you can create a terrain in the third-party tool. For details, see 5.2.0.1. Copy Source Heightmap: Creation of Terrain by Third-Party Tool below.

The remaining brushes (sub-nodes of the **Geometry** node) are controlled in the same way. They are briefly described in the subsections below, starting with 5.2.1. Colorization. The 5.2.0 section below describes the context menu of the **Geometry** section.

5.2.0. Context menu of the “Geometry” section

The context menu of the **Geometry** section contains a set of commands that can be helpful in some cases. To open this menu, right-click the **Geometry** section in the **Scene View**.



For the description of these commands, see 5.2.0.N subsections below.

5.2.0.1. Copy Source Heightmap: Creation of Terrain by Third-Party Tool

The **Copy Source Heightmap** command is useful if you want to use the heightmap from some third-party tool and want to generate terrain for your map based on it.
Particularly:
When you create a new terrain in the Editor, it creates the **_height_source.png** texture in the source folder of the level (**Media\prebuild\<level_name>**). This texture has 1

channel and it must be 16-bit. If necessary, you can generate the heightmap for your map using a 3rd party tool and save the resulting heightmap to this texture. To add heightmap from this texture to your map in the Editor, you can use the **Copy Source Heightmap** command.

5.2.0.2. Create Water Heightmap: Useful Map of Water Surfaces

The **Create Water Heightmap** command creates the texture with a heightmap of water surfaces that were created as the River objects on the map (see 5.9. Adding Rivers and Water Objects). This texture is called **_water_height.png**, it has one channel, 16 bit.
This texture is ***not*** used by the Editor for the generation of the level. However, this texture can be used, if masks for layers and distributions are generated in third-party applications (e.g. Substance Designer or Houdini). Using this texture and a heightmap of the level, one can easily see where the map contains water and what is its depth.
For example, according to the data on this mask, one can generate the distribution of canes on the banks of water objects and a wetness mask near them.

5.2.0.3. Create Default Flowmap: Default Map of the Flow for River Objects

The **Create Default Flowmap** command creates the default map of the flow of water for the River objects on the map (see 5.9. Adding Rivers and Water Objects). This texture is called **_default_water_flow.tga**, it has 3 channels (RGB), 8 bit for each channel.
The R and G channels contain components of the speed vector (for U and V axes of the terrain correspondingly).
The default direction of the flow of the water is automatically calculated by the Editor, based on the height differences along the river spline and its curvature.
The **_default_water_flow.tga** texture is ***not*** used by the Editor for the generation of the level. However, it could be used to generate a more accurate flow map in third-party applications, using it together with the terrain heightmap and the water heightmap textures.
After tuning, this water flow texture can be renamed to the water flow texture used for the generation of the level - **_water_flow.tga**. If you enable the **UseFlowMap** option (set **UseFlowMap = True**) in the properties of the River object after doing this, the Editor will use the created **_water_flow.tga** texture when generating the level. Or, you can manually paint the River object with the **Water** brush in the Editor to specify the flow (see 5.9. Adding Rivers and Water Objects).

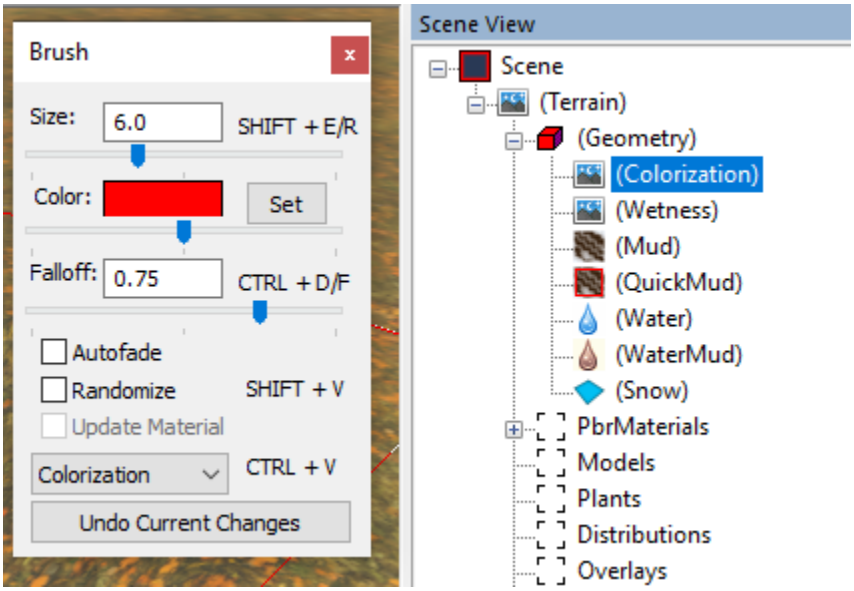
5.2.0.4. Restore version "mud" from "data.stg": Restoring Mud Data

The **Restore version "mud" from "data.stg"** command restores the mud data if it has become corrupted. This command overwrites the **mud** file (where the mud data is stored) with the data from the **data.stg** file, which contains all level data (including mud) in the binary format. The **data.stg** file is updated each time you save the level.

5.2.0.5. Create Ref Merge Map: Creation of a Mask for Merging a Reference

The **Create Ref Merge Map** command creates the **_ref_merge.tga** texture and enables the **RefMergeMask** brush that can be used to create a mask for merging a reference with your map. For more details, see 5.10.2. “RefMergeMask” brush.

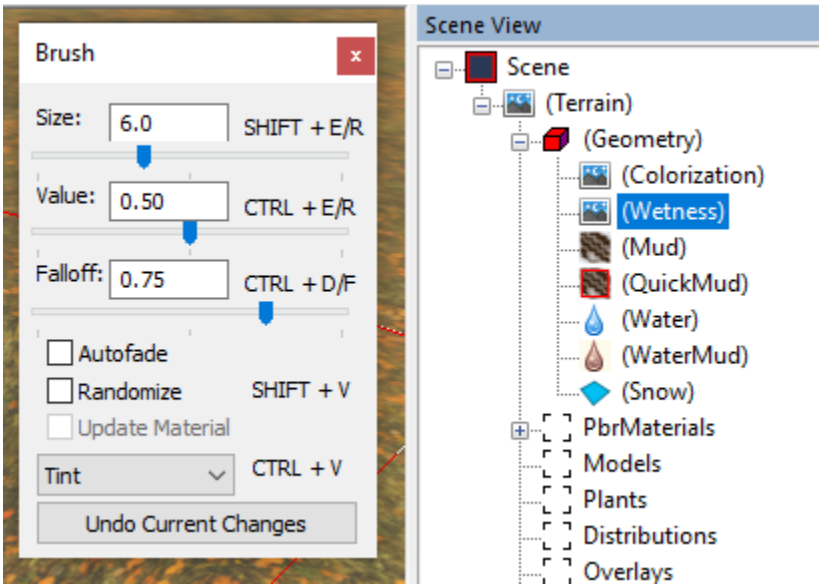
5.2.1. Colorization



The **Geometry > Colorization** brush allows you to paint the surface with a specified color.
In the **Color** parameter, you can specify the necessary color tint, and use the slider to specify how much this color will affect the surface.
If the slider pointer is located to the right from the middle of the slider, you will paint the terrain with the selected color. If the slider pointer is on the left - the brush will erase the color from the terrain. If the slider pointer is exactly in the middle of the slider, the brush will do nothing.
The **Set** button shows a color palette for selecting color.

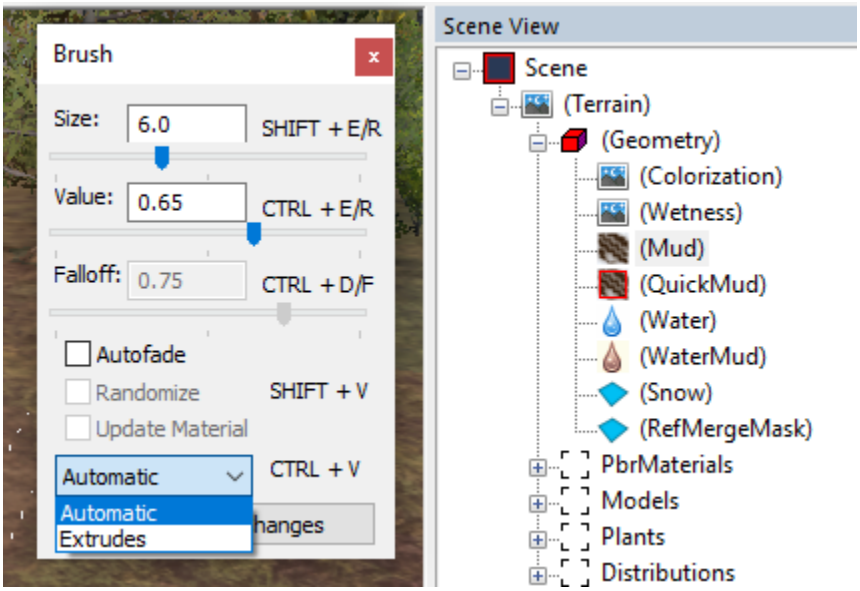
To paint with this brush hold the right mouse button.

5.2.2. Wetness

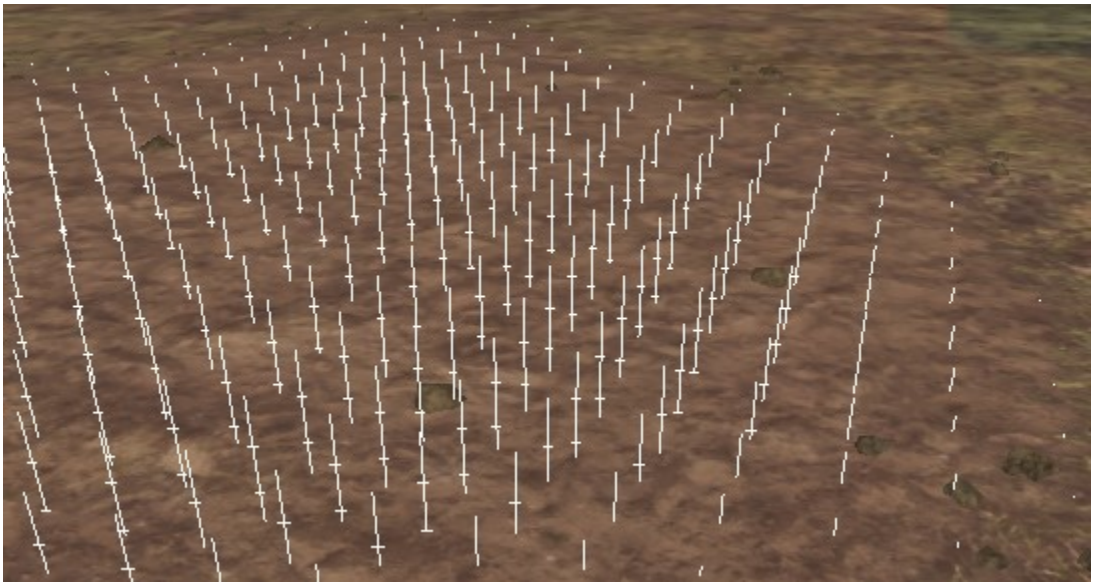


The **Geometry > Wetness** brush allows you to adjust the wetness of the surface. The higher the **Value** parameter is, the wetter the painted surface will be. The wetter the surface, the stronger the vehicle will get stuck in it even if the mud is not painted in this area. On winter maps, hard surfaces (e.g. winter asphalt, winter stone, ice) will become icy when painted with a wetness brush.

5.2.3. Mud



The **Geometry > Mud** brush allows you to add and edit mud on the terrain surface.



Mud is displayed on the surface as vertical lines with horizontal marks. The more marks the line has, the deeper the mud is at this point.
For example:

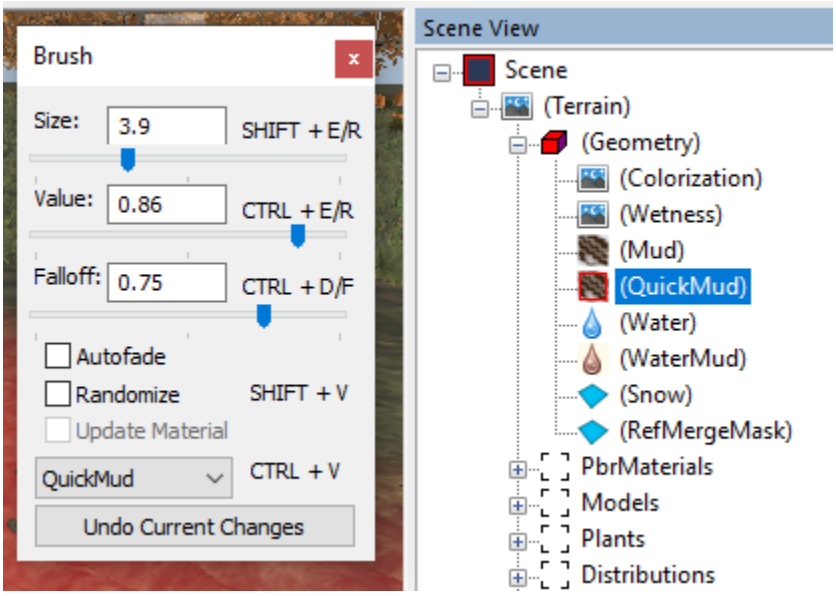
- The first horizontal mark is the boundary of the mud, which is passable by light and poorly prepared vehicles.
- The second mark is the boundary of mud passable by four-wheel-drive regular trucks with offroad tires.
- Below the second mark - almost everything will bog, except for heavy vehicles, upgraded to the maximum limit.

The higher the **Value** parameter of the brush is, the faster the brush will add depth to the mud. When the **Value** parameter has a negative value, the mud is reduced or erased.

In the drop-down menu, you can select two operating modes of the brush:

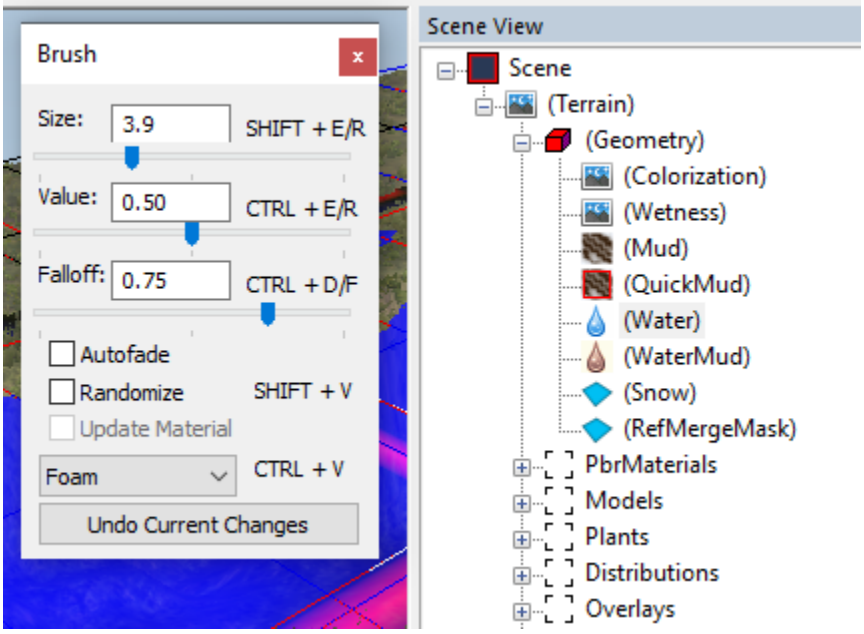
- **Automatic** - this mode adds mud and automatically paints the texture of the mud on the surface. This mud will be sufficiently hard and dried out if wetness or hidden mud is not painted on it (see below). To create mud traces, we recommend you to paint with a brush size of 0.5-0.8 meters. For light mud, the Value should be 0.54 - 0.56. For deep traces - 0.6 - 0.7.
- **Extrudes** - this mode adds depth to the mud on the terrain. In this case, the texture of the surface will not change. This is the “hidden mud” that the player will only see when the earth is wet in this place (automatic wetting is defined by the **Extrudes To Wetness** parameter in the **Terrain** section). This mud affects passability most of all.

5.2.4. Quick Mud



The **Geometry > QuickMud** brush allows you to paint mud with added ruts. This brush will paint the ruts, the friability of the soil, and its wetness at the same time.
It is used for quick painting of the mud on the badly broken roads.

5.2.5. Water



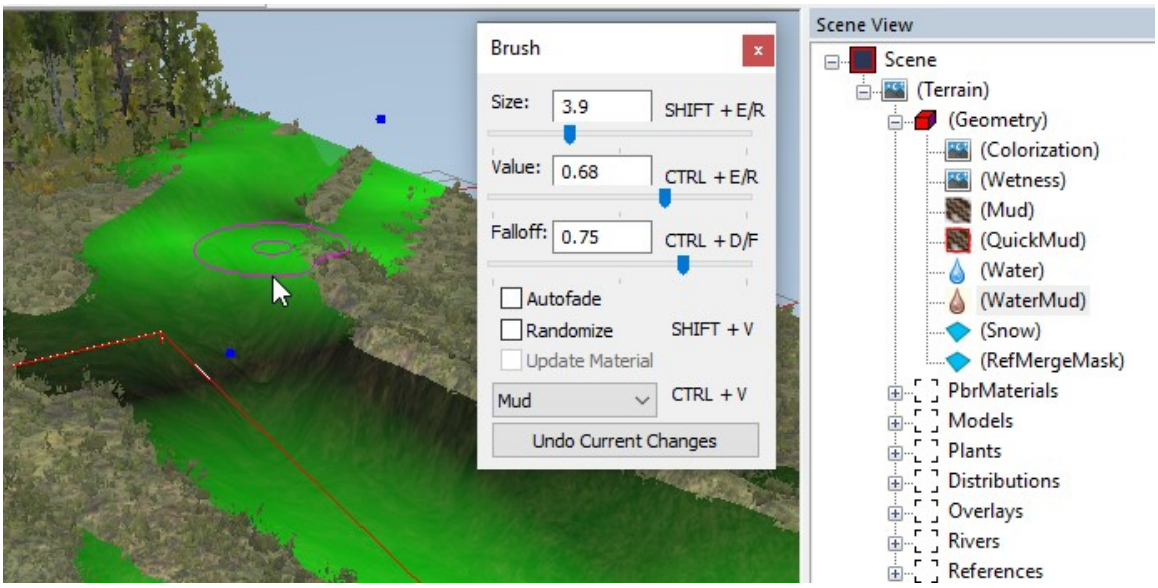
The **Geometry > Water** brush does ***not*** create water objects. It allows you to change the properties for *already created* **River** objects. The water flows themselves are created by the **River** tool (see 5.9. Adding Rivers and Water Objects).

Properties that can be changed with this brush:

- **Foam** - adds foam to the water surface.
- **Speed** - sets the speed of the water, separately from its direction (flow). By default, the flow direction goes from the 0 point of the **River** object to the next points (1, 2, etc.).
- **Flow** - Overrides the direction of the water flow, when the **River** object has the **UseFlowMap** parameter set to **True**.

NOTE: The mask for the foam is stored in the green channel of the **_water.tga** texture (in the map mod folder). The mask for the speed of water is stored in the blue channel of the same texture. The result of painting the flow of the river is stored in the **_water_flow.tga** texture. Along with manual painting of the flow of the river, you can generate a default flow map and then tune it with a third-party tool (see 5.2.0.3 for details).

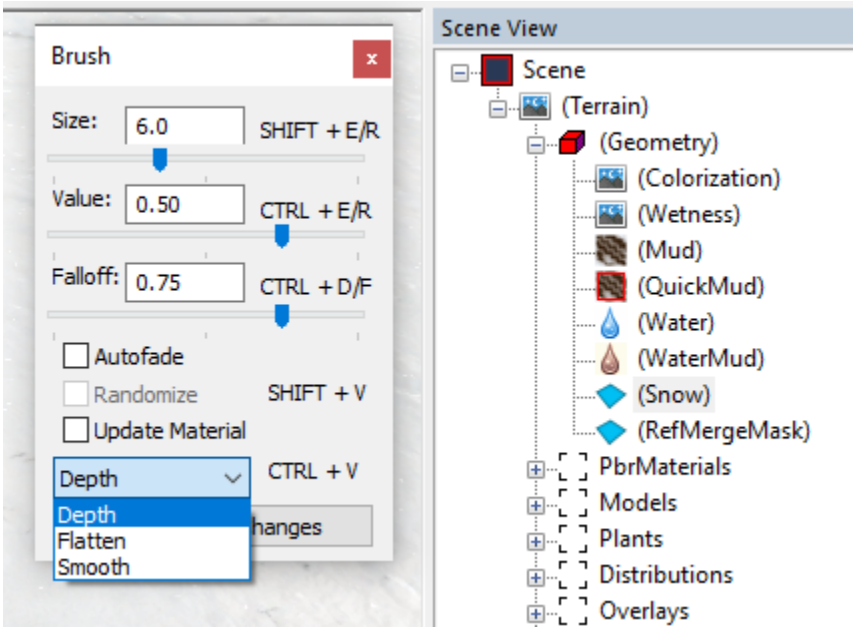
5.2.6. Water Mud



The **Geometry > WaterMud** brush allows you to paint dirty or muddy areas of water (it allows you to repaint water objects). The color and properties of muddy water are set in the **River** object (see 5.9. Adding Rivers and Water Objects).

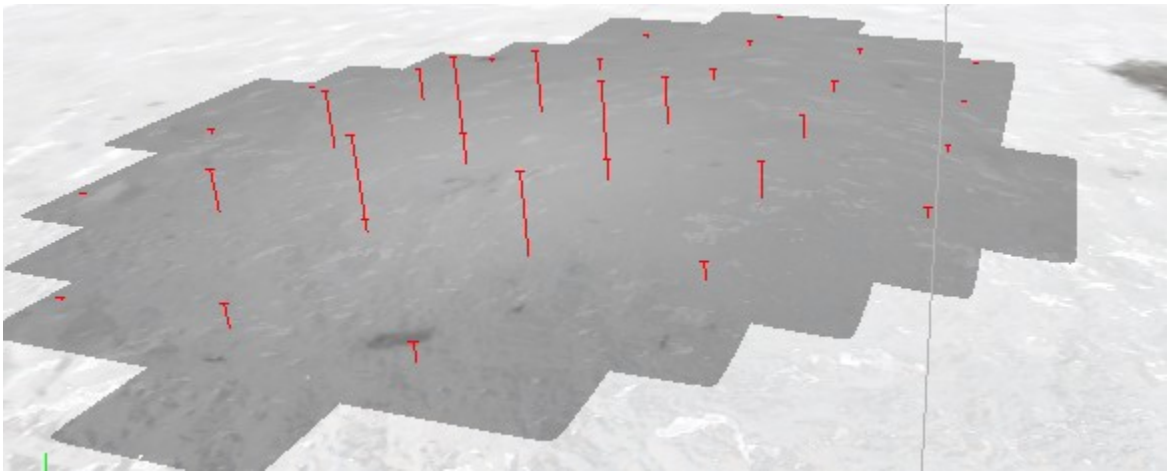
As opposed to the regular mud, the water mud simply affects the color of the river. I.e., according to the painted areas, the game will perform blending of the two river colors. These colors are set for the river in its properties: **Clean Type** (for clear water) and **Muddy Type** (for muddy water).

5.2.7. Snow



The **Geometry > Snow** brush allows you to control the depth of snow.
This brush can only be used on the snow terrain layer, after painting it with the **snow_layer** layer of the corresponding PBR material (see 5.3. below). You can paint using this brush if there is at least a little layer of snow terrain in the painted area. For example, if 0 amount of the snow is painted on the layer, then there will be no deep snow; however, if the weight of the snow on the snow layer is 50%, then deep snow can be painted. This is done so to avoid sharp "steps" of the deep snow (since on the map of the deep snow 1 pixel equals to 50cm).

As with mud (see 5.2.3. Mud above), after painting with the depth of the snow, a region with vertical lines with horizontal marks will appear on the terrain. The more horizontal marks are displayed on the vertical line, the deeper the snow is.



IMPORTANT: if there is a solid ground under the snow and there is no mud, the car will not sink in the snow for more than a half of a wheel. If the snow is deeper than 1 horizontal mark (see screenshot above) and there is a hidden mud (mud of the "**Extrudes**" type) under the snow, the car will sink deeper in the snow and will bury itself in the snow below the level of the wheels.

Properties:

- **Depth** - sets the depth of snow (similarly to Mud).
- **Flatten** - flattens snow depth.
- **Smooth** - smooths transitions between sections of snow with different depths.

By enabling the **Update material** option in the **Brush** window, you can add both the depth of the snow and the **snow_layer** itself, simultaneously.

NOTE: If you are creating a large level and are working with snow (painting depth or working with a material with the **snow_later**), then we recommend you to disable the autorebuild of the terrain. Otherwise, the autorebuild and/or any operation with the material will take a long time.

To view the final result of the performed changes, you need to rebuild the scene. To do this, right-click the scene window and select **Rebuild Terrain** or **Rebuild Visible / Selection** (to rebuild only visible or selected areas).

After painting with the depth of snow - the system will mark this level as snowy. And, only after that, the **soft_snow** and **crust_snow** layers can be applied (see 5.3.1. for details). They will be available only after performing **Rebuild Terrain** also.

5.2.8. RefMergeMask (only for References)

The **Geometry > RefMergeMask** brush is used for references. It is hidden in the UI by default. For details on it, see 5.10.2. "RefMergeMask" brush and 5.10. Adding References below.

5.3. Assigning PBR Materials to Terrain

The **PbrMaterials** section of the **Scene View** panel allows you to create PBR (Physically-Based Rendering) terrain materials with layers and paint the terrain with them.

To create a material:

1. Right-click the terrain (or the **PbrMaterials** section of the **Scene View** panel).
2. Select **Add PbrMaterial** in the context menu.

After that, a new material with 4 layers will be created. You can create a maximum of 4 such materials with 4 layers.

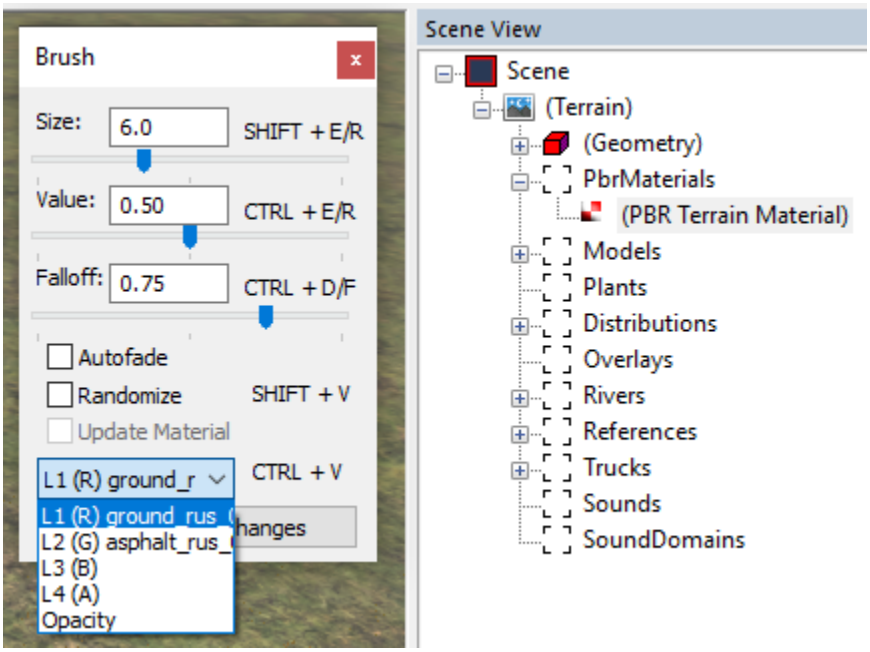
IMPORTANT: At winter levels containing snow, you can use only 3 layers of the material. The third layer should always be the snow (**snow_layer**).

After the creation of the material, its settings can be specified at the lower part of the **Scene View** panel (after selection of this material). We recommend to use almost the same values of settings for all materials of the level.
For example, sample material settings:

- For winter maps:
  - **AlbedoWetnessMult**="1"
  - **RoughnessWetnessMult**="1"
- For summer and autumn maps:
  - **AlbedoWetnessMult**="2"
  - **RoughnessWetnessMult**="0,5"

The usage of the same settings for all materials of the level is important for the convenience of painting and the absence of sharp boundaries between different materials.

The brush for painting with material contains a drop-down list with a selection of paint layers.



Painting with a layer is performed by holding the right mouse button. Whether the layer will be added or removed - depends on the value of the **Value** slider. If the **Value** is

greater than 0.50, then the layer will be added, if it is less than 0.50, then the layer will be erased.

The list of layers in the brush also contains the **Opacity** mode. This mode corresponds to painting the block with the selected material.

5.3.1. Material properties

Properties of the material can be specified at the lower part of the **Scene View** panel (after selecting this material in the **Scene View** panel).

Some brief notes on these properties:

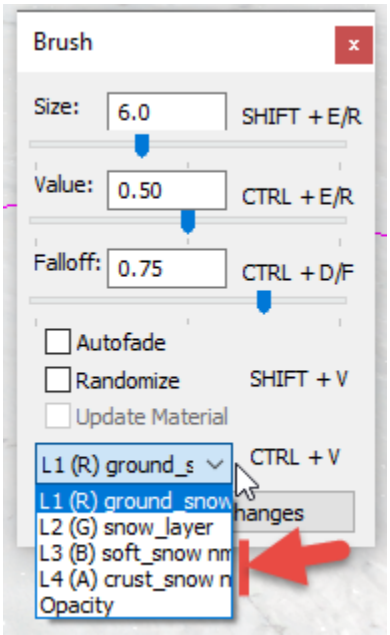
AlbedoWetnessMult - the coefficient that determines how much the existing wetness will darken the texture of the terrain.

RoughnessWetnessMult - the coefficient that determines how much the existing wetness will affect the roughness of the texture of terrain.

About **Layer 1**, **Layer 2**, **Layer 3** sections and these layers:

- To specify the particular layer, click **[press]** next to the **[Choose file]** field.
- On selecting layers:
    - as the first layer (**Layer 1**) we recommend choosing grass
    - as the second layer (**Layer 2**) we recommend choosing ground or rock or gravel.
    - on snowy levels, the third layer (**Layer 3**) should always be the **snow_layer**.
- Materials with the **_snowy** suffix in the name are designed specifically for winter levels.

The brush control changes when painting snowy levels. In this case, additional layers automatically appear in it:

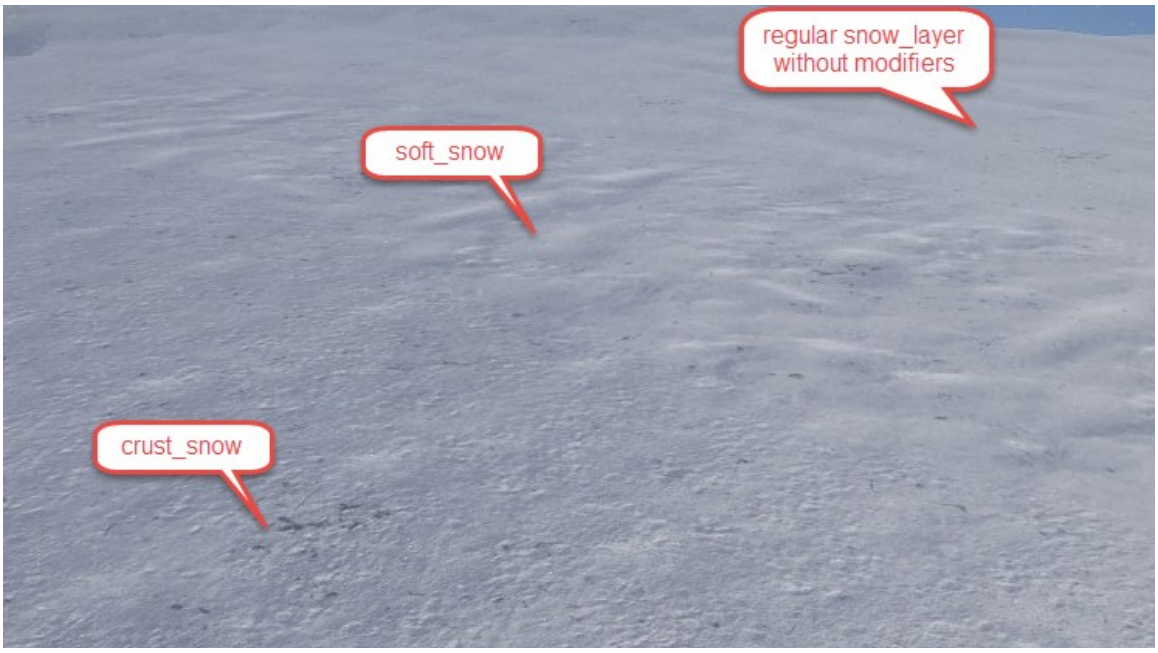


NOTE: A level is considered snowy, if, somewhere on it, the snow depth is painted using the **Geometry > Snow** brush (see above). Painting will not be active until you make **Rebuild Terrain** and save the level.

In particular, the **soft_snow** and **crust_snow** layers will appear in the drop-down menu of layer selection. These layers are modifiers of the already painted snow layer. They need to be painted over a layer of snow.

- **soft_snow** - soft snow, it is typically painted mainly in the areas that contain a forest, bushes, and a lot of plants.
- **crust_snow** - compressed snow with hard lumps, it is typically painted along the edges of the road.

These layers change the normal map of the **snow_layer** only. This is necessary to vary the snow appearance as described above. The results of painting with these layers cannot be seen in the Editor itself, but are visible in the game.



Tiling scale - the tiling scale of texture. Recommended values:

- for grass, earth, and sand - 5
- for rocks - 1
- for gravel - 3
- for snow - 2.2

HM blending contrast - the smoothness of the border when blending layers. Recommended values:

- for soft surfaces - 0.7-0.8
- for hard surfaces - 0.8-0.9

5.4. Adding Snow and Ice

This section gives a summary on snow and ice creation and links to other sections for more details.

To create a snow/ice coverage on the map:

1. Create a **PBR Material** that contains the **snow_layer**. The **snow_layer** texture must be selected as the **Layer 3** of this material. layers are up to you, but probably you will want to select textures in a winter setting for them. See 5.3. Assigning PBR Materials to Terrain and 5.3.1. Material properties for details.
2. Paint with the **Layer 3 (snow_layer)** the areas of the map you want to cover with snow. See 5.3 and 5.3.1 for details.
3. Using the **Geometry > Snow** brush, add the depth to the snow in the areas painted with the **snow_layer**. For more details, see 5.2.7. Snow.
   After using this brush, perform **Rebuild Terrain**.

4. Since you have painted snow depth in some areas, the Editor will consider that your map is snowy and will automatically display additional layers within the Brush available *for your PBR Material*. Particularly, you will see the **soft_snow** and **crust_snow** layers there (see 5.3.1. Material properties for details). Usage of these layers is the following:
    - **soft_snow** - soft snow, it is typically painted mainly in the areas that contain a forest, bushes, and a lot of plants.
    - **crust_snow** - compressed snow with hard lumps, it is typically painted along the edges of the road.
      NOTE: These layers change the normal map of the **snow_layer** only. This is necessary to vary the snow appearance as described above. The results of painting with these layers cannot be seen in the Editor itself, but are visible in the game.
5. Paint the necessary areas with the **soft_snow** and **crust_snow** layers.
6. Now, if your map contains some hard surfaces (e.g. winter asphalt, winter stone, ice) as layers of your **PBR Material**, you can make them icy by painting them with the **Geometry > Wetness** brush, see 5.2.2. Wetness.
7. If you enable the **Settings > Show Snow By Up Vector** option in the main menu, you will view the snow cover effect for models and plants on the scene, according to their texture settings.

Frozen rivers, lakes, and other ice surfaces are created as a terrain with the material containing either **ice_01** or **ice_02** texture as a layer. They are ***not*** created as regular River objects.

Falling snow and other meteo conditions are specified in the **Daytime Presets** (see 5.1.1. Terrain Properties).

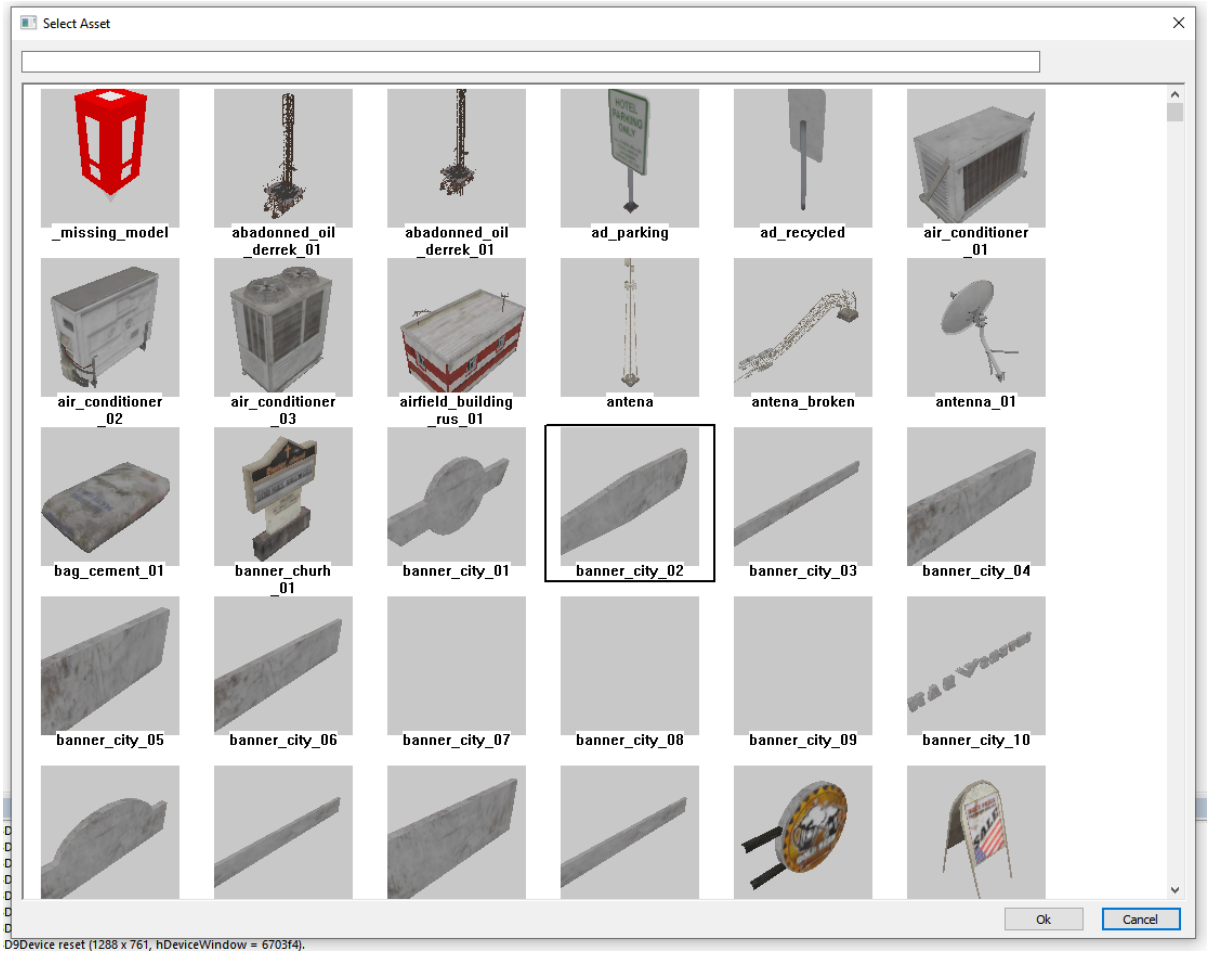
5.5. Adding Models

Editor allows you to add different models to the scene.

NOTE: In the alpha version of the Editor, you cannot add custom models to the scene. You can use only models from the predefined list.

To add a model, right-click the scene (or the **Models** section in the **Scene View**), and select **Add Model** from the context menu.

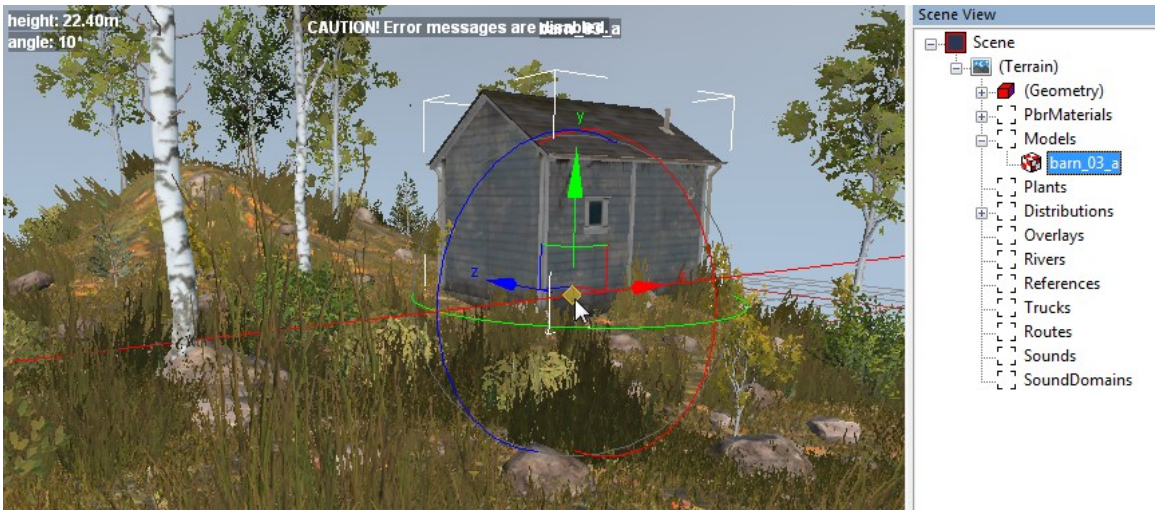
After doing this, the model selection window will be opened:



You can search for the particular model in this window if you know its name. The search query should be specified in the text field above the list.

NOTE: For some info on model types, see 5.5.1. Recommendations for models below.

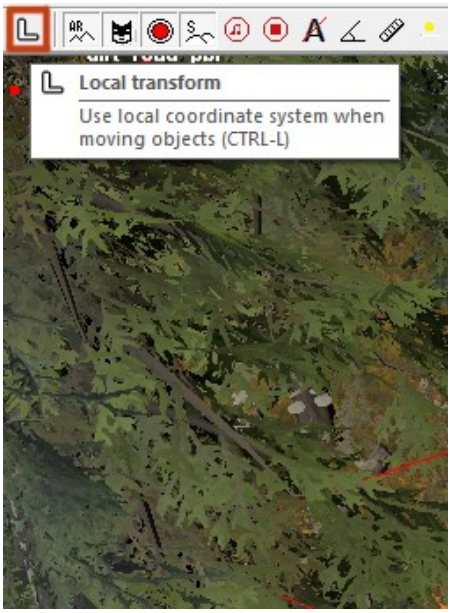
Double-click on the selected model in this window will add it to the map.



You can move, rotate, or scale the model on the map.
Moving and rotating is performed in the standard way, using arrows and circles displayed around the model (see screenshot above). To scale a model, you need to hover the mouse over the yellow rhomb displayed in the center of the coordinates of the model, then hold the left mouse button and scale the model as necessary by moving the mouse.
The same parameters can be specified in the lower part of the **Scene View** panel, within the **Position**, **Rotation**, and **Scale** fields.

Group	MainGroups
Brand	can_03
Tag	
⊟ Position	
X	288.092468
Y	77.505989
Z	226.593445
⊟ Rotation	
X	0.000000
Y	-0.000000
Z	-0.000000
Scale	1.025280
Disable Day Static Shadow	False
Disable Night Static Shadow	False
Animation Camera Frame Name	<No anim camera frames with...

There are also two coordinate modes for controlling the model: local and global:



If you enable the **Local transform** mode, then the axes of the model will correspond to its position. If you disable this mode, then the axes along which you can move the model will correspond to the coordinate grid of the entire map.

5.5.1. Recommendations for models

- Models with the **us** suffix are typically used for US maps.
- Models with the **rus** suffix are typically used for Russian maps.
- **farplane** objects correspond to mountains used for far planes.
- Regarding scale for rocks:
    - **rock_03** - recommended scale value: 3-5
    - **rock_04** - recommended scale value: 6-10
    - **rock_05** - recommended scale value: 4-7
    - **rock_06** - recommended scale value: 6-10
    - **rock_07** - recommended scale value: 1-2

5.6. Adding Plants

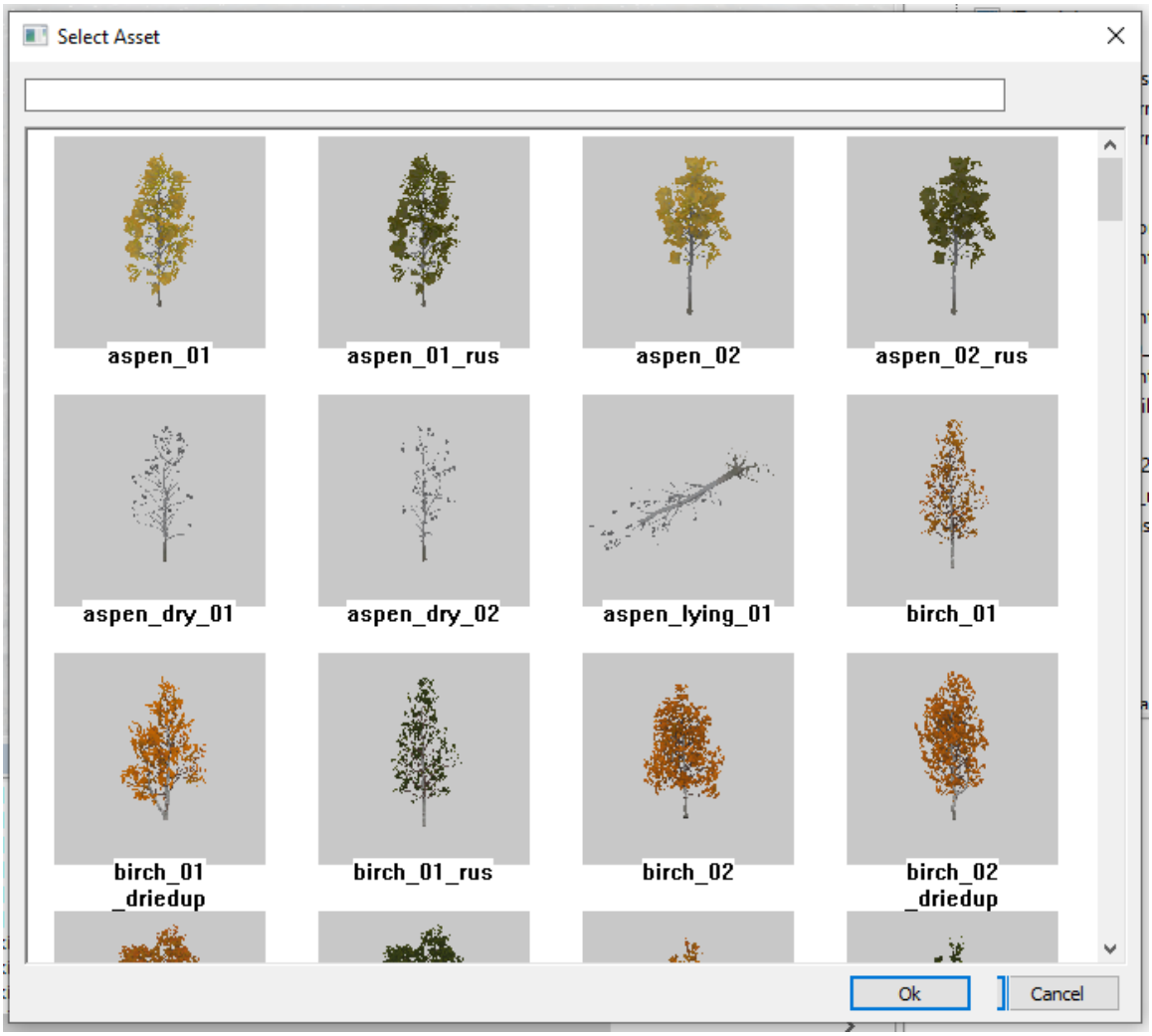
The list of models does not include plants. They are added to the scene separately.

The way you add plants to the map depends on how many plants you want to add:

- If you want to add a single plant, it can be done as described in this section.
- If you want to add multiple plants at once, it can be done with the help of the appropriate Distribution (see 5.7. below).

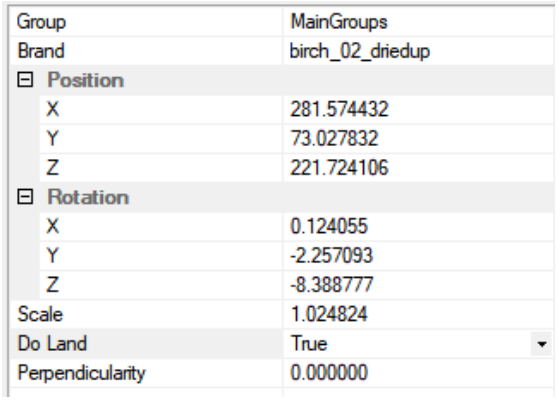
Single plants are added to the map similarly to the models.

You right-click the scene (or the **Plants** section in the **Scene View**) and select **Add Plant** from the context menu.
After doing this, the window with the list of the plants will open. You can search the list and double-click the necessary plant to add it to the map.



Moving, rotating, and scaling the plants are also performed similarly to models.

There are practically no differences, but in the settings of the plant itself there are several additional parameters:



These additional parameters are the following:

- **Do Land** - If this option is set to **True**, the plant will always be attached to the terrain. This allows you to avoid situations when a tree is hanging in the air.
- **Perpendicularity** - Perpendicularity to the coordinate grid. This is a useful setting for trees growing on steep hills and mountains. The value of this value is specified by the slider that appears to the right of the value when you click on it.

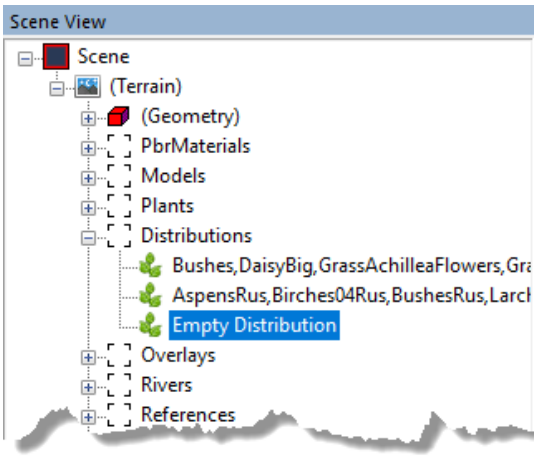
5.7. Adding Multiple Objects via Distribution

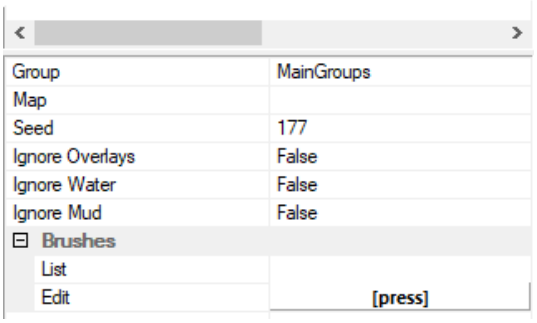
Adding large amounts of trees and other plants is much more convenient with the help of the **Distribution** map and usage of the **Distribution** brush. Besides, using Distributions you can add not only plants, but also stones, debris, and so on. (What you will add depends on the brush set you choose, see below).

To create a new **Distribution** object:

First of all, right click the terrain (or the **Distributions** section in the **Scene View** panel) and select **Add Distribution** in the context menu.

After doing this, the new **Empty Distribution** object will appear in the **Distributions** section in the **Scene View** panel.

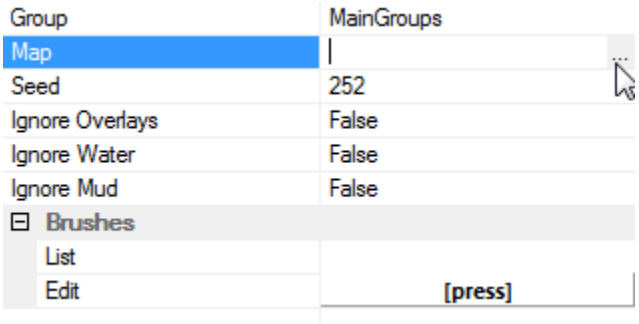




Now you need to create a map for this **Distribution** object and specify settings for plants that you will be adding using this Distribution.

Particularly, you will need to specify the following fields in the lower part of the **Scene View** panel:

- **Map** - In this field, you need to create the file of the Distribution map itself. To do this, you need to click on the **Map** field and then click the ··· button displayed on the right side of it.

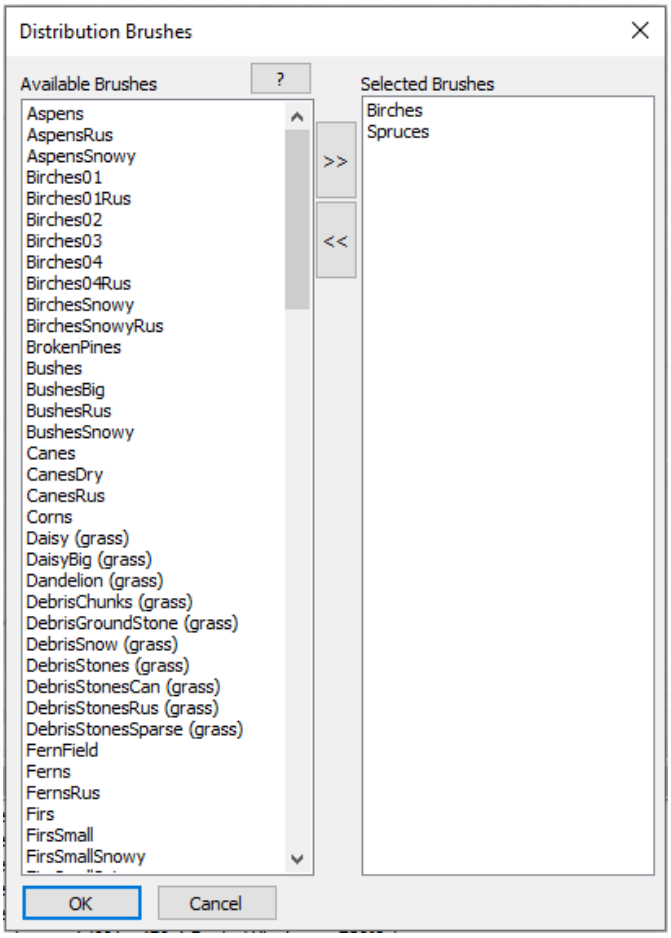


  After that, you need to specify the name of the new file of the Distribution map in the appearing window. This name must start with the **dstr_** suffix and must end with the **.tga** extension. For example, **dstr_spruces_1.tga**
  After clicking **Open** in this window, the file with the specified name will be created, and the

brush for this distribution map will appear in the main window of the Editor.

- After that, you can specify properties for ignoring some areas of the map. Particularly, by default, plants cannot grow through roads, water, and mud. However, after switching the necessary parameter to **True**, you can become able to add plants on these surfaces:
    - **Ignore Overlays** - allows you to paint Distributions over roads.
    - **Ignore Water** - allows you to paint Distributions under the water.
    - **Ignore Mud** - allows you to paint Distributions over the mud.

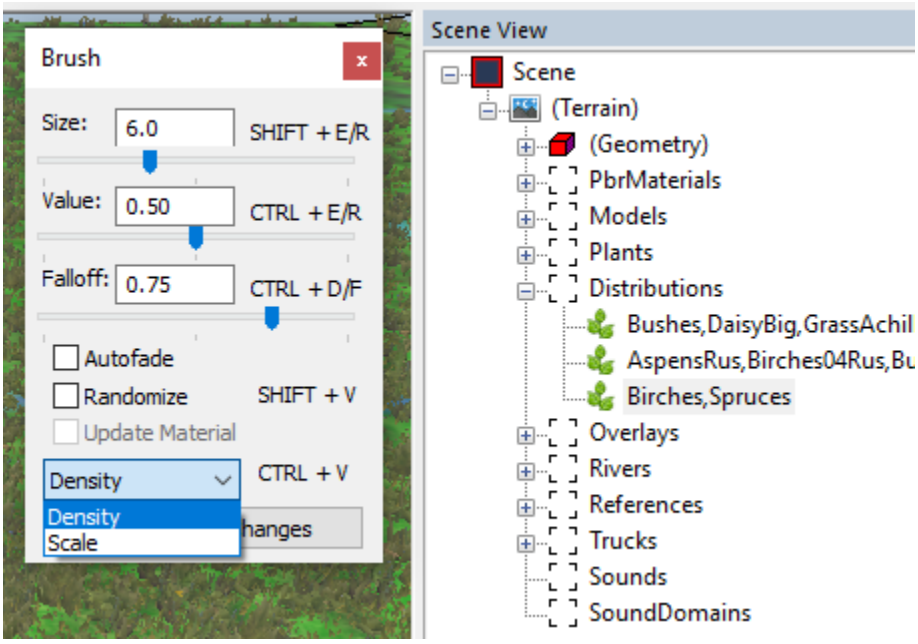
- In the **Brushes** section, you need to set up brushes for the Distribution. When setting up brushes, you can add to a Distribution a single brush or multiple brushes at once. For example, in addition to a brush for a particular plant, you can add brushes for other types of plants, brushes for mushrooms, leaves, stones, etc.
  To set up brushes, you need to click the **[press]** button next to the **Edit** field.
  After doing this, the **Distribution Brushes** window will appear:



It allows you to select brushes you will use when you will be painting with this Distribution. On the left side of this window, there is a list of all brushes available in the Editor. On the

right, there is a list of brushes added to this Distribution. You can move brushes from the left list to the right and back using the arrows between these lists.
For example, if, within this Distribution, you want to add aspens (**Aspens**) to the map along with small stones (**SmallRocks**), then you will need to add these brushes to the **Selected Brushes** list on the right. Once you added all necessary brushes to this list, click **OK**. After that, all these brushes will be combined into one brush for painting, and the name in the Distributions list will display the set of brushes selected for this Distribution.

After setting up brushes, you can start painting, i.e. start filling the map with plants or other objects these brushes correspond to.



When you select the necessary Distribution in the **Distributions** section of the Scene View panel, the **Brush** window appears in the main panel of the Editor (see screenshot above).
This window corresponds to all the brushes that you selected in the Distribution, and allows you to paint with them as if you were painting with one brush. The **Size**, **Value**, and **Falloff** parameters are responsible for the size, strength, and softness of this brush, respectively. The **Randomize** option allows you to plant your objects unevenly.

Along with these parameters, the **Brush** window also has two modes that can be selected in the drop-down list:

- **Density** - The density of plants in the painted area. The higher the **Value** parameter is in this mode, the denser the plants will be added. To add plants to the area, the **Value** parameter must be higher than 0.50. To erase plants from the area - it must be below 0.50.
- **Scale** - The scale of the plants. In this case, the **Value** parameter is responsible for the size of plants in the painted area.

After setting up the parameters in the Brush window, you can paint with this brush by holding the right button of the mouse.

NOTE: You can see the final appearance of the added plants only after rebuilding the terrain of the scene. To rebuild it, right-click the **Terrain** section in the **Scene View** panel and select **Rebuild Terrain** in the context menu.

5.7.1. Recommendations for painting with Distributions

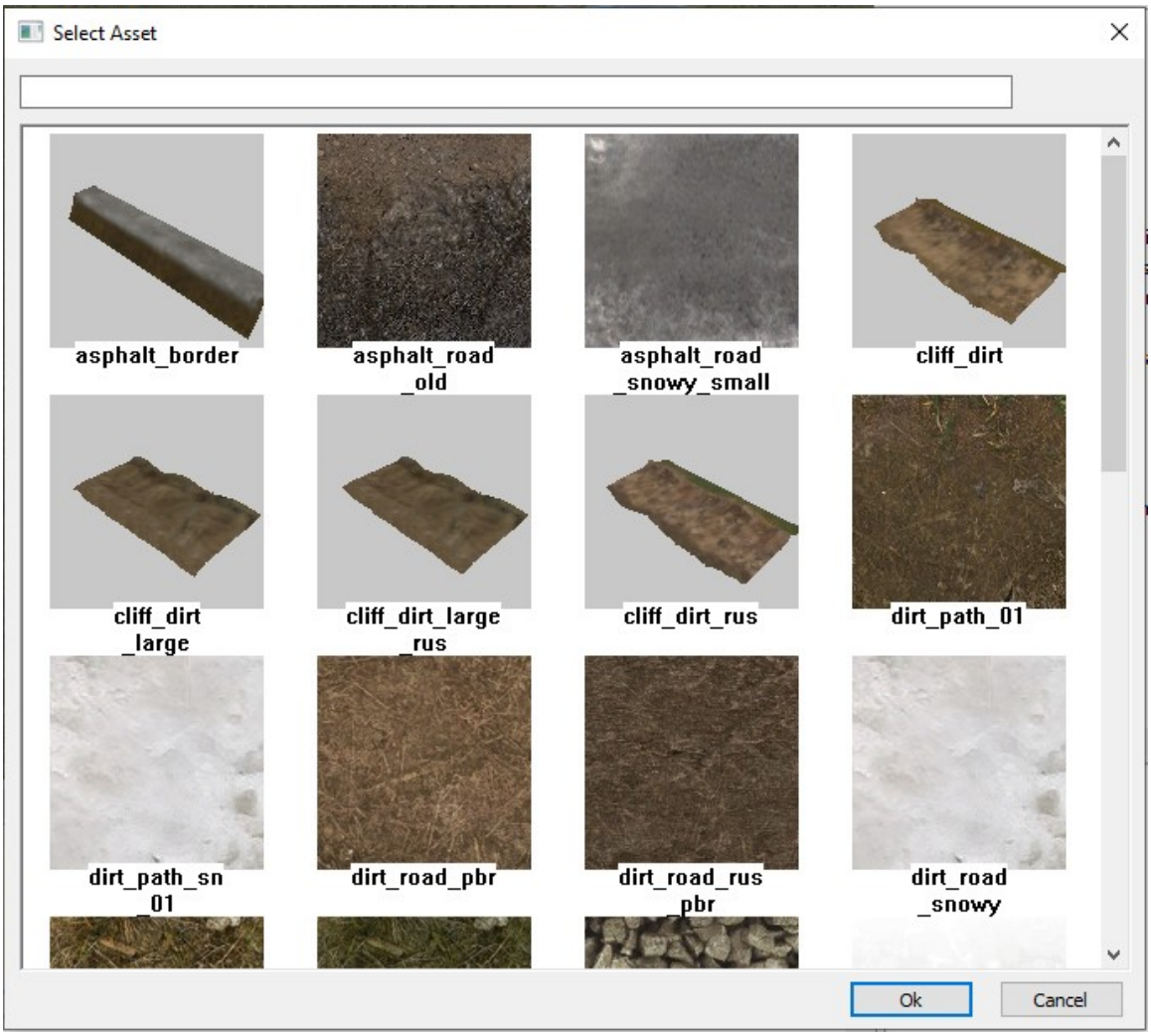
- When painting plants in the **Density** mode, the recommended **Value** = 1.
- When painting rocks/debris in the **Density** mode, the recommended **Value** = 0.7. To make the rocks more chaotic, you can use, for example, the following **Scale** settings for painting:
    - **Size** = 0.6
    - **Value** = 1.0
    - **Falloff** = 0.07
    - **Autofade** = false
    - **Randomize** = true
- When painting canes (**Canes**) in the **Density** mode, the recommended **Value** = 0.6.
- We recommend setting the **Falloff** value close to 0.
- The higher the mountains, the smaller the trees. On distant high mountains we recommend you to use the mature trees, but with a lower **Scale** value. This will allow them to disappear from a greater distance, and then the silhouette of the mountain will be visible longer.

5.8. Adding Overlays

On your map, you can lay roads of several types and add some decorative objects that use a system of curves: railroad tracks, wires, pipes, etc.
All these objects are added to the map in the form of the **Overlay** objects. These objects stretch along the curve that is created by this tool.

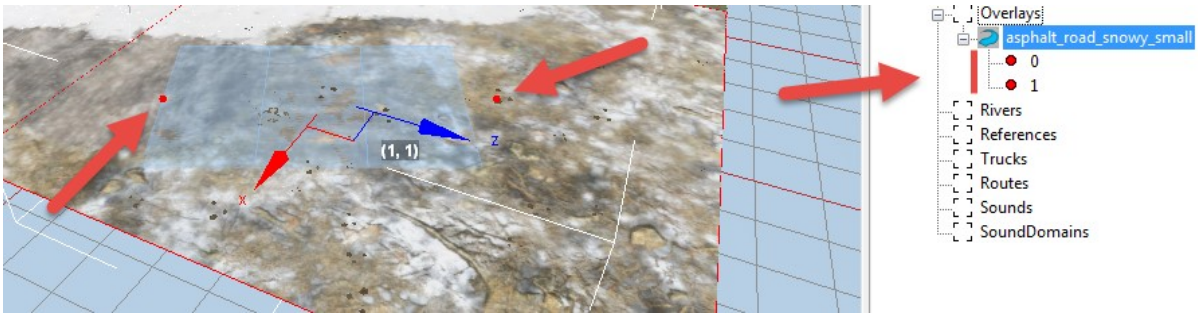
To add an overlay to the map, you need to perform right-click on the terrain (or, on the **Overlays** section in the **Scene View** panel), and select **Add Overlay** in the context menu.

After doing this, the overlay selection window will appear.

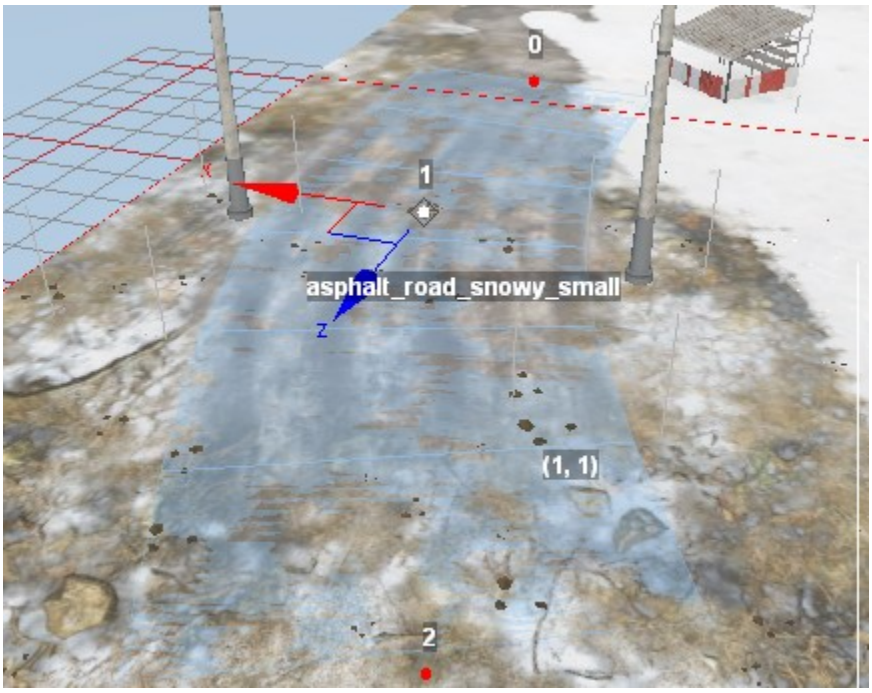


To add selected overlay to the map, you need to double-click it in this window. After doing this, the new overlay, which will contain two points, will be added to the map.

Each point of the overlay has its number, and these numbers begin with 0. You can expand an overlay object in the **Scene View** window and determine the number of its points. The same points can be seen in the main scene window:



You can add new points to the overlay, to set a more sophisticated curve for it. To add a new point, you can select one of the existing points of the overlay, right-click it, and select **Add after** or **Add Before**. Depending on the selected command, a dot will be added to the overlay either between the current number and the number before it or between the current number and the number after it.



For example, If we select point **#1** on the screenshot above, right-click it, and select **Add before**, then the new point will appear between the point **#0** and point **#1**. If you select **Add After**, then the new point will be added between the point **#1** and point **#2**. If you select point **#0** and then perform **Add before** - or select point **#2** and then perform **Add after**, the overlay will be extended.

Points of the overlay can be moved similarly to moving models. To do this, you can:

- select the particular point of the overlay and, using arrows and holding the left mouse button, move the point as necessary.
  OR
- select the particular point of the overlay, then, in the properties of this point, change values of the **Position** X and/or **Position Y** fields.

An overlay as a whole can also be moved (similarly to moving models).

Along with that, you can also change the width of the overlay in the particular point. To do this, you can:

- hold the left mouse button in the center of the coordinates of the overlay, then move the mouse to the side, increasing or decreasing the width.
  OR

- select the particular point of the overlay, then, in the properties of this point, change the value of the **Width** field.

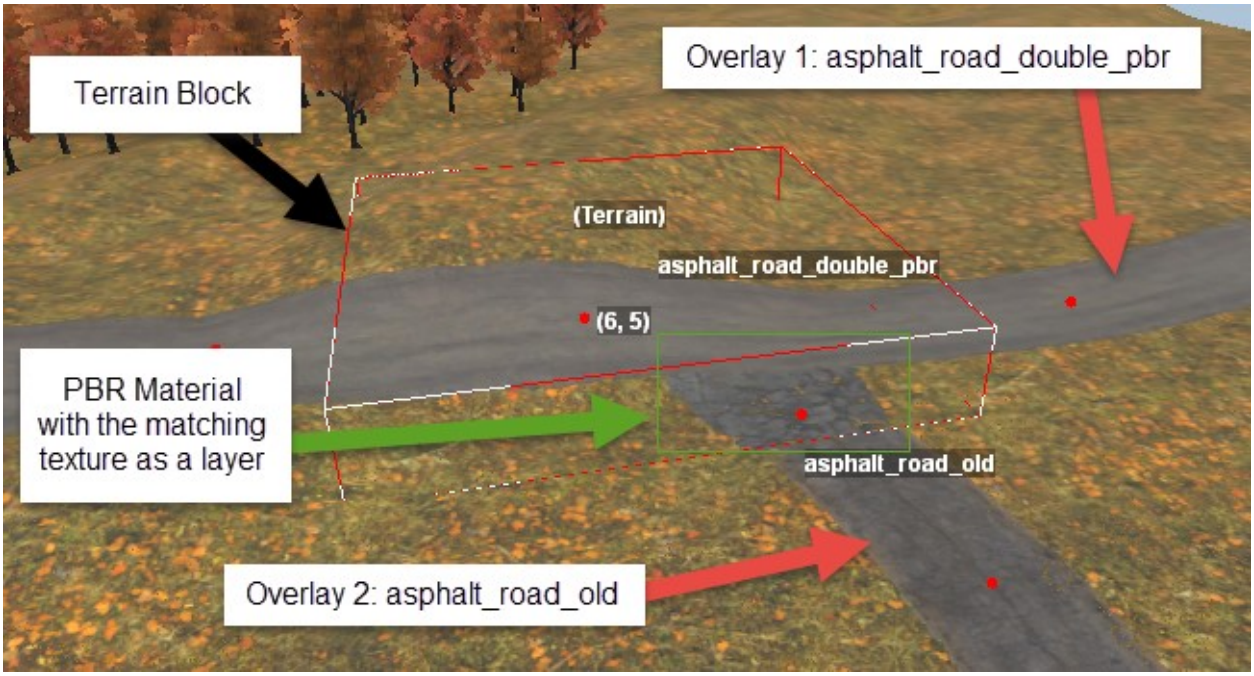
NOTE: Overlay will be updated after each operation that changes it. However, some parts of it may disappear, if they are out of the scope of the camera. You can see the final view of the overlay by rebuilding the scene (right-click in the scene window, then **Rebuild Terrain** in the context menu).

5.8.1. Important Limitation: “1 road type per terrain block”

Engine of the game has a technical limitation: it can render only one *textural* overlay (overlay which is rendered over terrain) within 1 terrain block.
So, you are not able to use different types of roads within 1 terrain block. The border of the terrain block is marked by the red cube that appears after clicking the terrain with the left mouse button.
If you add multiple types of roads to a single block, then part of them may become invisible. However, you can add textural and non-textural overlays to one block (e.g. road + wires).

However, there is a workaround for this. If you need to create an intersection of roads of different types within 1 terrain block, you can do the following:

1. Place the main parts of different roads on different terrain blocks.
2. In the intersection area, paint the terrain between roads using the PBR material where the road texture is selected as one of the layers.



As an alternative option, you can hide the intersection under the layer of snow, mud, etc.

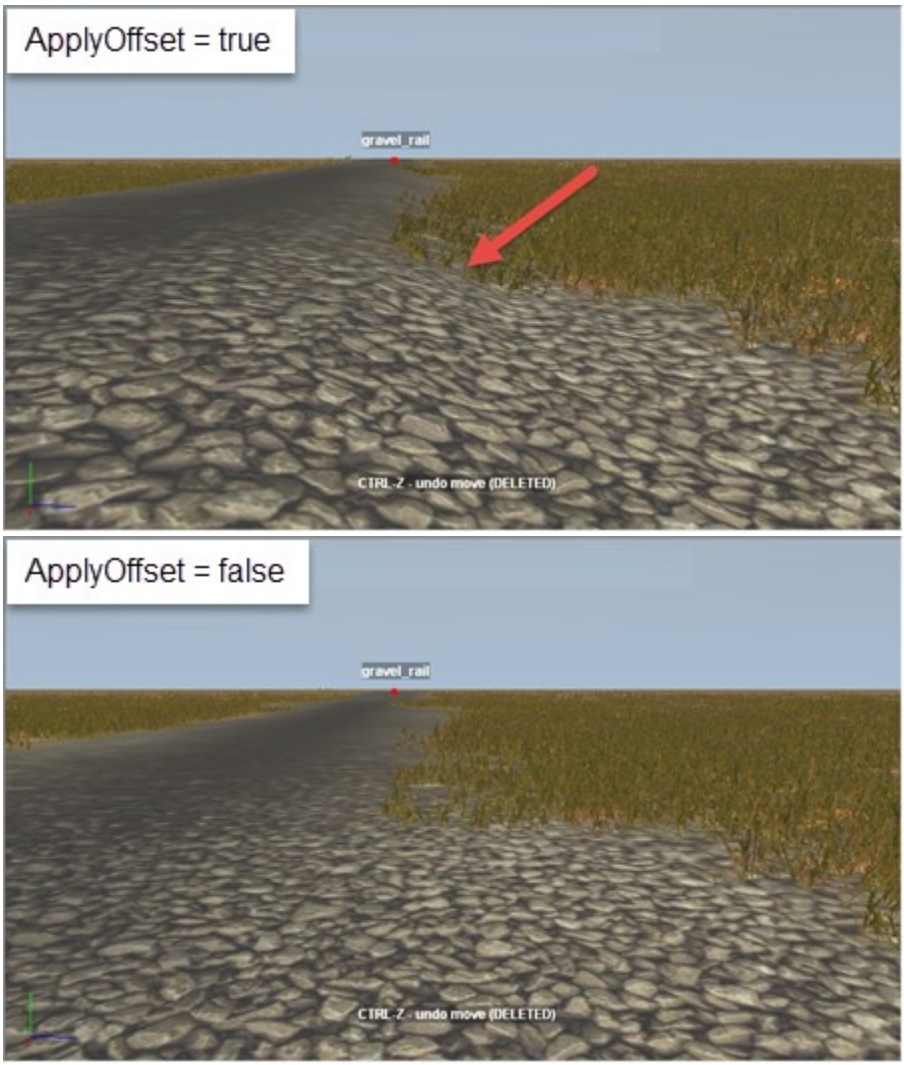
5.8.2. “Flatten”: Flattening roads

You can also specify the **Flatten** parameter in the overlay properties. If **Flatten** is set to **true**, the overlay will try to flatten the terrain underneath it.
However, when enabled, this option flattens road bumps ***along its width*** (from one roadside to another one). Along its length, the road may remain uneven. In other words, the road is flattened in a perpendicular direction, i.e. there will be no oblique slopes from one roadside to another (see screenshot below).

NOTE: The heightmap itself, which we have edited using the **Geometry** brush (see 5.2 above), will remain unchanged when the **Flatten** parameter is enabled; the overlay will simply flatten it. To see the result of this flattening - you need to perform the **Rebuild Terrain** operation.

5.8.3. “ApplyOffset”: Adding ruts and bumps

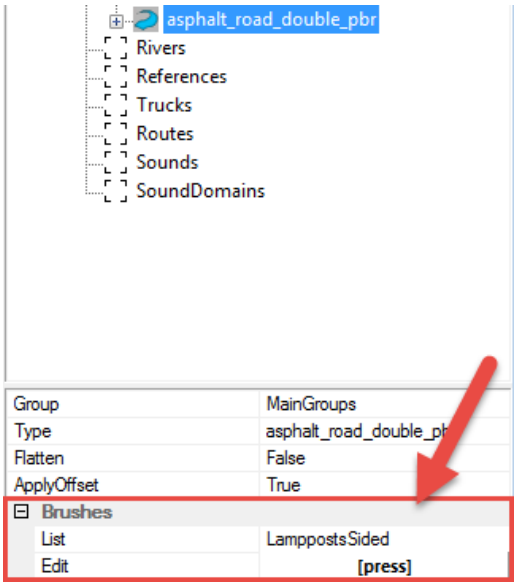
The overlay also has the **ApplyOffset** parameter. If it is turned on, the road will change a little bit the terrain under the road: the elevations, ruts, and other types of unevenness will be added to it. The particular type of changes in terrain depends on the type of road.
By default, this option is enabled, if you turn it off - the road will become flatter.
When you change the value of this parameter, you need to perform the **Rebuild Terrain** operation to see the result.

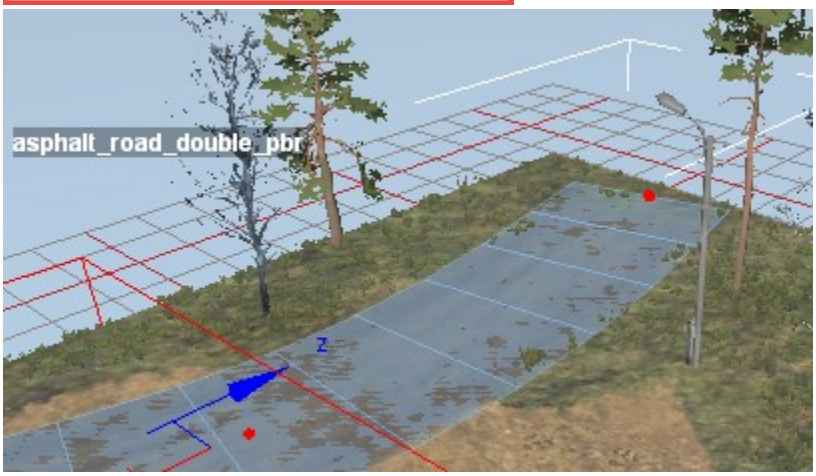


5.8.4. “Brushes”: Adding Lampposts

Properties of an overlay also contain the **Brushes** section. These fields allow you to add auxiliary objects that will be placed along the length of the overlay. For example, you can add lamp posts along the side of the road.

To select the necessary type of objects that will be placed along the overlay, click the **[press]** button next to the **Edit** field and select the necessary brushes, in the same way as when setting up a Distribution (see 5.7 above). Selected objects will appear on the map after **Rebuild Terrain**.





NOTE: The intervals between the placed objects are defined in the configuration of the brushes. This configuration is stored in the **initial.pak** archive, in the **[media]\classes\editor\brushes.xml** file there:

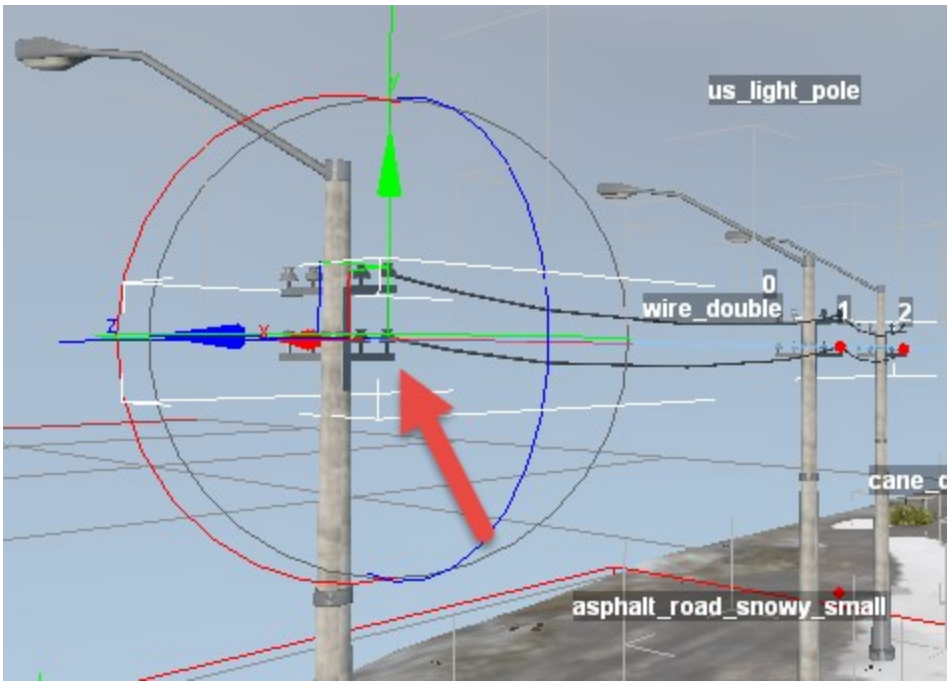
```
<OverlaysPlants>
    <LamppostsSided>
        <ModelType
            AlignToTangent="-1.0"
            Brands="lamppole_a"
            DirOffset="8"
            Divergence="0.0"
            Interval="28.0"
            Perpendicularity="0.0"
            TangentOffset="-8.0"
        />
    </LamppostsSided>
    <Lampposts>
```

5.8.5. Wires: Adding and connecting them

As you can see, there are wires in the list of overlays (their names start with **wire_**, e.g. **wire_double**); however, overlays do not contain poles these wires are attached to.
The process of adding poles and their wires is the following:

1. Add poles, either as separate models (see 5.5. above), or massively, using the **Brushes** parameter of an overlay. Place them as you need.
2. Add an overlay of the wires.
3. Snap each point of the wire overlay to the necessary snapping point on the poles. There may be multiple snapping points there.
   To snap the point of the wire overlay to the snapping point of the pole:
   a. Select the point of the wire overlay.
   b. Move it maximally close to the snapping point of the pole, and:
      i. while moving it close, hold the **B** button - for snapping.
      ii. or, hold the **V** button - for fine-tuning of the snapping.
   c. After one point is snapped, perform the same operations with the next one.

For example, in the picture below, we placed a set of **us_light_pole** models and have connected them with the **wire_double** overlay.



5.8.6. Recommendations for overlays

- Typically, for US roads, you need to use roads with the **us** suffix in their names. For winter maps, you can use roads with **_sn**, **snow**, **snowy** suffixes.

- When working with overlays, which are not roads, but 3D geometry, you should not move the points of the overlay too close to each other. Otherwise, breaks are possible.
- If you paint wetness on the winter asphalt roads (see 5.2.2. Wetness above), they will be covered with ice.

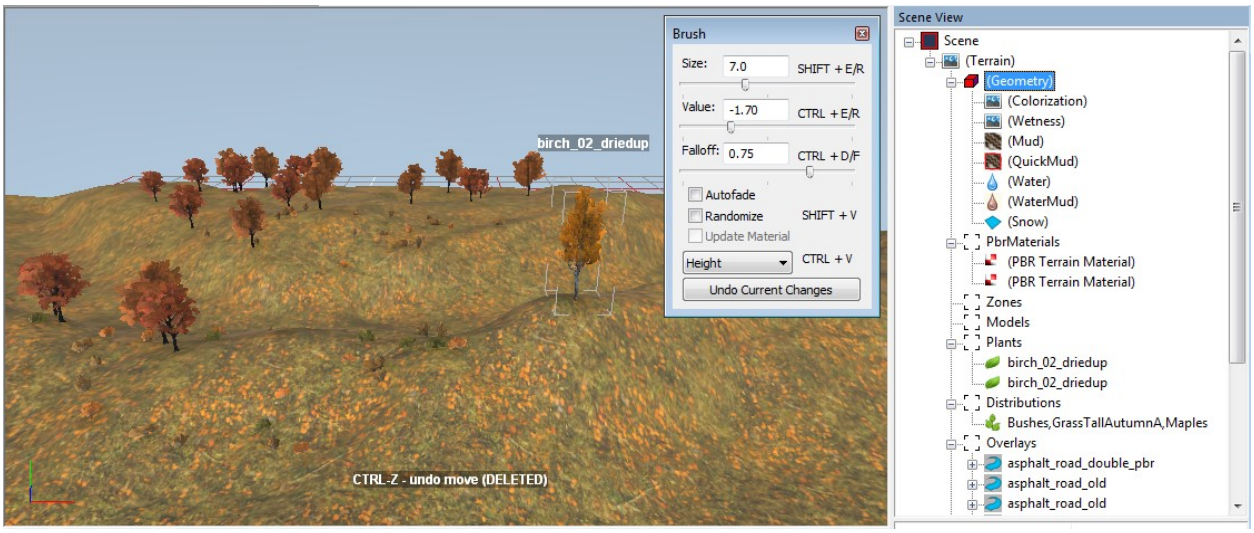
5.9. Adding Rivers and Water Objects

Rivers and other water objects are added to the map in the form of the **River** objects.
To create this object, right-click the terrain in the main window (or the **Rivers** section in the **Scene View**), then select **Add River** in the context menu.

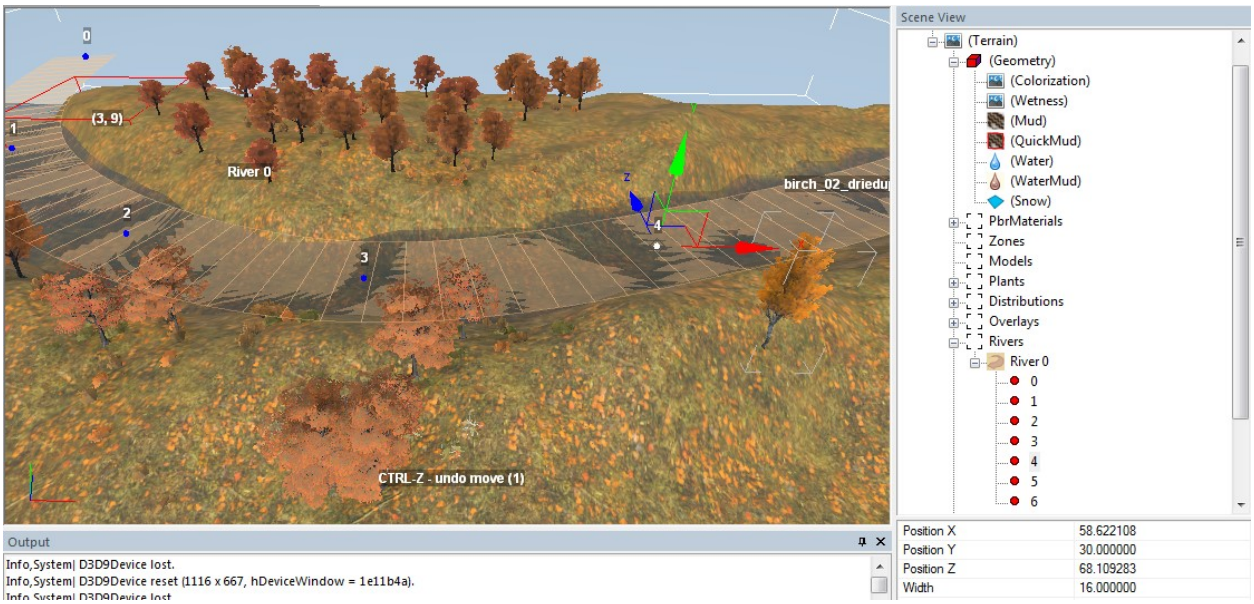
Logic of River objects related to adding points and changing their location on the map is similar to overlays (see 5.8. Adding Overlays). But there is also an important difference: in contrast to roads, all points of the River object have a height. The water level in the river in this area depends on this height.

The process of creation of a **River** object is typically the following:

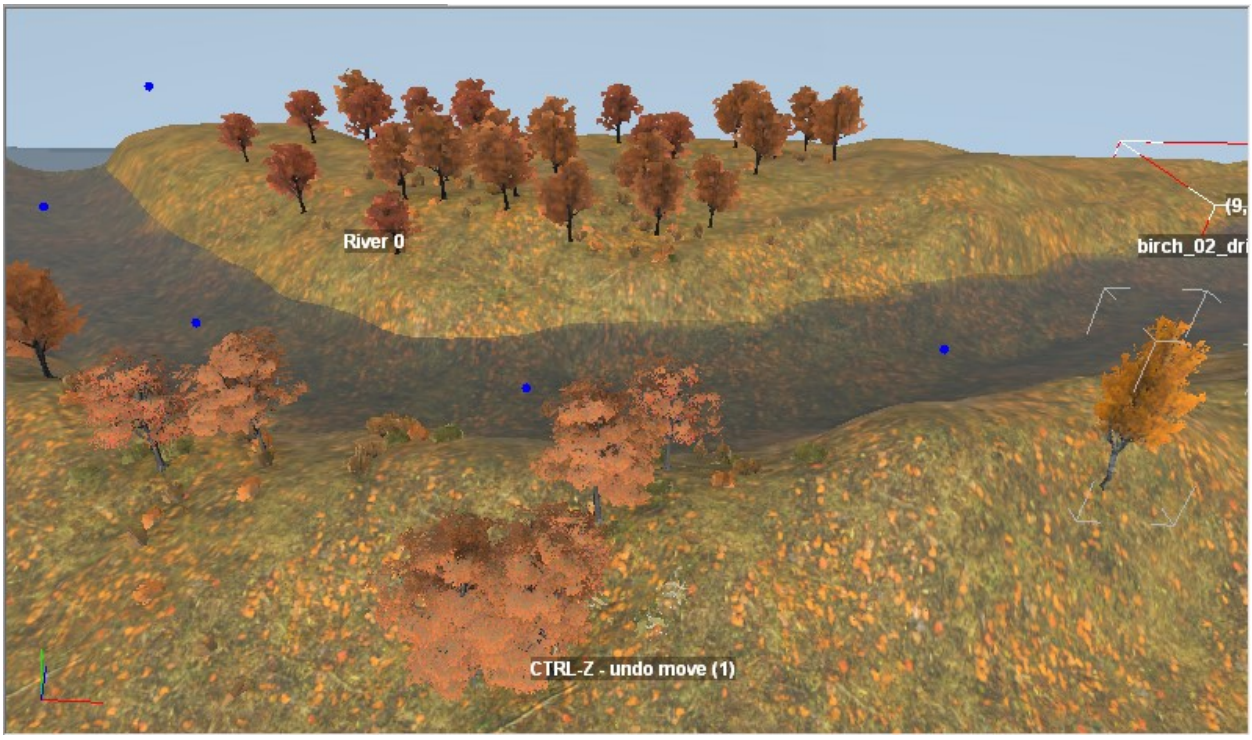
1. Prepare a deepening of the terrain, which we will fill with water.



2. Add the **River** object. Add the necessary number of points to this River object and move/modify it so that it covers the bed of the river. This is done similarly to overlays. However, you need to change the height of the points of the River object as well. You can set the same height for each point of the River object in the **Position Y** parameter of this point. The width of the river at a specific point of the River object can be set by changing the **Width** parameter of this point.

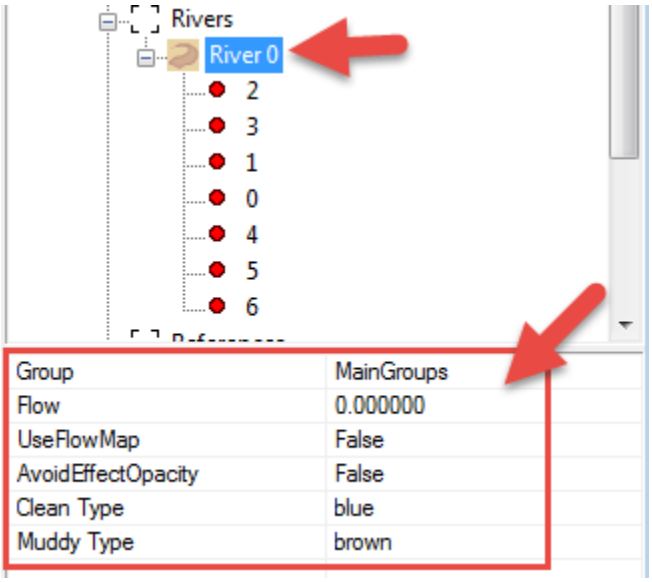


3. Ensure that the river borders are correct. If necessary, adjust the terrain or the River object.

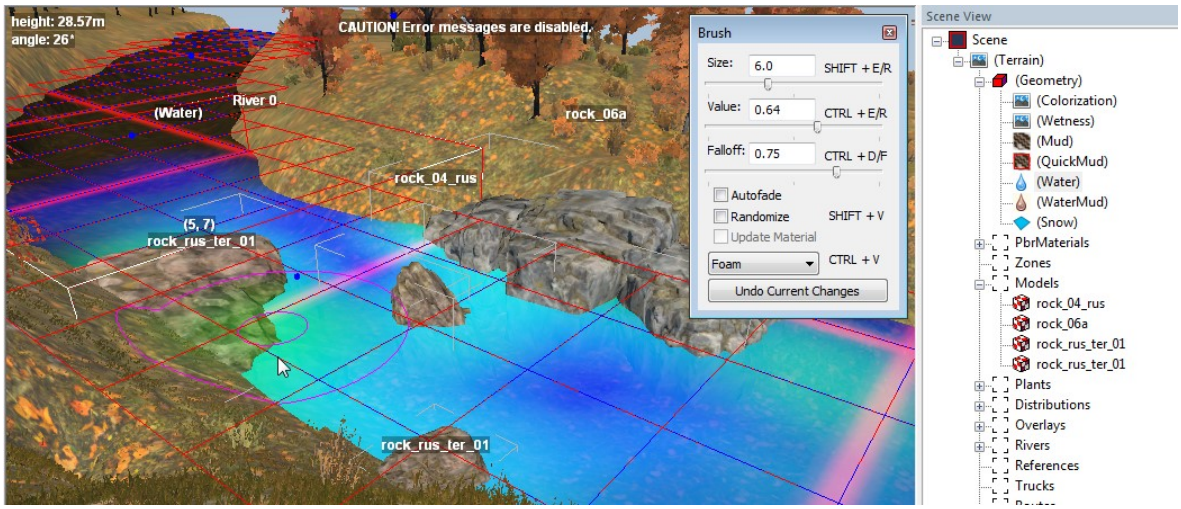


4. After selecting the created River object in the **Rivers** section of the **Scene View** panel, you can configure the following parameters in the object properties panel:

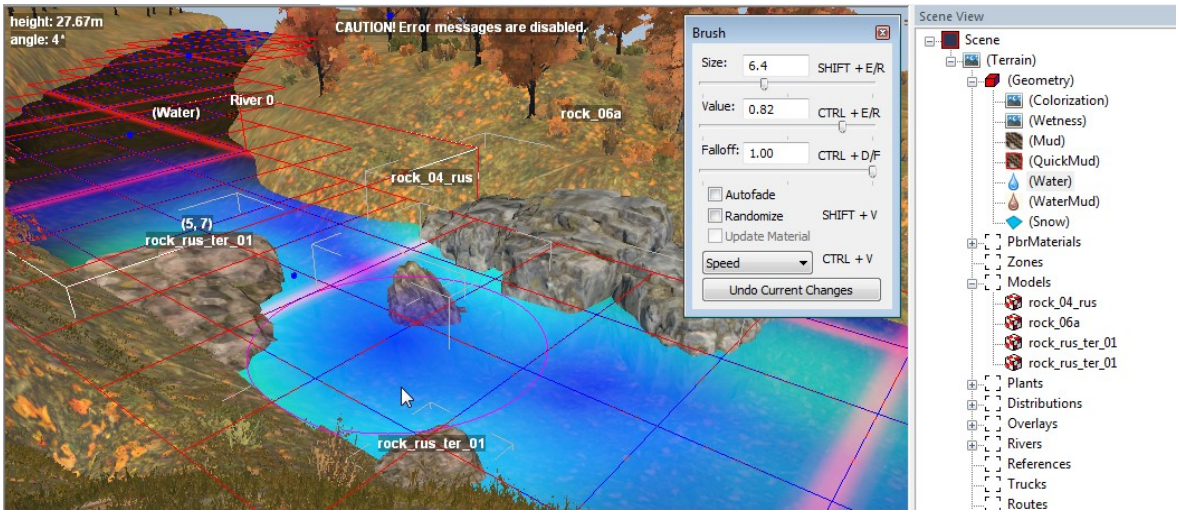
- **AboveReferences** - if set to "**True**", protects the river colors selected for this river from overriding by river color of the imported references. See 5.10.4. Recommendations for references for details.
- **UseFlowMap** - allows you to paint the direction of the flow with the **Water** brush.
    - If **False**, then the direction of the flow will be set to the direction, in which the numbers of points of the River object are increasing. If you want the opposite direction, you can invert the numbering of these points. To do this, right-click on the **River** object in the **Scene View** and select **River <N> - Invert** from the context menu.
    - If **True**, then you can specify the direction of the river flow using the **Geometry > Water** brush in the **Flow** mode (see 5.2.5. Water).
- **AvoidEffectOpacity** - allows you to ignore the decrease of waves and current velocity depending on depth. By default (**False**), the smaller the depth, the lower the speed of the stream and the smaller the waves. The **True** value allows you to make shallow, but wild mountain rivers.
- **Clean Type** - the color of the river when its water is clean.
- **Muddy Type** - the color of the river when its water is muddy. The mud is painted by the specific **WaterMud** brush (see 5.2.6. Water Mud).



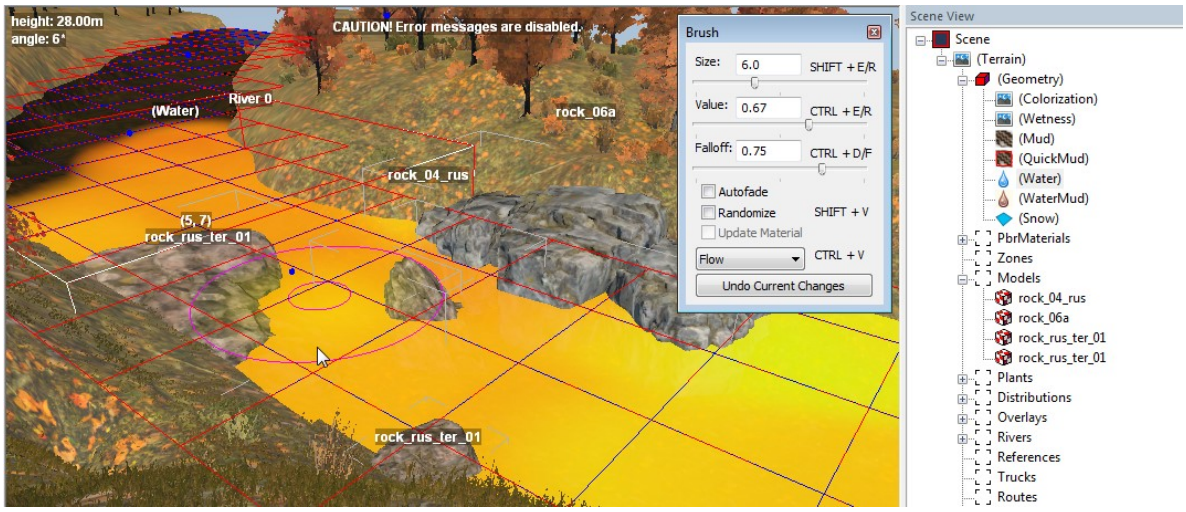
5. If necessary, using the **Geometry > Water** brush in the necessary mode (see 5.2.5. Water), paint the following maps of the river:
    - **Foam** - the foam that will be drawn on the surface of the water. The higher the **Value** with which you paint, the more foam will be in this area. As a rule, foam needs to be painted in some "wild" places of the river, for example, where water collides with rocks. The result of painting the foam is stored in the green channel of the **_water.tga** texture (in the map mod folder).



- **Speed** - the speed of the water in the direction of its flow (see **Flow** below). The higher **Value** you use for painting, the higher the speed of the water will be in this area. Value = 1 is the maximum water velocity. The result is stored in the blue channel of the **_water.tga** texture (in the map mod folder).



- **Flow** - this map will be applied to the river only if **UseFlowMap = true** is set for the properties of the river (see step 4 above). By default, the flow direction goes from the point #0 of the River to its subsequent points. But, if you paint the river with the **Flow** brush, this will override the flow direction in the painted areas. The Editor remembers the direction in which the brushstrokes were performed, and stores this direction to define the river flow in this area. The color of the brushstroke on the map depends on this direction. The result is stored in the **_water_flow.tga** texture. Along with manual painting of the river flow, you can generate a default flow map and then tune it with a third-party tool (see 5.2.0.3 for details).



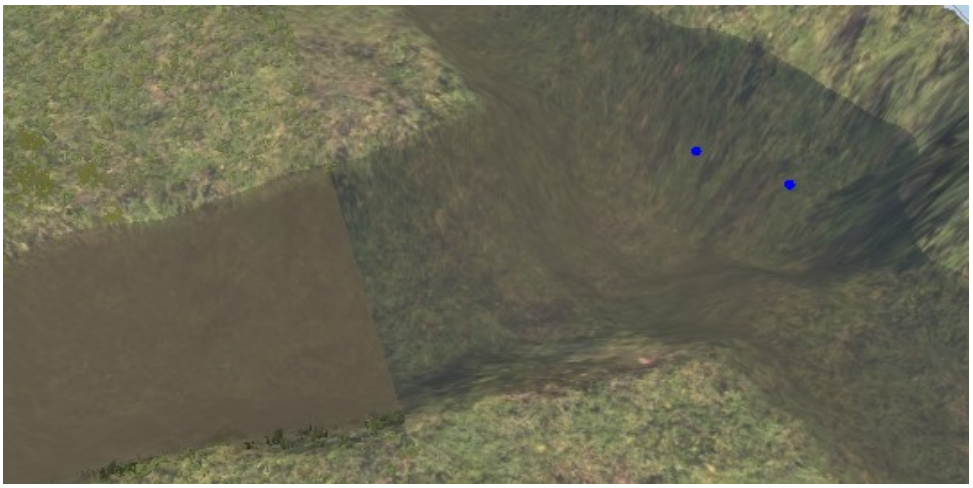
6. Switch to the **Terrain** section in the **Scene View** panel, and ensure that the river looks the way you want, in terms of its speed, direction of flow, and foam.

7. If necessary, paint the dirty or muddy areas of water using the specific **Geometry > WaterMud** brush (see 5.2.6. Water Mud).

5.9.1. Important Limitation and Recommendations for Rivers

You can add multiple rivers to the map. However, **two rivers should have the same settings, if they are within the same terrain block**.
You cannot merge rivers with and without the defined **Flow**. The river colors (**Clean Type** and **Muddy Type**) of the merged rivers should also match. Otherwise, one of the

rivers within a terrain block will use river colors of another river and there will be a sharp border in the color of the river on the edge of the terrain block:



Moreover, on the banks of the river, the surface of the water and the surface of the terrain should ***not*** have the same height. (The height of the terrain should be a little bit more.) Otherwise, the border between the water and the terrain will look unpleasant:

To fix this issue, you typically need to increase the height of the terrain a little bit.

5.9.2. Adding River Sounds via “RiverMarkup”

The river should not be silent in the game. To add sound to the river, you can use the **RiverMarkup** tool.

Its principle is very simple - we create something similar to an overlay - the so-called

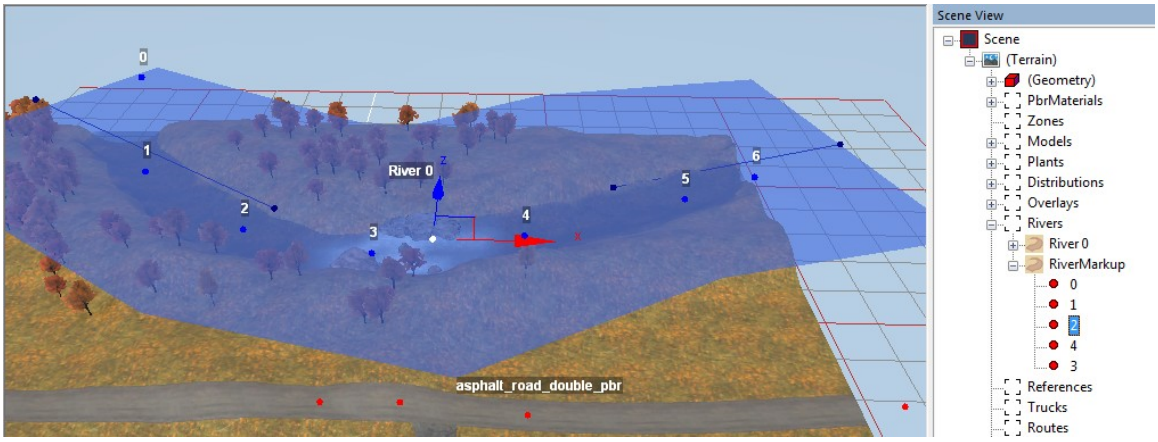
“sound riverbed”. And, we locate it so that it covers the riverbed of the river and its surroundings, roughly copying the shape of the river.

Inside the created “sound riverbed”, the volume of the river sound will be at its maximum and the sound of the river will be played as 2D sound. When the player is moving away from the borders of the “sound riverbed”, the sound volume will fade, and the 2D→3D panning will be performed. I.e, the 2D sound will be gradually transformed into 3D sound, so the player in this area will be able to understand by the river sound in what direction the river is located.

NOTE: As the sound of the river, the game will play the river sound from the sound preset, which is set in the **Ambient Preset** parameter of the **Terrain** object (see 5.1.1. Terrain Properties). If this parameter is not set, the river will be silent.

To add a “sound riverbed” to the river, do the following:

1. Right-click the **Rivers** section in the **SceneView** panel.
2. In the appearing context menu, select **Add RiverMarkup**.
3. Move the created **RiverMarkup** object to the river.
4. Similarly to overlays (see 5.8), add points to the curve of the **RiverMarkup** object by right-clicking the **RiverMarkup** object and selecting **Add Node**. Similarly to overlays, move them on the map, positioning a curve of the **RiverMarkup** object along the river bed.



5. Each such point also has a **Width** parameter, which allows you to set the width of the **RiverMarkup** object at this point.
6. Ensure that the **Ambient Preset** property of the **Terrain** object is set correctly (see 5.1.1. Terrain Properties).

5.10. Adding References

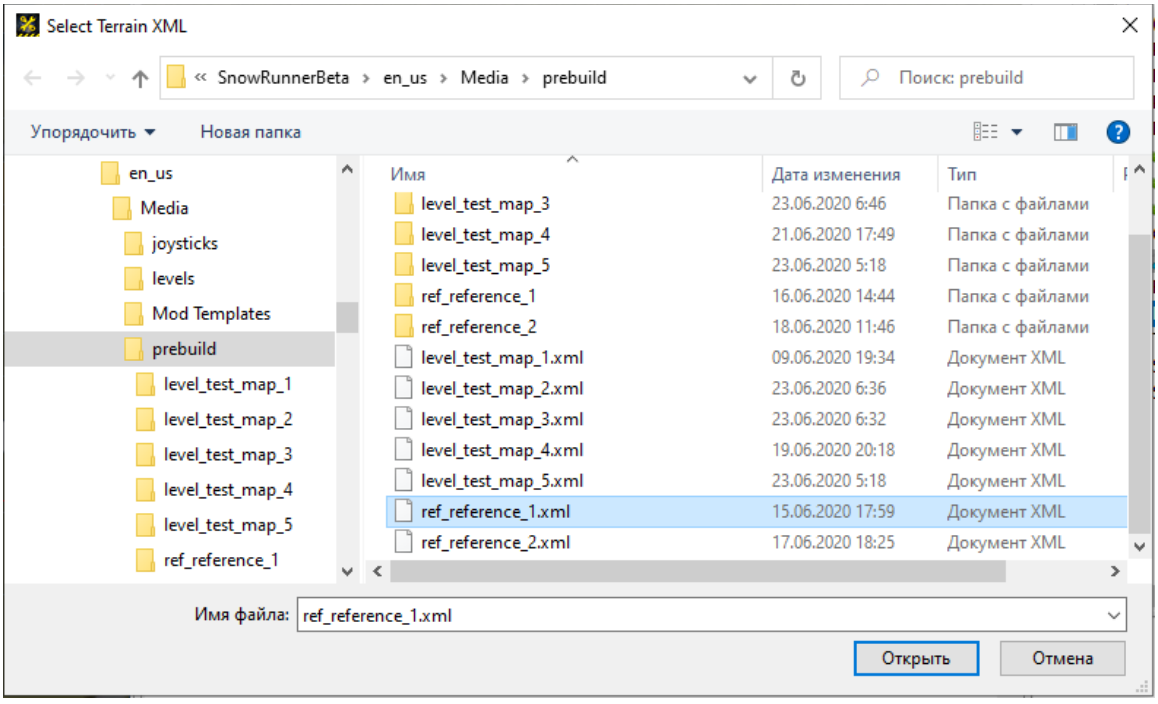
A “reference” is an external map that can be added to your map. Typically, reference maps are small or contain some reusable content. Or, this feature can be used for collaborative work on a large map, where different modders work on their separate parts of a large map and then import their pieces to it.

Names of all reference maps should start with the “**ref_**” prefix, according to the naming convention. There is no predefined set of reference maps, which is provided with the game. However, you can create your own reference maps and use them in your maps.

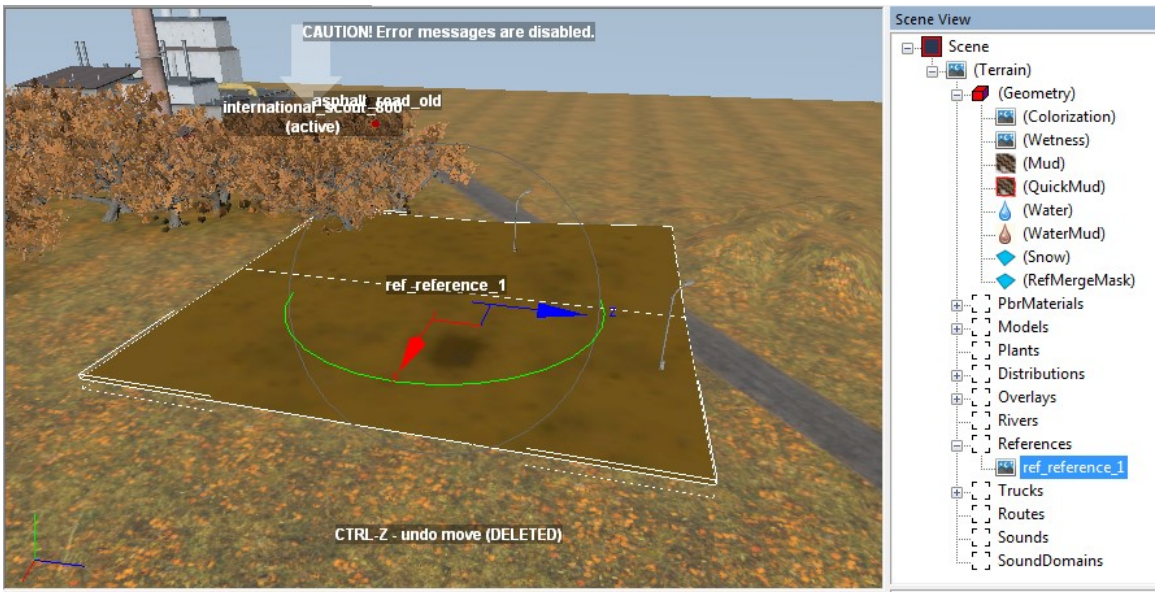
NOTE: You can not modify a reference you have imported to your map, except its position and orientation. If you need to change its content, you need to modify the initial, source map of the reference.

To add a reference to your map:

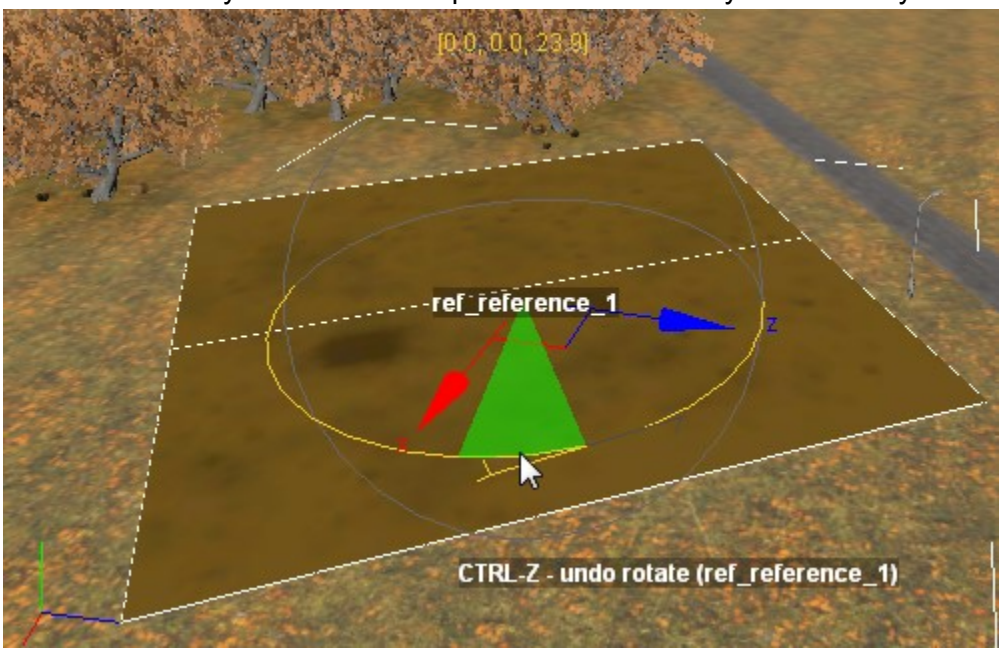
1. Right-click the terrain (or, the **References** section in the **Scene View** panel), and select **Add Reference** in the context menu.
2. In the appeared standard open dialog, select the **.xml** file of the map of the reference. By default, this dialog shows all source **.xml** files of your maps (in the **prebuild** folder, see 4. File Paths and Naming above).



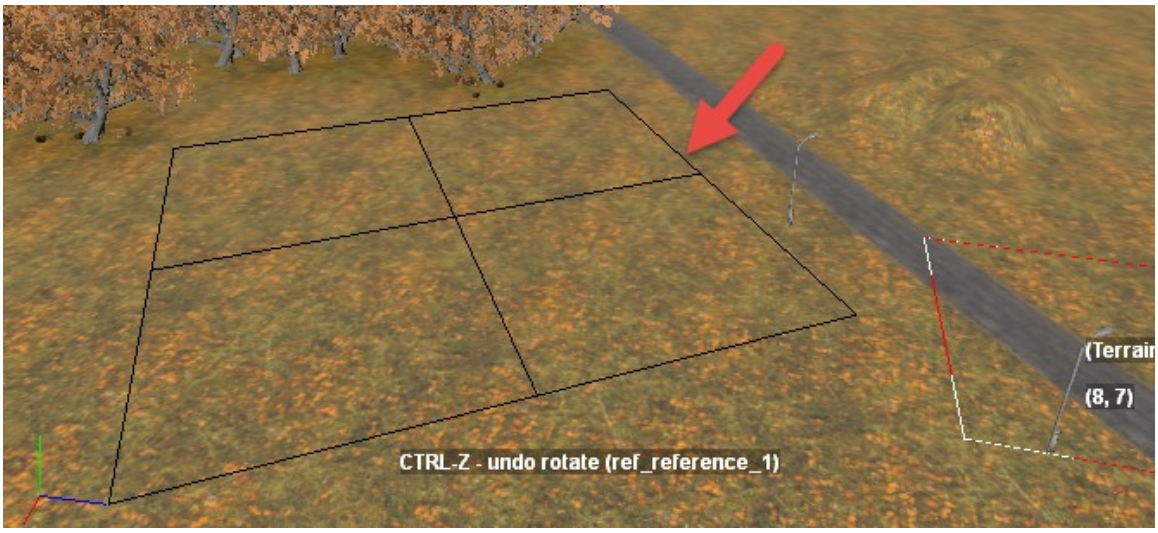
3. In this dialog, select the **.xml** file of your reference and click **Open**.
   After doing this, your reference will appear on the map as a brown rectangle:



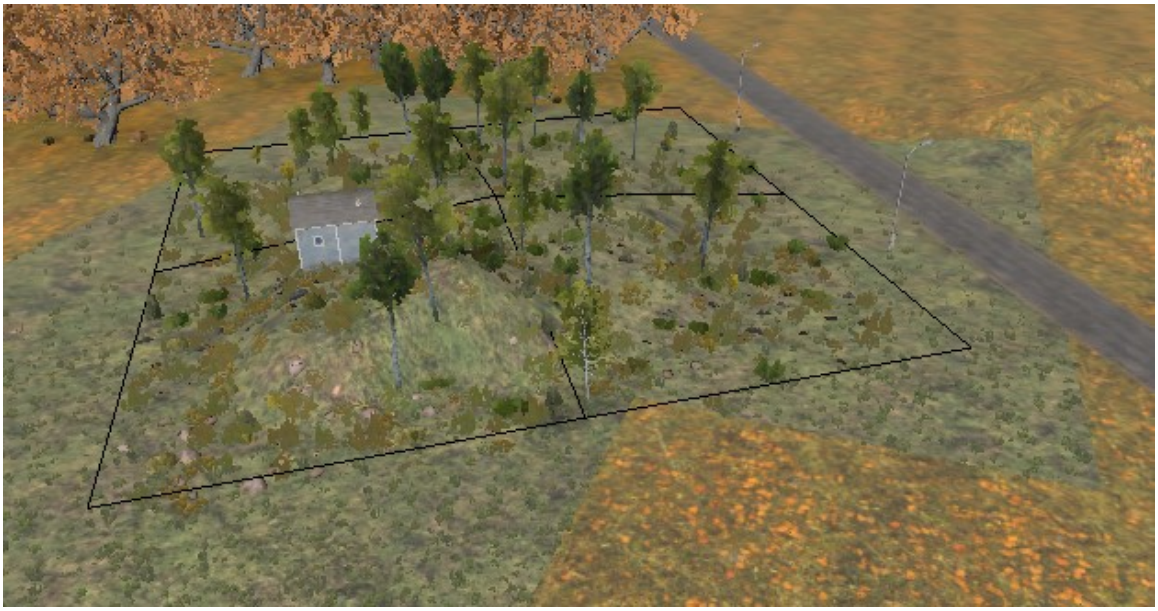
4. Move and rotate your reference to put it to the necessary location on your map.



5. Then, deselect the reference by clicking somewhere on the map. The reference area will be displayed on the map as in the simplified mode:



6. Perform the **Rebuild Terrain** operation (you can do it by right-clicking the terrain and selecting **Rebuild Terrain** from the context menu). After doing this, the content from the reference will appear on the map:

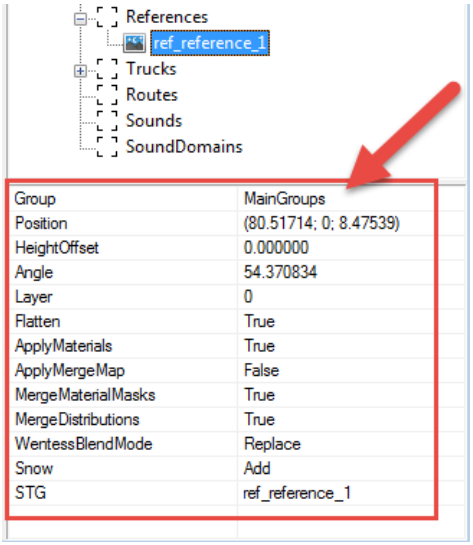


7. As you can see, objects from the imported reference are added to your map. Moreover, the height of the terrain and its material are also changed in the area of the reference (in the screenshot above the material of the reference was applied to all terrain blocks on which reference was located). Change of the material can be enabled or disabled in the properties of the reference (in the **ApplyMaterials** field, see below).

8. To correctly merge imported reference with your map, you can:
    a. **configure the properties** of the reference that are displayed at the lower part of the **Scene View** panel when the reference is selected.
    b. **Use the "RefMergeMask" brush** to create a mask for merging a reference.
    c. **Use Mutators** to substitute values of settings of the reference and its objects according to a predefined mapping table (e.g. transform an autumn reference to a winter one).

5.10.1. Reference properties

To edit reference properties, select it in the **References** list in the **Scene View** panel. After doing this, you can edit properties of the selected reference in the lower part of the **Scene View** panel.



The properties are the following:

- **Position** - the coordinates of the reference on your map.
- **HeightOffset** - the shift in height that can be set for the terrain of the reference. Using this field, you can increase or decrease all terrain of the reference (as a whole).
- **Angle** - the angle of rotation of the reference on your map.
- **Layer** - the layer of the reference on the map that can be used in the case of the intersection of the references to determine what reference should be on top and what reference settings should have more priority. The higher the number of the layer is, the more priority the reference will have.
- **Flatten** - whether or not the reference should flatten the terrain below it. If this parameter is **True**, the initial terrain of your map below the reference will be flattened, then the terrain of the reference will be applied above it, and the terrain on the edges of the reference will be normalized to fit into the terrain of the other part of your map. If this parameter is **False**, then the terrain of the reference (its height) is simply added to the terrain (height) of the initial map in this place.
- **ApplyMaterials** - whether or not the reference should substitute the initial materials of the map below it with its own materials. Please note that if this parameter is **True**, the materials will be substituted for all terrain blocks the reference lies on, even if it does not cover them fully (see the screenshot of step **#6** in 5.10 above). If set to **False**, the reference will use the materials of the map underneath (see the screenshot of step **#7** in 5.10 above). The Materials used by the reference can be also substituted with other materials using Mutators (see 5.10.3 below).
- **ApplyMergeMap** - whether or not the reference should use the **RefMergeMask** map (the **_ref_merge.tga** texture) for merging the reference with the map. For details, see 5.10.2. “RefMergeMask” brush below.
- **MergeMaterialMasks** - whether or not the reference should blend the materials of the reference and the map using the **RefMergeMask** mask. For details, see 5.10.2. “RefMergeMask” brush below.
- **MergeDistributions** - whether or not the distributions specified in the reference should be added to the map.
- **WetnessBlendMode** - specifies what should be done with the wetness of the reference (see 5.2.2. Wetness). Possible values:
    - **Replace** - the wetness mask of the reference should replace the wetness mask of the map below it
    - **Add** - wetness values of the reference should be added to the wetness values of the map below it.
- **Snow** - specifies what should be done with the depth of the snow of the reference (see 5.2.7. Snow above). Possible values:
    - **Replace** - the depth of the snow of the reference should replace the depth of the snow of the map below it.

    - **Add** - the depth of the snow of the reference should be added to the depth of the snow of the map below it.
    - **Ignore** - the depth of the snow of the reference should be ignored. In this case, the depth of the snow of the map below the reference will remain the same.
- **STG** - displays the name of the reference (it cannot be modified).

NOTE: After changing the properties of the reference, you need to perform the **Rebuild Terrain** operation to apply your changes. You can do it by right-clicking the terrain and selecting **Rebuild Terrain** from the context menu.

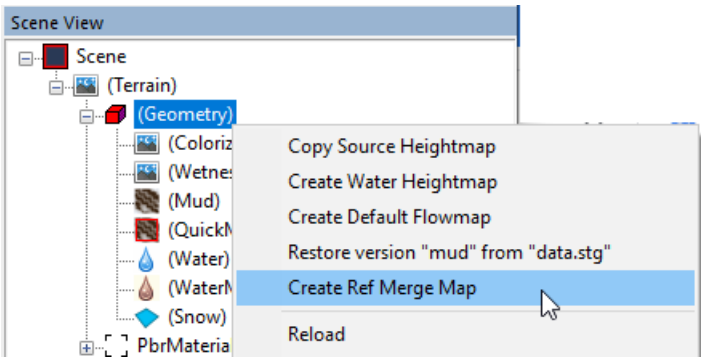
For recommendations on the setup of these properties, see 5.10.4. Recommendations for references below.

5.10.2. “RefMergeMask” brush

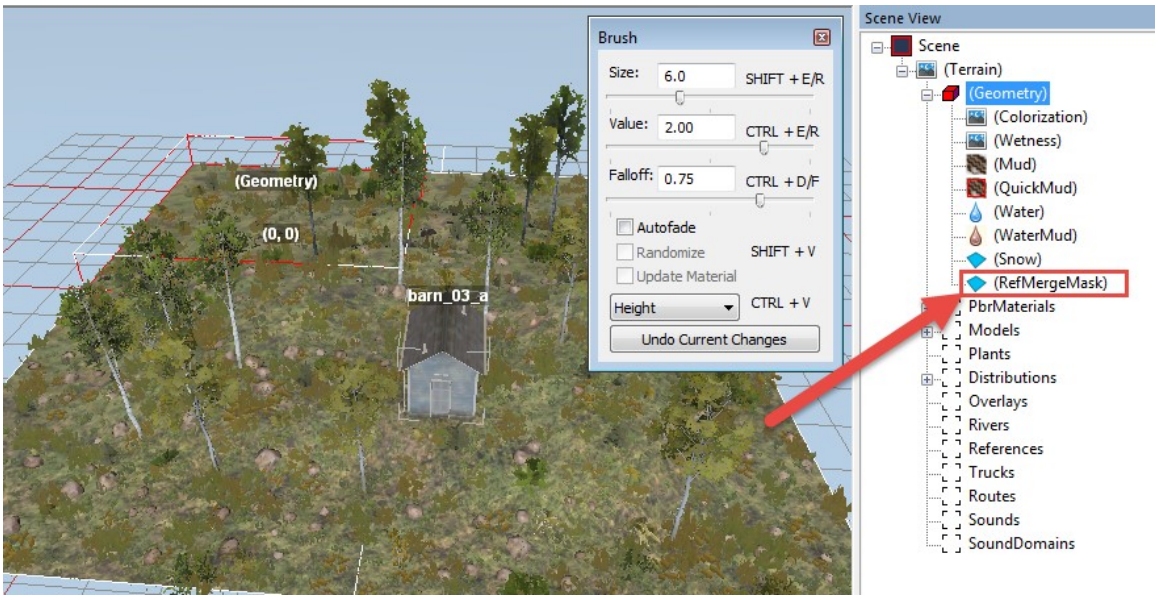
The **RefMergeMask** brush is used for references. It allows you to create a mask for merging a reference with your map. This mask will affect the merging of objects of the reference, its plants, materials, height with the corresponding properties of your map. The created mask is stored in the **_ref_merge.tga** texture. However, this mask will be used only if the **ApplyMergeMap** property of the reference is set to “**True**”.

Since it is used only for references, the **RefMergeMask** brush is hidden in the UI by default. To display it, do the following:

1. Right-click the **Geometry** section in the **Scene View** panel.
2. In the context menu, select **Create Ref Merge Map**.

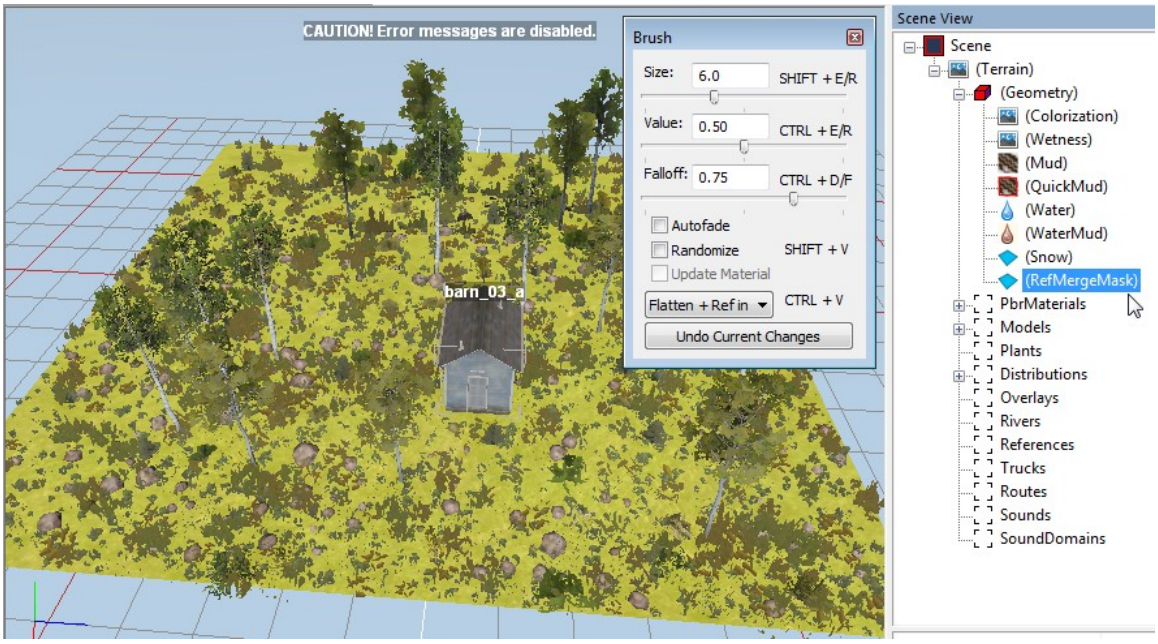


3. After doing this, the **_ref_merge.tga** texture will be created in the folder of the reference, and the **RefMergeMask** brush will be displayed in the **Geometry** section:



4. Now you can select this brush and paint the mask for merging a reference with your map.

When you select this brush, the main window will display the initial reference merging mask of the reference:



This mask allows you to perform smooth blending of the reference with the surrounding landscape, blending of the materials and plants.
Yellow color on the mask means that this area will be added to the map when this reference is imported to it. By default, the whole reference map has the same tone of

yellow, i.e. it is all added to the map.

Using the brush, you can specify areas that you do not want to add to the map (by removing yellow color from them) and the areas where the content of the reference and content of the map should be blended (the weight of the content from the reference in this blending is defined by the tone of yellow it has on the mask).

The **RefMergeMask** brush works similarly to all over brushes from the **Geometry** section: if the value selected in the Value slider is greater than 0.50, the brush will add color to the mask; if it is less than 0.50, the brush will remove color. Painting is performed by holding the right mouse button.

When painting the mask, you need to paint below objects located on the reference map and below the water.
Typically, the resulting mask should be similar to the picture below, where the mask gradually fades to the borders of the reference:

NOTE: This mask allows you to blend the materials of the reference and the map. However, if layers of the materials are different then there will be a sharp difference in them on the borders of the terrain blocks of the map and the reference. To avoid that, you need to use the same base material in the reference and on the map. (Because of that, we recommend you to use only the base material on the edges of the reference.) Or, to avoid that you can use the appropriate Mutator.

5.10.3. Usage of Mutators

Mutators allow you to transform all references imported to a map to meet its settings. This is done by the substitution of the initial content of the reference with the content of the same type but matching the target map.
Particularly, using mutators, you can substitute such things as models, material layers, brushes used within distributions, standalone plants, and overlays.

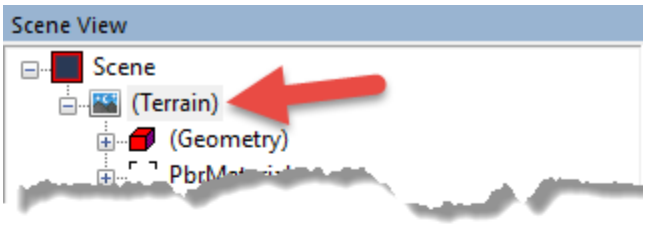
Mutators that can be currently used by the Editor are defined in the **initial.pak** archive, in the **[media]\classes\editor\mutators.xml** file there. This XML file has a simple structure. Using corresponding tags, it defines “mutator” entities as objects that have an ID and a mapping table with IDs of objects, which maps the objects you want to substitute with alternative variants you want to use when this mutator is applied:

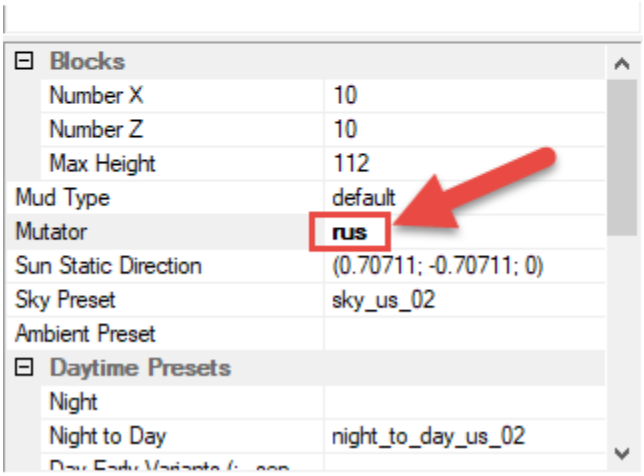
```
<Mutator Name="rus">
    <Mutations>

        <ModelMutation Source = "rock_03"  Target = "rock_03_rus"/>
        <ModelMutation Source = "rock_06"  Target = "rock_04_rus"/>
        <ModelMutation Source = "rock_05"  Target = "rock_rus_ter_01"/>
        <ModelMutation Source = "rock_06a"  Target = "rock_04a_rus"/>

        <MaterialLayerMutation Source = "grass_test"      Target = "grass_rus_01"/>
        <MaterialLayerMutation Source = "ground_test"     Target = "ground_rus_01"/>
        <MaterialLayerMutation Source = "stone_test"      Target = "rocks_rus_01"/>
        <MaterialLayerMutation Source = "gravel_pbr_test" Target = "gravel_rus_01"/>
        <MaterialLayerMutation Source = "default"         Target = "grass_rus_01"/>

        <BrushMutation Source = "Birches01"        Target = "Birches01Rus"/>
        <BrushMutation Source = "Birches02"        Target = "Birches01Rus"/>
        <BrushMutation Source = "Birches03"        Target = "Birches01Rus"/>
        <BrushMutation Source = "Bushes"           Target = "BushesRus"/>
        <BrushMutation Source = "BushesBig"        Target = "Birches04Rus"/>
        <BrushMutation Source = "SmallTrees"       Target = "Birches04Rus"/>
        <BrushMutation Source = "SmallRocks"       Target = "RocksRus"/>
        <BrushMutation Source = "FernField"        Target = "FernsRus"/>
        <BrushMutation Source = "Spruces_usa"      Target = "SprucesRus"/>
        <BrushMutation Source = "Tsugas"           Target = "LarchesRus"/>
        <BrushMutation Source = "Canes"            Target = "CanesRus"/>
        <BrushMutation Source = "LeavesAutumn"     Target = "LeavesSummer"/>
        <BrushMutation Source = "GrassTallAutumnA" Target = "GrassTallSummerB"/>
        <BrushMutation Source = "GrassTallAutumnB" Target = "GrassTallSummerB"/>
        <BrushMutation Source = "Maples"           Target = "Pines"/>

        <PlantMutation Source = "birch_01"       Target = "birch_01_rus" />
        <PlantMutation Source = "oak_02"         Target = "pine_03_rus" />
        <PlantMutation Source = "sugar_maple_02" Target = "pine_03_rus" />

        <OverlayMutation Source = "cliff_dirt"       Target = "cliff_dirt_rus"/>
        <OverlayMutation Source = "cliff_dirt_large" Target = "cliff_dirt_large_rus"/>

    </Mutations>
</Mutator>
```

ID of the mutator

mapping table of the mutator

If you want to apply this mutator to all references imported to the map, you need to specify its ID at the **Mutator** field in the properties of the **Terrain**:



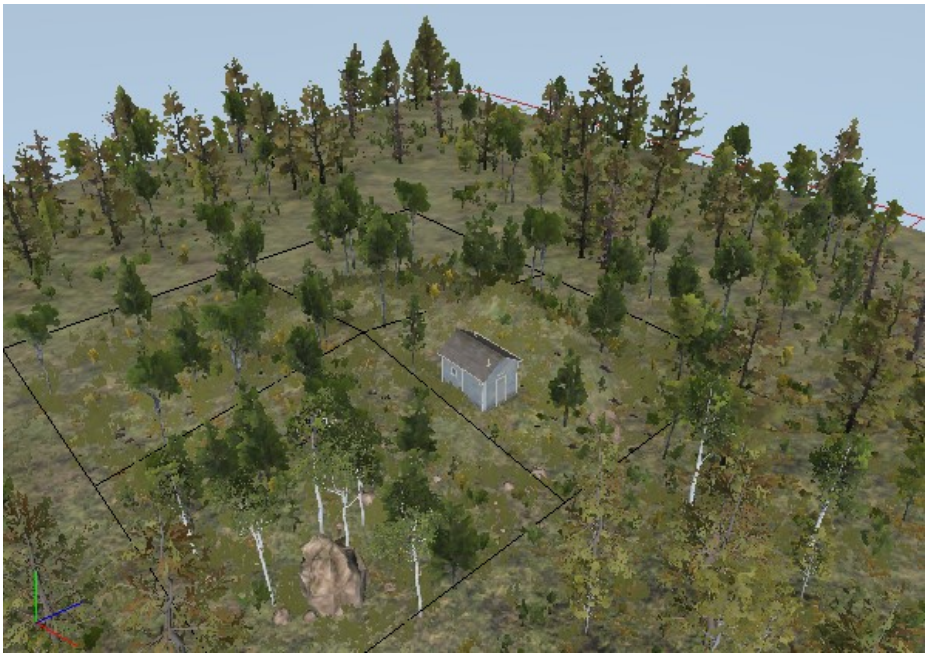


NOTE: After changing the value of the **Mutator** field, you need to perform the **Rebuild Terrain** operation to apply your changes. You can do it by right-clicking the terrain and selecting **Rebuild Terrain** from the context menu.

NOTE: Mutators are applied only to references imported to the map. And to all such references at once.

For example, let's assume that we have a reference which was initially created in the autumn setting and it does not fit well with the rest of the map, which is in summer and "Russian" setting:

In this case, by using the mutator with the “**rus**” identifier for the terrain of the map, we can transform this reference to the more appropriate setting:



5.10.4. Recommendations for references

If you do not plan to use Mutators and plan to use materials of the reference (i.e. **ApplyMaterials** is "**True**", see 5.10.1 above), then the ***base layer*** of the materials of the

reference and the map should be the same. For information on materials, see 5.3. Assigning PBR Materials to Terrain above.

Generally, there are two types of references:

- Type #1 - “natural” references, where there is no water or objects
- Type #2 - references that contain water or objects.

There are two sets of typical values of reference properties for these types.

For the type #1, you can use the ability to completely adjust the reference to the map. I.e. you can set up the reference so that it modifies the level for itself only slightly. In this case, typical settings of the reference are the following:

- **Flatten** = "False"
- **ApplyMaterials** = "False" (“True” is also possible)
- **ApplyMergeMap** = "True" (so, typically you need to specify the RefMergeMask, see 5.10.2. “RefMergeMask” brush).
- **MergeMaterialMasks** = "True"
- **MergeDistributions** = "True"
- **WetnessBlendMode** = "Add" (“Replace” is also possible)
- **Snow** = "Replace"

Type #2 is the most common and universal. We recommend you to make the terrain below it rather flat to avoid sharp differences in height at the reference border. For this type, the typical settings of the reference are the following:

- **Flatten** = "True"
- **ApplyMaterials** = "True"
- **ApplyMergeMap**="True" (so, typically you need to specify the RefMergeMask, see 5.10.2. “RefMergeMask” brush).
- **MergeMaterialMasks** = "True"
- **MergeDistributions** = "True"
- **WetnessBlendMode** = "Replace"
- **Snow** = "Replace"

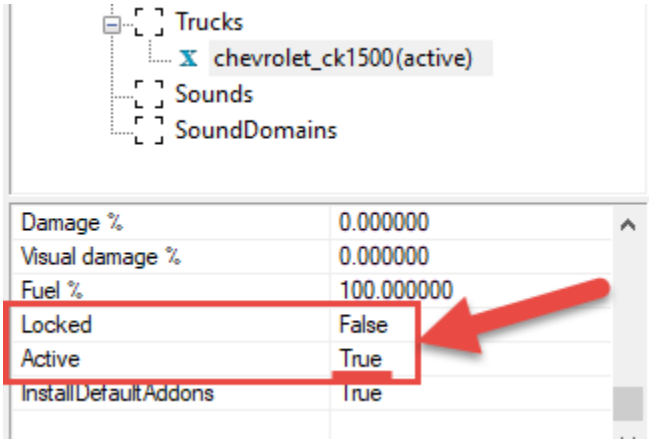
On the map, at the location of the reference, we recommend you to remove all plants. However, if necessary, you can leave some plants on the map at the edges of the reference area.

If your reference contains a river, the river colors from the reference may override the river colors of another river on the map near it. The usage of river colors from the reference is the default behavior in this case. However, if you set the **AboveReferences** field of your river on the map to "**True**", you will protect its river colors from overriding.

5.11. Adding Trucks

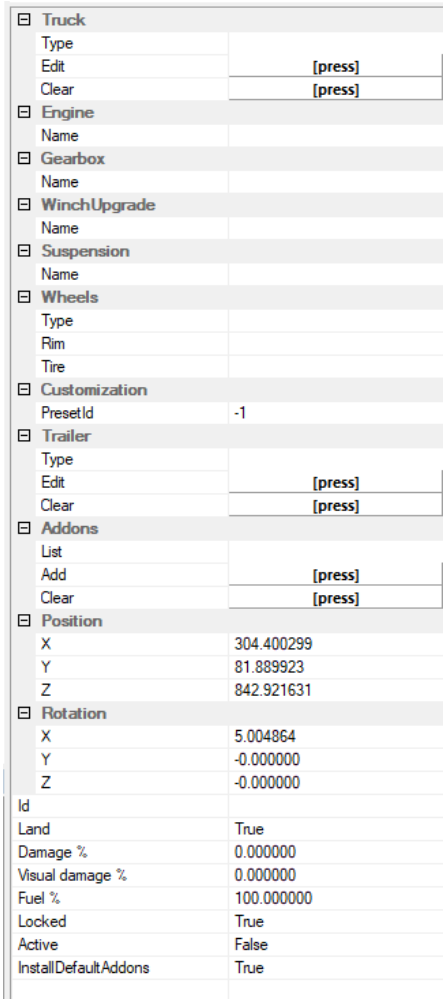
NOTE: By default, trucks are added to the map in **Locked** mode. In this mode, the player cannot use the truck, until it is found.

NOTE: **The truck in which the player starts the game must be marked** as **Active** by setting **True** in the corresponding field (see below). By default, the new truck has this field set to **False**. **At least one truck on the map must be Active for correct spawning!**



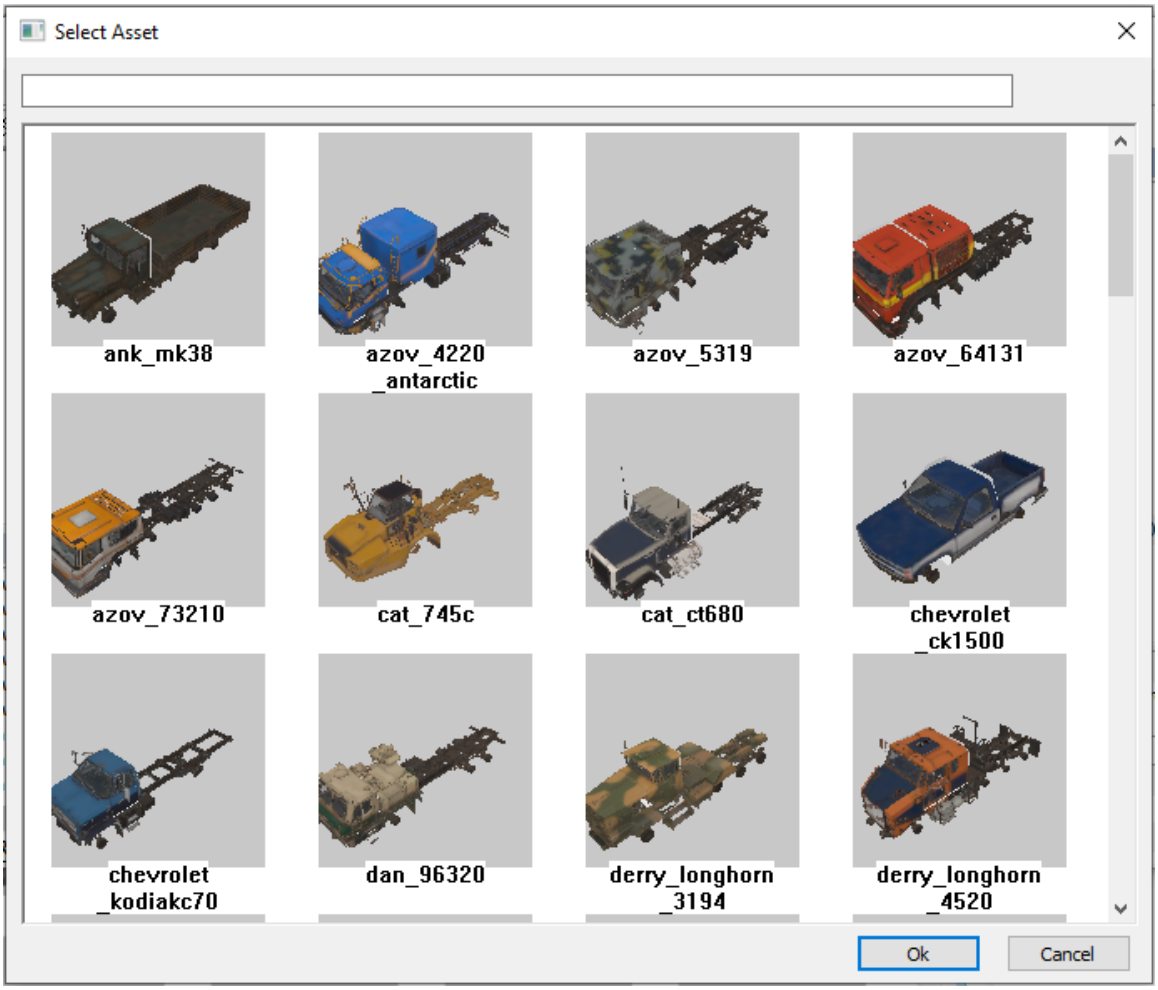
To add a truck or trailer to the map, you need to right-click the map (or the **Trucks** section in the **Scene View**) and select **Add Truck**.

After doing this, the model of the truck will appear on the map. Now, in the properties of the truck, you can specify what particular truck will be spawned and set its addons and other settings. To specify these properties, you need to select the created truck object in the **Trucks** section of the **Scene View**. Properties are specified in the lower part of this panel.



When described step by step, the process is the following:

1. Right-click the map, select **Add Truck**.
2. Select the created truck in the **Scene View** in the **Trucks** section. Its properties appear in the lower part of the panel.
3. Now choose which truck you need. In the **Truck** parameter in the properties of the truck, click on the **[press]** button next to the **Edit** field. After doing this, the truck selection list will be displayed. In the same list, you can also find models of trailers.



4. After adding a truck or a trailer to the map, you can set other settings for it. If the wrong truck or trailer was selected, then the **Edit** field can be cleared by pressing the **[press]** button next to the **Clear** field.
5. The truck on the map will appear in its standard version. But you can put on it the necessary upgrades in the appropriate fields (see below). The name of the upgrade must be entered manually, in the format of the ID of this upgrade in the game.
   For example, you need to specify "**g_scout_highway**" for the highway gearbox. You can view the list of all possible addons for the selected truck and their IDs directly in the game. For instructions, see 5.11.1. How to identify IDs of truck parts below.
   Using these IDs you can specify the following parameters:
   - **Engine**
   - **Gearbox**
   - **WinchUpgrade**
   - **Suspension**
   - **Wheels** - Tires and rims (without specifying their size):
     - **Type** - specifies the type of the tires, see 5.11.1. E.g. **wheels_scout1**
     - **Rim** - specifies the type of rims, see 5.11.1. E.g. **rim_offroad**.
     - **Tire** - specifies the type of tires, see 5.11.1. E.g. **allterrain_2**.

- **Customization** - the number of the color/paint of the truck.

6. After doing this, you can fill in all other fields:
    - **Trailer** - in this section, you can add a trailer to a truck. It is added the same way as the truck (see above).
    - **Addons** - in this section, you can add the necessary visual addons to the truck, similarly to the selection of the truck. However, in the addon selection window you can select multiple addons (by clicking on them) and add them to the truck at once.
    - **Position/Rotation** - these fields specify current coordinates and rotation angles of the truck.
    - **Id** - the identifier of this truck in the game.
    - **Land** - automatically sets the truck on the terrain surface.
    - **Damage%** - the amount of damage dealt to the functional components of the truck (engine, suspension, wheels, etc.).
    - **Visual Damage%** - the amount of damage that will be visually displayed on the truck (scuffs, dents, and so on).
    - **Fuel%** - how much fuel the truck has.
    - **Locked** - if this option is enabled, the player cannot use the truck, until it is found by him/her on the map.
    - **Active** - allows to select the truck in which the player will be spawned on the map (the value must be **True** in this case). There can be only one Active truck on the map. The default value for this field is **False**.
    - **Install Default addons** - this option automatically installs all default addons to the truck.

5.11.1. How to identify IDs of truck parts

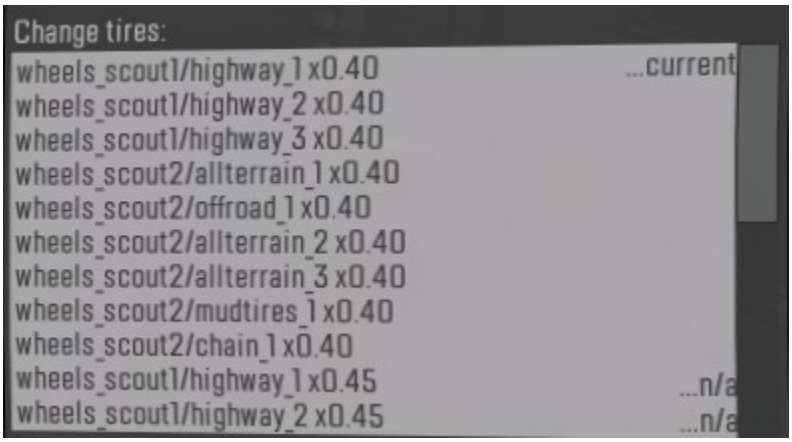
When creating the truck in the Editor, you need to know the IDs of all truck parts, add-ons, etc. to fill in some of the fields. You can view these IDs in the game itself.

To do this:

1. Open the Proving Grounds, через **MODS > Select map >** any **Proving Grounds** map.
2. At the Proving Grounds, select Garage in the TOOLS menu.

3. In the appearing menu, you can see all necessary IDs:

To identify the type (**Type**) of tires, look at the first part of the line in the **Change tires** list. For example, **wheels_scout1**



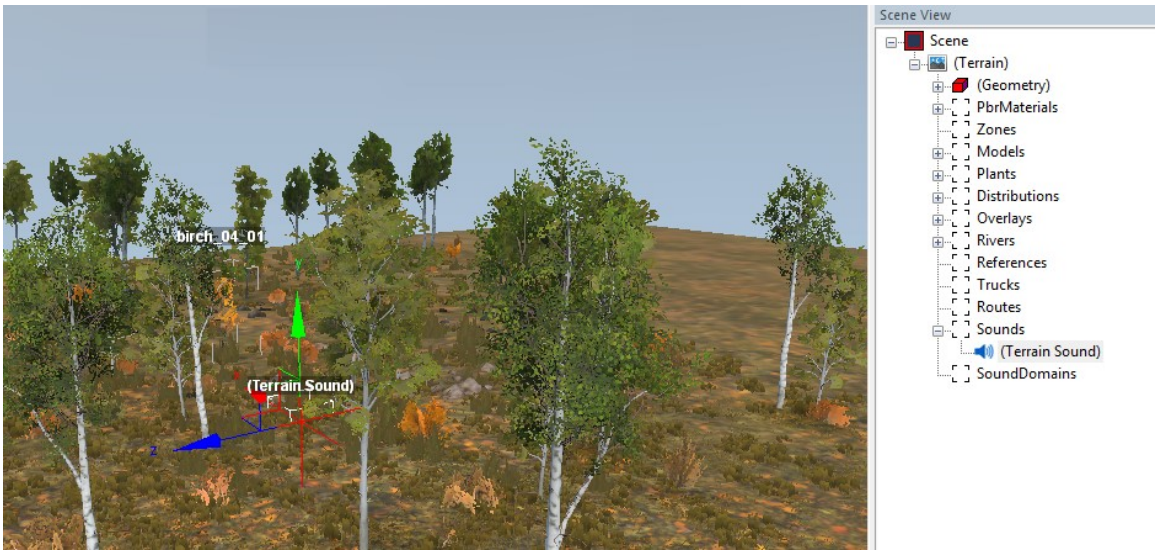
To identify the type of tires (**Tire**), you need to look at the second part of the line in this list, before the size of tires. For example, highway_1 or allterrain_2.

To identify the type of rims (**Rim**), you need to look at the second part of the line in the Change rims list, before the size. For example rim_1 or rim_offroad.

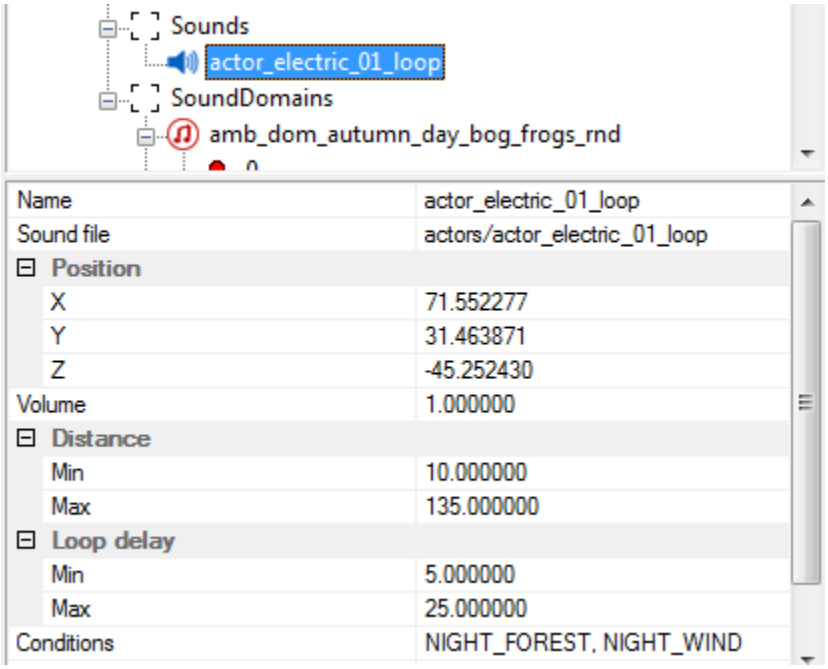
5.12. Adding Sounds

To add a point source of the 3D sound to the scene:

1. Right-click the terrain (or the **Sounds** section in the **Scene View**) and select **Add Sound**.
2. A locator indicating the sound actor will appear in the scene. Move the appeared actor to the necessary area of the scene:



3. To set the properties of the created sound actor, select it in the **Scene View** panel, within the **Scene > Terrain > Sounds** section of it. Properties of the actor are displayed at the lower part of the **Scene View** panel:



You can specify the following properties:

- **Name** - The internal name of the sound actor in the Editor.
- **Sound file** - the sound that this actor will play. In this field, you need to specify the relative path to the sound, including its name without file extension (see the note below). Since our actor is a 3D sound source, the sound file for it must be MONO.

NOTE: In the alpha version of the Editor you cannot use custom sound files, you can use only the pre-defined set of sound files used by the game. All these sounds are stored in the **shared_sound.pak** archive, in the **[sound]** directory.
In the **Sound file** field, you need to specify the path relative to the **[sound]** folder. When specifying a path, you can use either slashes ("\") or backslashes ("/"), and you should not specify the file extension of the sound file.
For example, if you want to play the sound located in the **shared_sound.pak** at the following path: **[sound]\actors\actor_electric_01_loop.pcm**, then you need to specify the following value in the **Sound file** field: **actors/actor_electric_01_loop**

- **Volume** - the playback volume. The default value is 1 (the maximum, initial volume of the sound file). If you specify values in the [0,1] interval, the volume of the sound file will be multiplied by this parameter (and the sound will be decreased correspondingly).
- **Distance** section - the section that sets the sound distances (in meters):
    - **(Distance) Min** - the sound volume will be played at its maximum within a sphere with a center in the source of the sound and a radius equal to the value of this parameter. For example, in the screenshot of the properties above, there will be maximum volume within a radius of 10 meters from the actor.
    - **(Distance) Max** - the hearing distance. The sound volume will change from its maximum value to zero between Distance Min and Distance Max.
- **Loop delay** (**Min**, **Max**) section - delay in seconds for the recurred playback of the sound. If both Min and Max values are zero, then the sound will play continuously, without a pause. If these values are not equal to zero, then, after the playback of the sound is finished, there will be a pause. The length of this pause will be in the range of [Min, Max] seconds (a random value will be taken from this range). After the pause, the sound will be played again.
- **Conditions** - if this parameter is not specified (the field is empty), the sound will play at any time, during day or night. However, you can limit the interval during which it can be played:
    - If you want to play your sound only during the day, then you should set this parameter to **DAY_FOREST, DAY_WIND**
      Please note that these two comma-separated IDs are the single value of this parameter, not the two values (see the screenshot above). They cannot be used separately.

- If you want to play your sound only during the night, then you should set this parameter to **NIGHT_FOREST, NIGHT_WIND** Please note that these two comma-separated IDs are the single value of this parameter, not the two values (see the screenshot above). They cannot be used separately.

5.12.1. Adding Series of Sounds

When configuring a sound actor (or a sound domain, see 5.13 below), you can specify not a single specific sound file to be played, but a random alternation of the sounds from a specific set. For example, a barking of a dog can be played as a series of barking sounds, where each successive sound will be different from the previous one.

You can see that many series of the files in the **[sound]** directory of the **shared_sound.pak** archive have been designed that way.
For example, the set of sounds for a night owl, which you can find in the **[sound]\amb\amb_us_autumn\amb_us_autumn_night_forest_owl** directory, consists of 5 sounds. Each of these sound files has the suffix **"__<N>**" (the double underscore with a number) in the file name:

- **amb_us_autumn_night_owl_rnd__1.pcm**
- **amb_us_autumn_night_owl_rnd__2.pcm**
- **amb_us_autumn_night_owl_rnd__3.pcm**
- **amb_us_autumn_night_owl_rnd__4.pcm**
- **amb_us_autumn_night_owl_rnd__5.pcm**

To configure the sound actor to play a series of these sounds, rather than a particular sound, you need to specify the name of one of these files without its "**__<N>**" suffix in the **Sound file** field of this actor (see 5.12. Adding Sounds above). In this case, the whole series of these sounds will be played.

For example, to play in your sound actor all the files above, you can specify the following value of the **Sound file** parameter in the actor's properties:
amb/amb_us_autumn/amb_us_autumn_night_forest_owl/amb_us_autumn_night_owl_rnd

5.13. Adding Sound Domains

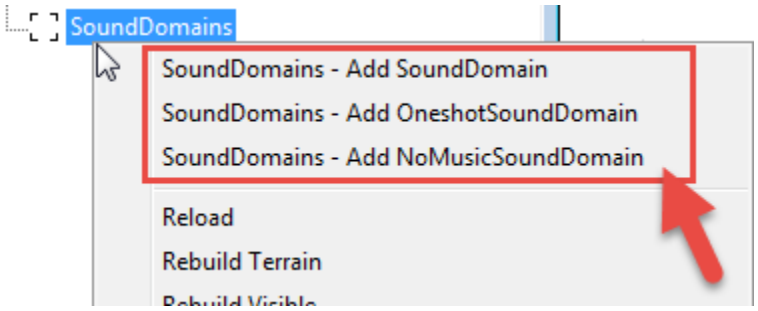
You can add 3 types of Sound Domains to the map:

- Regular **SoundDomain** - sets the area where a certain 2D stereo sound will play. For example, using this object we can configure the playback of the water lapping in the swamp.
- **OneShotSoundDomain** - these domains are designed to play single 3D sounds inside a certain ring around a player when he/she enters the domain. Sounds will be generated at a random position within this ring. For example, you can

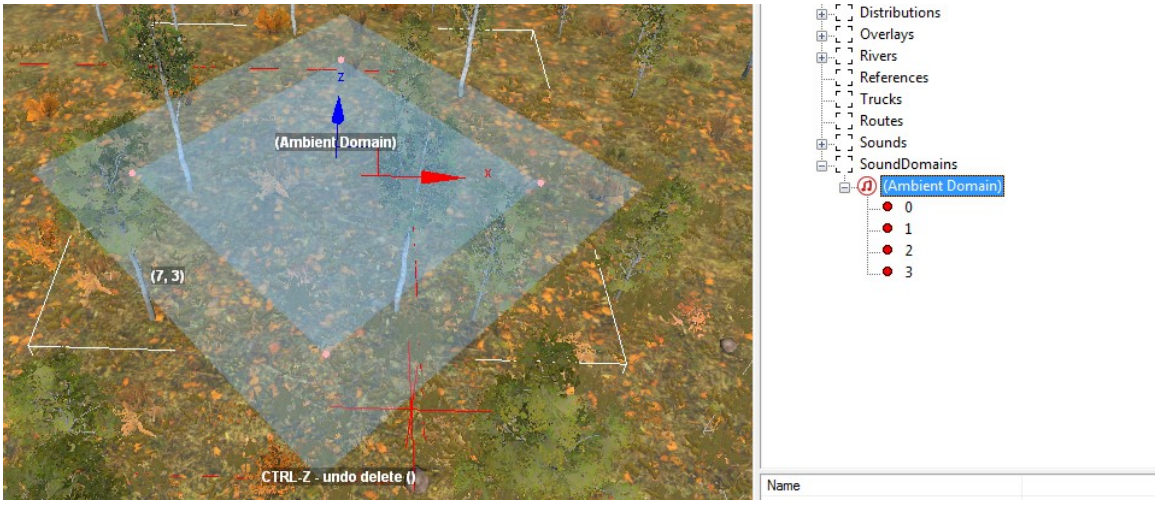
configure a sound of the rockfall using this type of domain. When the player drives near a large rock and enters the domain located near it, the player will hear that the sounds of crumbling stones will be played around him/her at a random position with a certain frequency.

- **NoMusicSoundDomain** - these domains are designed to turn off the in-game music in certain areas. When the player enters the domain of this type, the volume of the music is gradually decreased to zero.

All these types of domains are added to the map in a standard way - by right-clicking the **SoundDomains** section in the **Scene View** panel and selecting **Add <type of the added domain>** in the context menu.



After that, the domain will be created, and the area of this domain will appear on the map. By default, this area is a square with four vertices.

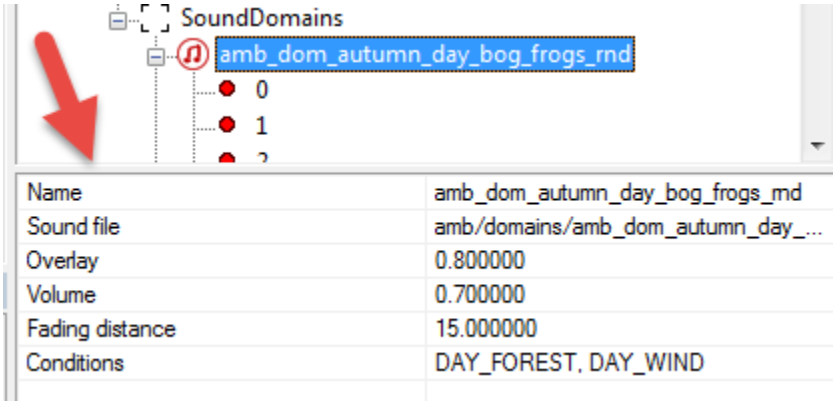


You can edit the domain area in the standard way: move the vertices, add vertices to this area, or delete unnecessary vertices.
To add a new vertex, right-click this domain in the **Scene View** panel and select **Add vertex** from the context menu. Or, if you want to add a vertex at the particular position, you can select a particular vertex of a domain, right-click it, and select **Add vertex** in the

context menu. In this case, the new vertex will be added in the middle between the selected vertex and the next one in a clockwise direction.

NOTE: If you want the domain to work correctly, **its area must be convex**. If you need to create a domain of a more complex shape, you need to compose it from several convex domains with the same settings.

After the setup of the domain area, if the domain is selected, you can configure its properties at the lower part of the **Scene View** panel.



These properties vary for different types of domains. They are described in the subsections below.

NOTE: The **Sound file** field (see 5.12 above), which sets a sound or a series of sounds to be played (for **SoundDomain** and **OneShotSoundDomain** domains), works the same way as for regular sounds. In the alpha version of the Editor, you cannot use custom sound files for domain sounds, you can use only the pre-defined set of sound files used by the game. All these sounds are stored in the **shared_sound.pak** archive, in the **[sound]** directory.
In the **Sound file** field, you need to specify the path relative to the **[sound]** folder. When specifying a path, you can use either slashes (“\”) or backslashes (“/”), and you should not specify the file extension of the sound file.
For example, if you want a domain to play a series of sounds located in **shared_sound.pak** at the following path:
[sound]\amb\domains\amb_dom_autumn_day_bog_frogs_rnd_set,
then you need to specify the following value in the **Sound file** field:
amb/domains/amb_dom_autumn_day_bog_frogs_rnd_set/amb_dom_autumn_day_bog_frogs_rnd
For more details on playing sounds and sound series, see 5.12. Adding Sounds and 5.12.1. Adding Series of Sounds above.

5.13.1. SoundDomain Properties

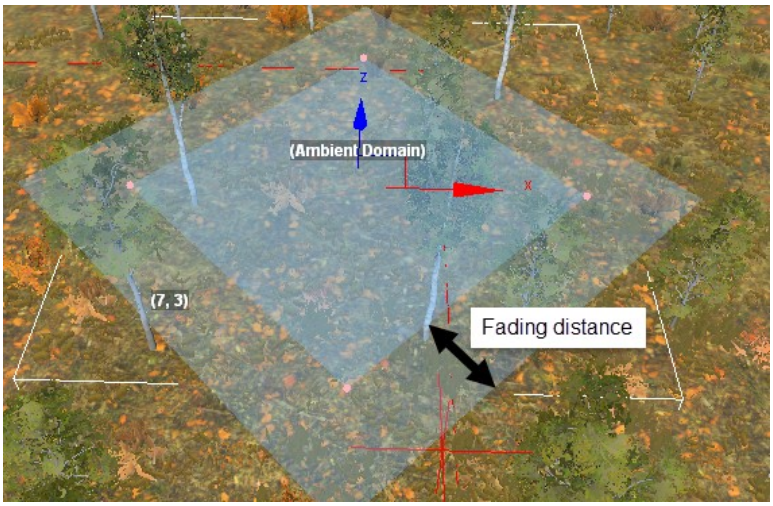
For a general description of a **SoundDomain**, see 5.13. Adding Sound Domains.

Properties of a **SoundDomain** are the following:

- **Name** - the internal name of the sound domain in the Editor.
- **Sound file** - the looped stereo sound that this domain will play. In this field, you need to specify the relative path to the sound, including its name without file extension (see note below).

  NOTE: In the alpha version of the Editor, you cannot use custom sound files for domain sounds, you can use only the pre-defined set of sound files used by the game. All these sounds are stored in the **shared_sound.pak** archive, in the **[sound]** directory.
  In the **Sound file** field, you need to specify the path relative to the **[sound]** folder. When specifying a path, you can use either slashes ("\") or backslashes ("/"), and you should not specify the file extension of the sound file.
  For example, if you want a domain to play a series of sounds located in **shared_sound.pak** at the following path:
  [sound]\amb\domains\amb_dom_autumn_day_bog_frogs_rnd_set,
  then you need to specify the following value in the **Sound file** field:
  amb/domains/amb_dom_autumn_day_bog_frogs_rnd_set/amb_dom_autumn_day_bog_frogs_rnd
  For more details on playing sounds and sound series, see 5.12. Adding Sounds and 5.12.1. Adding Series of Sounds above.

- **Overlay** -the weight of the sound of this domain (from 0 to 1). The sound of the domain will be mixed with the main ambient sound of the scene with this weight.
- **Volume** - the playback volume. The default value is 1 (the maximum, initial volume of the sound file). If you specify values in the [0,1] interval, the volume of the sound file will be multiplied by this parameter (and the sound will be decreased correspondingly).
- **Fading distance** - the distance (in meters) from the domain border where the sound will fade smoothly from its maximum volume (at the domain border) to zero (at the fading distance). On the map, this area of the fading sound is displayed as the semi-transparent external area around the domain:



- **Conditions** - if this parameter is not specified (the field is empty), the sound will play at any time, during day or night. However, you can limit the interval during which it can be played:
    - If you want to play your sound only during the day, then you should set this parameter to **DAY_FOREST, DAY_WIND**
      Please note that these two comma-separated IDs are the single value of this parameter, not the two values (see the screenshot of domain properties in 5.13). They cannot be used separately.
    - If you want to play your sound only during the night, then you should set this parameter to **NIGHT_FOREST, NIGHT_WIND**
      Please note that these two comma-separated IDs are the single value of this parameter, not the two values (see the screenshot of domain properties in 5.13). They cannot be used separately.

5.13.2. OneShotSoundDomain Properties

For a general description of a **OneShotSoundDomain**, see 5.13. Adding Sound Domains.

Properties of an **OneShotSoundDomain** are the following:

- **Name** - the internal name of the sound domain in the Editor.
- **Sound File** - the sound or the series of sounds this domain will play. In this field, you need to specify the relative path to the sound, including its name without file extension (see note below). Typically, for **OneShotSoundDomain**, the suffix **__<N>** in the file name is also omitted (to play a series of sounds, see 5.12.1).

  NOTE: In the alpha version of the Editor, you cannot use custom sound files for domain sounds, you can use only the pre-defined set of sound files used by the game. All these sounds are stored in the **shared_sound.pak** archive, in the **[sound]** directory.

In the **Sound file** field, you need to specify the path relative to the **[sound]** folder. When specifying a path, you can use either slashes ("\") or backslashes ("/"), and you should not specify the file extension of the sound file.
For example, if you want a domain to play a series of sounds located in **shared_sound.pak** at the following path:
[sound]\amb\domains\amb_dom_rolling_stones_rnd_set,
then you need to specify the following value in the **Sound file** field:
amb/domains/amb_dom_rolling_stones_rnd_set/amb_dom_rolling_stones_rnd
For more details on playing sounds and sound series, see 5.12. Adding Sounds and 5.12.1. Adding Series of Sounds above.

- **Volume** (**Min**, **Max**) - the volume range of the played sounds. Each new sound will be played with a new random value of the volume from this range.
- **Radius** (**Min**, **Max**) - these fields set a ring around the player, with the inner radius of the ring equal to the **Min** value and its outer radius equal to the **Max** value. Both **Min** and **Max** values are specified in meters. The sound will be played at the random point inside this ring.
- **Interval** (**Min**, **Max**) - these fields set the minimum and maximum time intervals between sounds (in seconds). Each successive sound will be played after the previous one with a delay, and the value of this delay will be each time taken randomly from the [**Min**, **Max**] range.
- **Weather Intensity threshold** - this field is currently not used. You should keep the default value of it, which is -1.
- **Conditions** - if this parameter is not specified (the field is empty), the sound will play at any time, during day or night. However, you can limit the interval during which it can be played:
    - If you want to play your sound only during the day, then you should set this parameter to **DAY_FOREST, DAY_WIND**
      Please note that these two comma-separated IDs are the single value of this parameter, not the two values (see the screenshot of domain properties in 5.13). They cannot be used separately.
    - If you want to play your sound only during the night, then you should set this parameter to **NIGHT_FOREST, NIGHT_WIND**
      Please note that these two comma-separated IDs are the single value of this parameter, not the two values (see the screenshot of domain properties in 5.13). They cannot be used separately.

5.13.3. NoMusicSoundDomain Properties

For a general description of a **NoMusicSoundDomain**, see 5.13. Adding Sound Domains.

Properties of a **NoMusicSoundDomain** are the following:

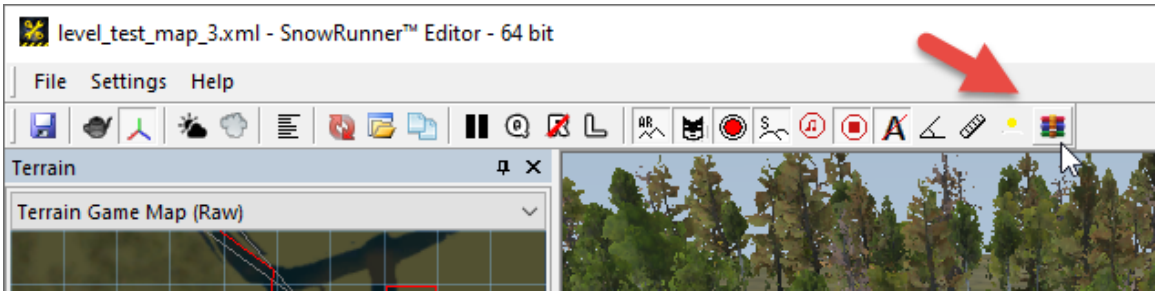
- **Name** - the internal name of the sound domain in the Editor.
- **Distance threshold** - the distance (in meters) from the domain border, at which the music volume decreases/increases.
- **Fade in time** - the time (in seconds) for the fade-in transition. This transition will increase the volume of music (from zero to the volume set in the game) when the player is leaving the domain.
- **Fade out time** - the time (in seconds) for the fade-out transition. This transition will decrease the music volume (from the volume set in the game to zero) when the player is entering the domain.

5.14. Adding Zones

In the alpha version of the Editor, you cannot add zones (Garage, Fuel station, etc.) to the scene. This functionality will appear at the later versions of the Editor.

6. Packing a Map

To pack the map, you need to click the **Pack terrain** button () on the toolbar of the Editor.



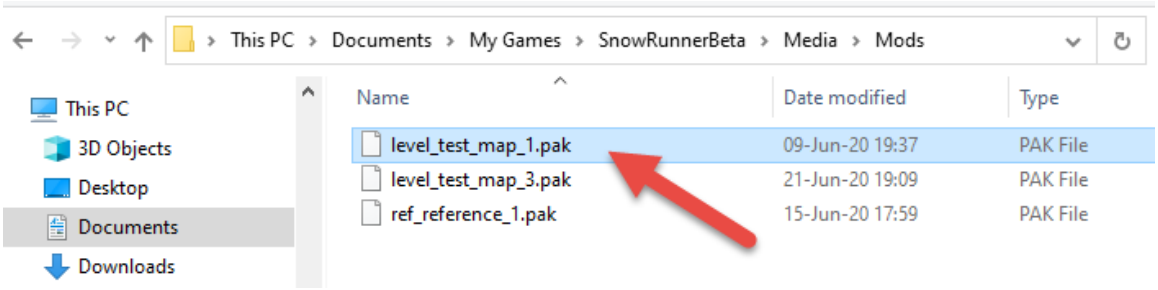
After doing this, the system will create two files:

- .pak file - which is necessary for local testing.
- .zip file - which is intended for uploading to mod.io.

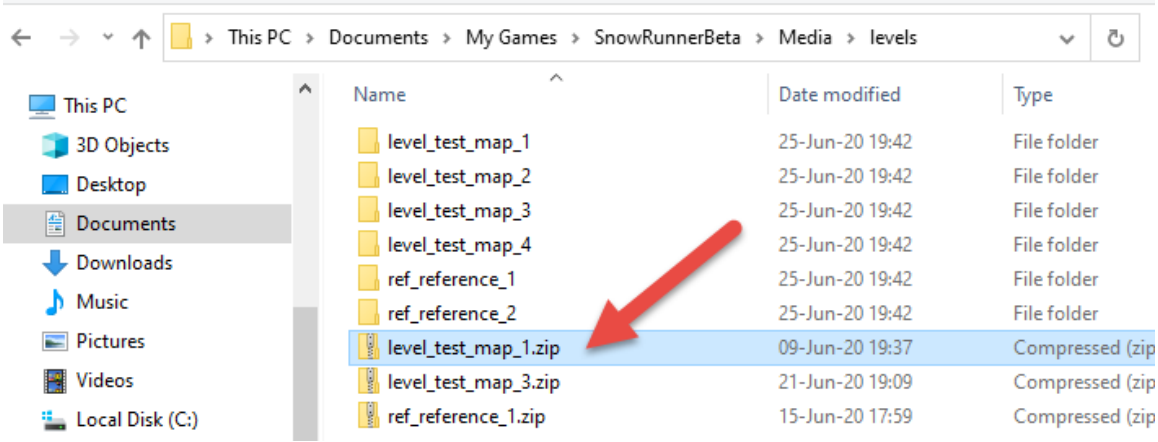
After successful packing, the .pak file is automatically copied to the mods folder of the game, which will allow the game to find this map and display it in Custom Scenarios. So, directly after packing, you can proceed to testing your map in the game.

If you need the .pak file itself, you can find it in the folder with local mods of the game, i.e. in the **Media\Mods** folder, which is created in the **Documents\My Games\SnowRunnerBeta** folder.

Full path to this folder is typically similar to the following:
C:\Users\<name_of_user>\Documents\My Games\SnowRunnerBeta\Media\Mods



The .zip file will be stored in the **Media\levels** folder:



This particular .zip file you can upload to snowrunner.mod.io in a standard way.

NOTE: If you want to upload a custom map mod to snowrunner.mod.io, you should take into account that this map will be playable only for users that have the PTS version of the game. All other users will not be able to open this map in the game or play on it. Because of that, we recommend you to either upload your map as a hidden mod or, in the case of the public mod, specify in the title and description of the mod that it is intended for the PTS version only.

7. Testing a Map in the Game

Directly after packing, you can test your map in the game.

To do this:

1. Restart the game. After the restart, the game will find the .pak file generated as a result of packing (see above).
2. In the main menu of the game, open **NEW GAME > CUSTOM SCENARIOS**.
   On this screen, you will see the name of your map.

3. Select it (by clicking it) and press **ENTER**.
4. You will see a list of saved games. Click a necessary slot there (where you want to start a new game on your map). If necessary, overwrite one of your previously saved games.

5. After a loading screen, you will be spawned to your map in the “Proving Grounds” mode. I.e., the **TOOLS** menu (with **Repair & Refuel** and other options) will be available for you as if you have loaded one the Proving Grounds maps.

IMPORTANT: To be able to spawn on your map correctly, you need at least one truck on your map and this truck must be Active (i.e. in the properties of the truck the **Active** parameter must be set to **True**).

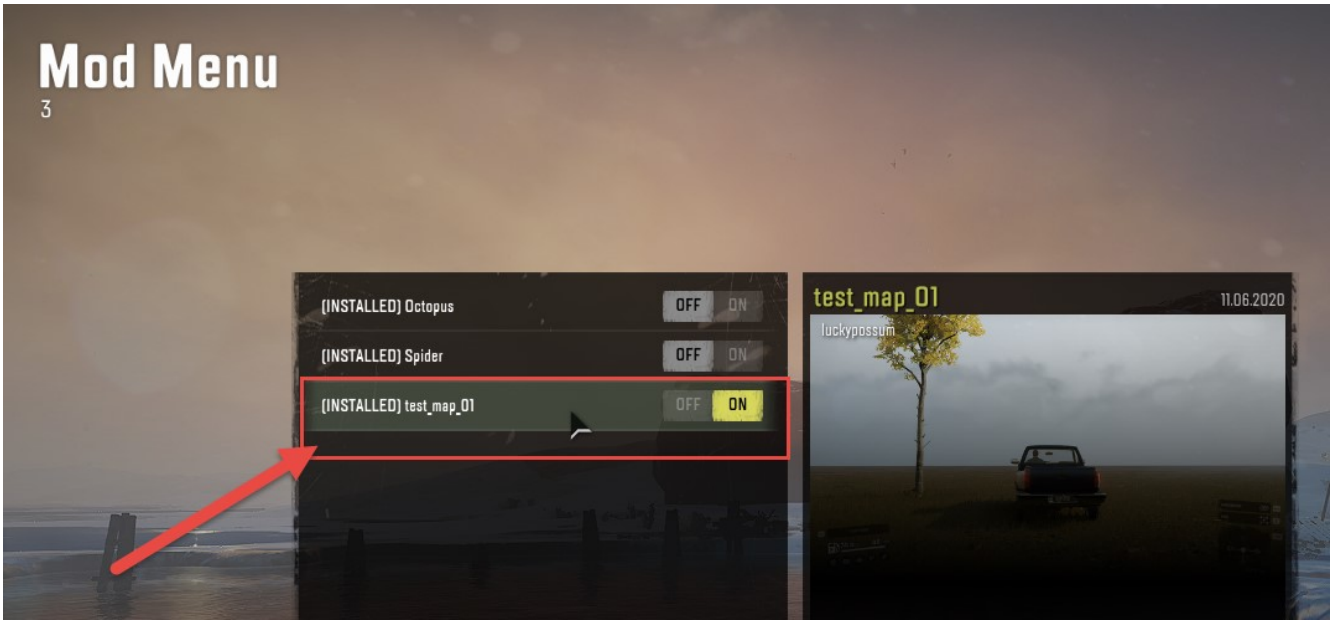
8. Publishing a Map

After you have packed your map, you need to locate the generated .zip file (see 6. Packing a Map above). This .zip file can be uploaded to snowrunner.mod.io the same way as truck mods are uploaded (see section **4** at the https://snowrunner.mod.io/guides/quick-mod-creation-guide-adding-trucks for details). However, there is an **important nuance**:

- After publishing, the map will be playable only for users that have the PTS version of the game. All other users will not be able to open this map in the game or play on it.
  Because of that, we recommend you to either upload your map as a hidden mod or, in the case of the public mod, specify in the title and description of the mod that it is intended for the PTS version only.

9. Downloading Map Mods from mod.io

To download a map mod from mod.io, you need to subscribe to it and activate it in the game. This is done the same way as it's done for trucks (see section **5** at the https://snowrunner.mod.io/guides/quick-mod-creation-guide-adding-trucks for details).



After that, you will be able to play on the activated maps using the PTS version of the game. Please note that you will not be able to open map mods or play on them using the regular version of the game.

10. Playing on Map Mods from mod.io

After your map mod is successfully installed and activated (see 9. above), you will be able to play on it using the PTS version of the game.
To do this:

1. Open **NEW GAME > CUSTOM SCENARIOS** in the main menu.
2. Find the downloaded map there.

3. Select it (by clicking it) and press **ENTER**.
4. You will see a list of saved games. Click a necessary slot there (where you want to start a new game on your map). If necessary, overwrite one of your previously saved games.

5. After a loading screen, you will be spawned to the downloaded map.

As opposed to the “Proving Grounds” mode used during testing of a local map, the game on the downloaded map will start in a regular mode, as if you are playing one of the initial game levels.

11. Viewing Trucks

Along with working with maps, the Editor also allows you to view mods of your trucks.

This feature can be useful due to the following:

- The Editor loads the truck faster than the game. You do not need to load the level to view the truck.
- For the truck, you can open:
    - The XML file of the mesh - to view the Fbx file of the truck with textures.
    - The XML file of the class - to view the whole truck with wheels, damage areas, light settings, and so on.
- You can open XML files of meshes and view Fbx files not only for trucks, but for plants, the driver, and so on. However, the XML file of the class can be opened for trucks only.
- When you open the XML file of the mesh, you can ensure:
    - that the model of the truck exported from the 3D package is correct.
    - that paths of textures specified in the XML file of the mesh are correct.

  You can open the XML file of the mesh before creating the XML of the class.
- When you open the XML file of the class, you can see most errors that occur due to the incorrect XML files of all classes that form the description of the truck (truck itself, suspension, gearbox, wheels, etc).
- In the game, you cannot see the collision objects. In the Editor, they are displayed, so you can check that model of the truck was exported correctly.
- You can see the hierarchy of the skeleton of the truck with parented collision objects.

NOTE: We highly recommend opening your trucks in the Editor. By opening them there you can view errors that do not result in crashes of the game but can affect truck behavior.

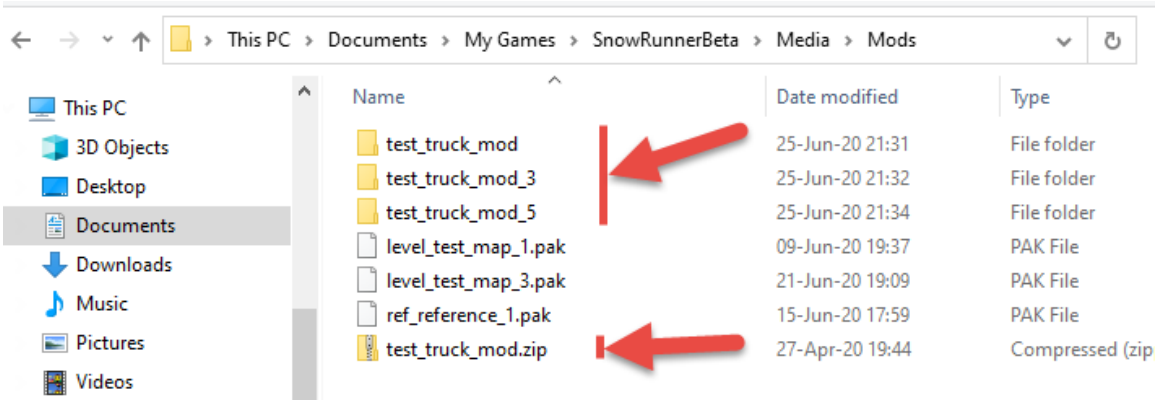
11.1. Opening XML files of a Truck

Your truck mods are stored in the **Media\Mods** folder, which is created in the **Documents\My Games\SnowRunnerBeta** folder.

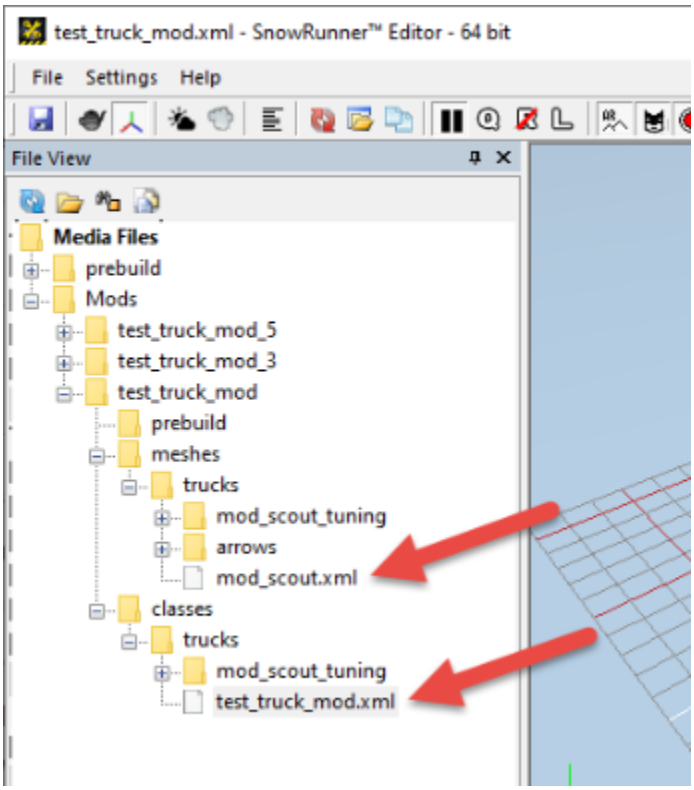
Full path to this folder is typically similar to the following:
C:\Users\<name_of_user>\Documents\My Games\SnowRunnerBeta\Media\Mods

Along with .pak files of the maps, this folder contains:

- folders with source files of the truck mods
- their .zip files (for uploading to snowrunner.mod.io, see https://snowrunner.mod.io/guides/quick-mod-creation-guide-adding-trucks for details).

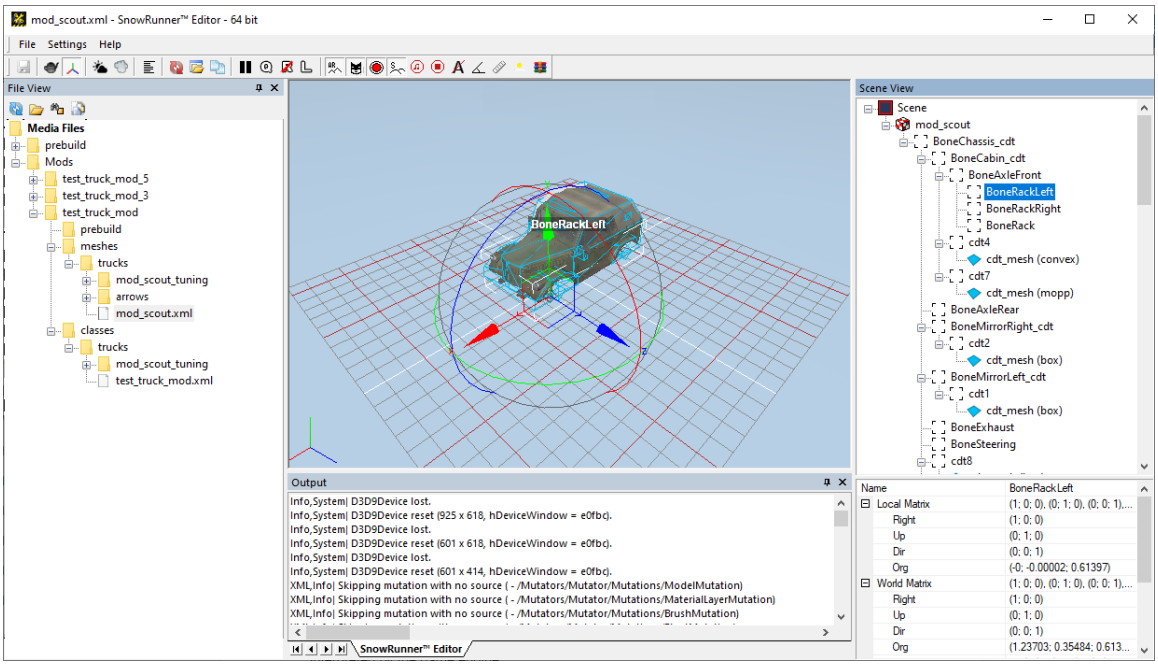


The Editor uses the same **Media** folder. Therefore, you can simply open the XML files from source folders of the truck mods in Editor (without copying anything to a different folder).
To do this, simply expand the **Mods** folder in the **File View** panel of the Editor, locate the XML file of the mesh or the XML-class of your truck, and double-click them:



11.2. Viewing XML file of the Mesh

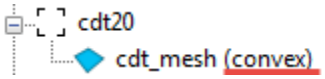
If you open the XML file of the mesh of the truck, you will see the contents of the Fbx file with applied textures.



Here you can quickly check the opened model for correctness.

In the **Scene View** panel, you can see the whole hierarchy of the truck skeleton with the CDT objects. If you select an object there, it will be displayed in the main panel and its properties (coordinates, etc.) will be displayed at the lower part of the panel.

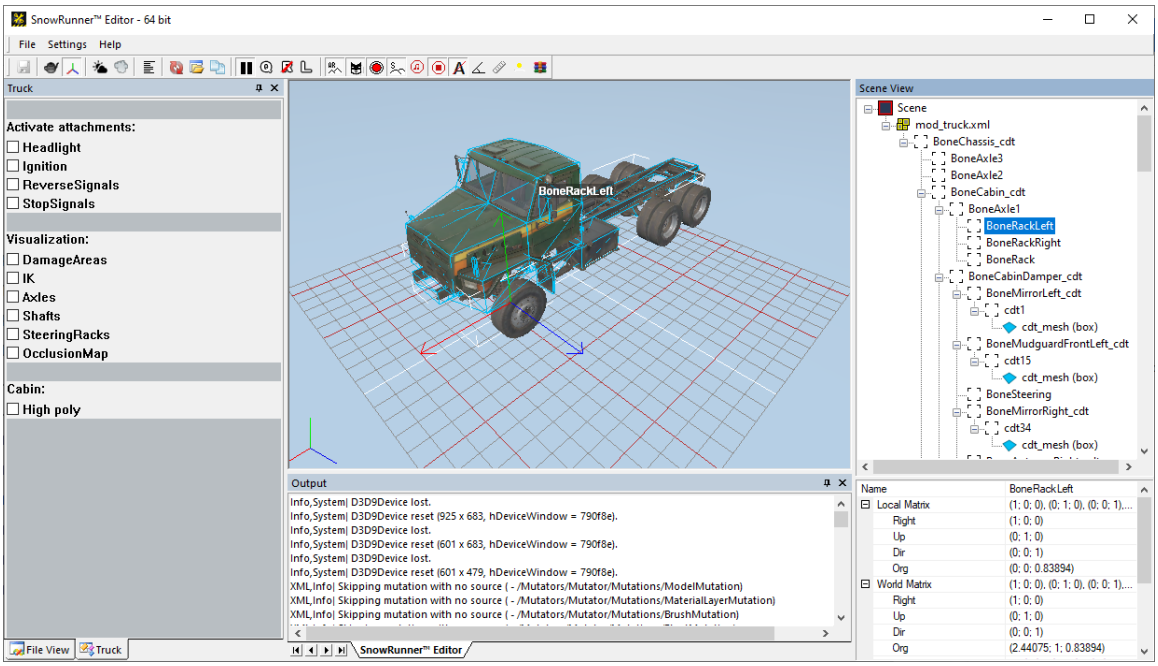
Next to a name of collision object, you can see how the form of this collision object is interpreted by the game engine:



The best such form is the “box”; however, “convex” is also suitable; the “mopp” value here means memory optimized partial polytope (Havok term), which seems to be better than “convex”; if the object is marked as “non-convex”, it may cause some issues. See “*2.6.1.1. Collision meshes*” of the main truck guide for details.

11.3. Viewing XML file of the Class

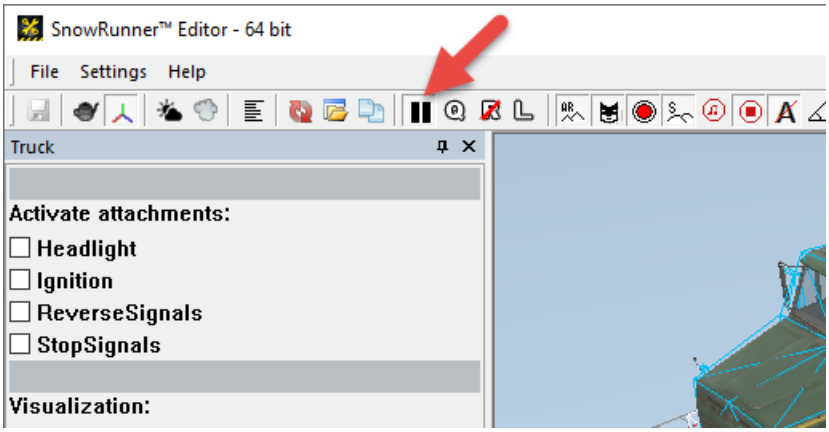
When you open the XML file of the class of the truck, it is open in the new **Truck** tab in the Editor:



The panel on the left side displays some options that can be useful while working with a truck:

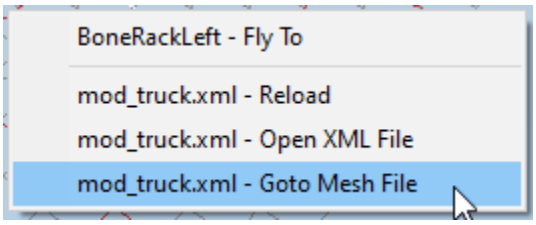
- **Activate attachments** options - allow you to enable/disable the lights that are described in the XML of the truck.
- **Visualization** options - allow you to visualize some objects that are not related to lights or the physical model. For example, you can visualize the Damage Areas of the truck by enabling the corresponding button.
- **Cabin** option - allows you to view the cabin of your truck in the high-poly mode.

The **Scene View** panel on the right displays the whole hierarchy of the truck skeleton with the CDT objects. It works the same way as when viewing the XML-mesh of the truck (see above).
Using this preview of the truck, you can also enable its Havok simulation. To do this, click the  button on the toolbar of the editor:



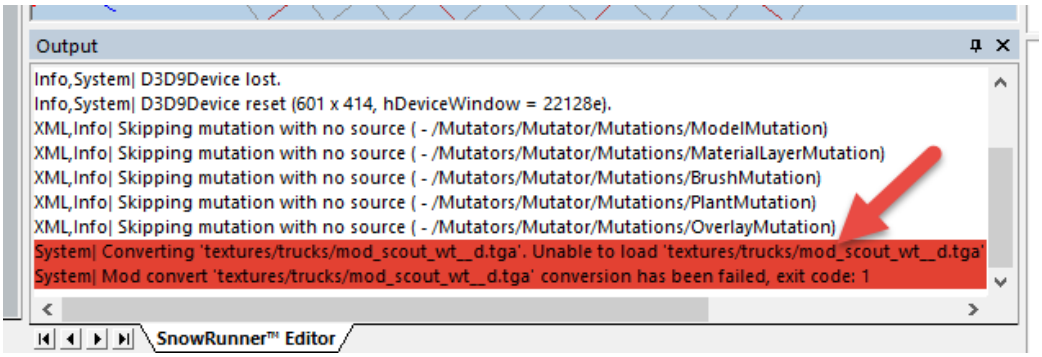
After doing this, the truck will be displayed as if it is placed on the ground.

The preview of the XML-class of the truck allows you to quickly proceed to viewing the XML-mesh of the truck. To do this, right-click somewhere in the main panel and select **Goto Mesh File**.



11.4. Viewing Errors

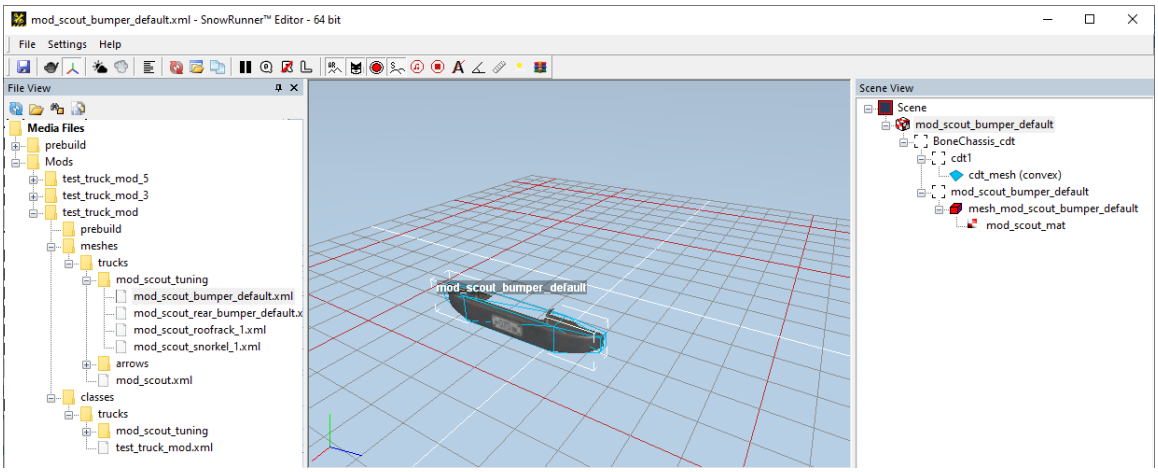
If the **Settings > Ignore warnings** option is not selected in the main menu of the Editor, errors will be displayed to the user as pop-up windows.
Along with that, errors are displayed to the user in the log within the **Output** panel.



You can select errors there and copy them to buffer by pressing CTRL+C, then paste where necessary by pressing CTRL+V.

11.5. Viewing XML files of Meshes for Other Objects

Using Editor, you can open XML files of meshes and view Fbx files not only for trucks, but for plants, the driver, and so on.
For example, you can open the XML file of the mesh of the bumper and view its Fbx model:



The XML file of the *class* can be opened for trucks only.

11.6. Viewing the Snow Cover Effect for a Truck

Using the **Settings > Show Snow By Up Vector** option in the main menu, you can enable the snow cover effect for the truck, according to its material settings.
For more details on the snow cover effect settings, see the "*7.2. <Material>*" section of the main truck guide.