

# **Content Tools Reference Guide**

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**Software designed and built in Australia by BigWorld.**

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# Chapter 1. Introduction

This document describes the tools available in BigWorld from a technical point of view. For details on how to make the best use of them, alongside suggestions, see the document Content Creation Manual.

## Note

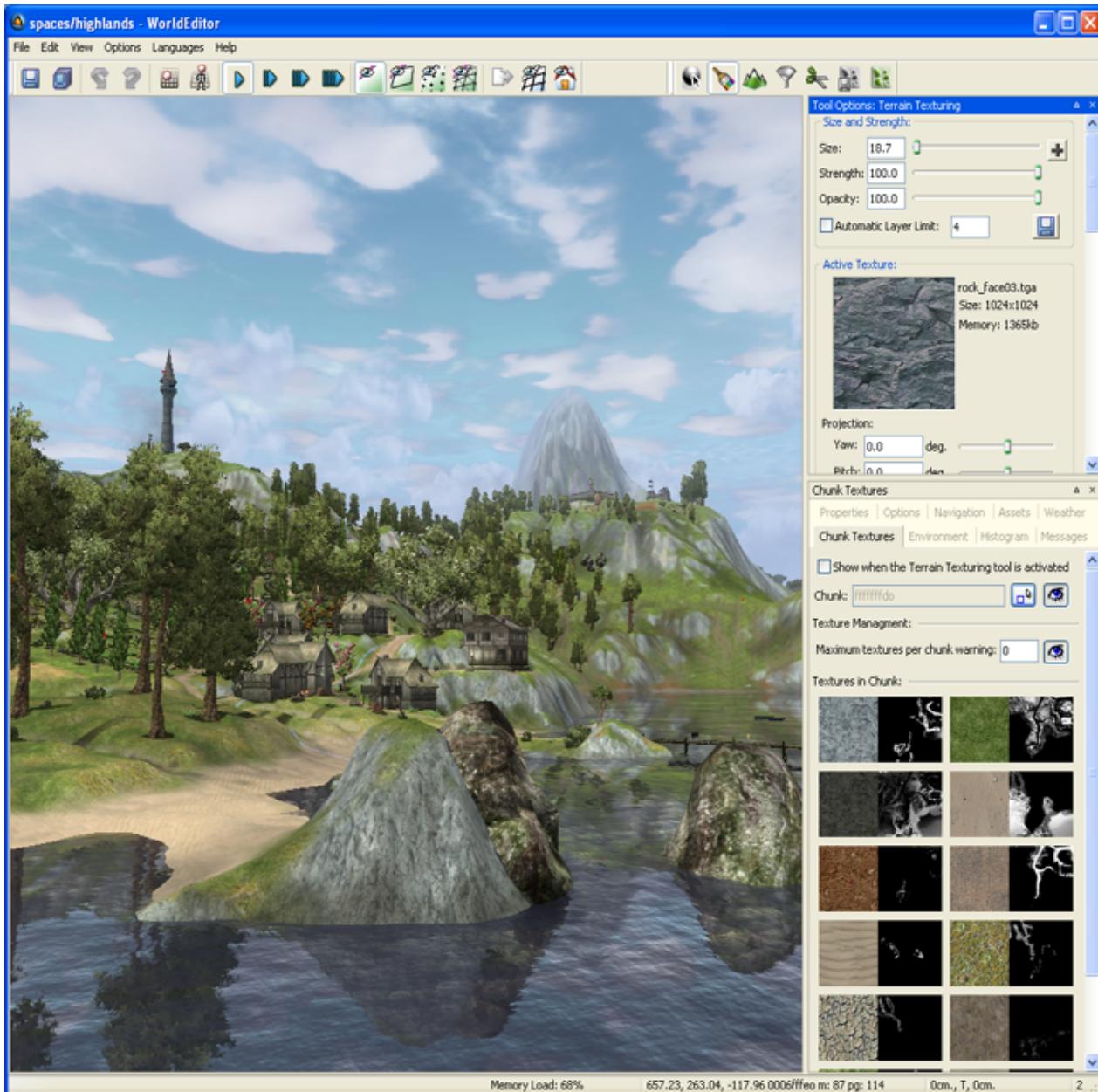
For details on BigWorld terminology, see the document Glossary of Terms.

# Chapter 2. WorldEditor

WorldEditor is BigWorld's tools to quickly create and edit worlds.

This chapter describes the options available in WorldEditor's environment.

For more details on how to perform common tasks in WorldEditor, see the document Content Creation Manual which can be accessed from inside the WorldEditor by pressing F1 or by selecting the **Help → Content Creation** menu item<sup>1</sup>.



WorldEditor window

For details on how to start this and other BigWorld tools, see *Starting the Tools* on page 273 .

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<sup>1</sup>For details, see “Menu items” on page 12 .

## 2.1. Menu items

The list below describes the menu items available in WorldEditor:

- **File → New space<sup>B</sup>**

Opens the **New Space** dialog box, where the user can create a new space, specifying its name, path, size, and alternatively, advanced terrain features.

After creation, the space will be displayed in the viewport.

For details, see “New Space dialog box” on page 49 .

- **File → Open space<sup>B</sup>**

Opens the **Browse For Folder** dialog box, where the user can specify the space to be loaded.

For details, see “Browse For Folder dialog box” on page 47 .

- **File → Reload all chunks<sup>B</sup>**

Reloads all chunks and associated data of the current space.

- **File → Reload all textures**

Reloads all textures currently used by WorldEditor, to refresh textures changed by external applications.

- **File → Regenerate Terrain LODs**

Reloads the terrain textures and applies them to all chunks in the space.

- **File → Save**

Saves all modified terrain and chunk files, plus the project's space map, if it was changed — this operation can be stopped by pressing **Esc<sup>C</sup>**.

Secondary data (such as terrain shadow information, static lighting data, and chunk thumbnails) that has already been calculated will also be saved, but no calculation is done. A list of chunks whose secondary data have been calculated will be stored in the space's `space.cleanlist` file.

The next time the **File → Process Data** menu item is selected, the necessary calculation will be performed on all chunks that are dirty.



Performs the same function as the **Save** toolbar button<sup>A</sup> (  ).

- **File → Process data**

Calculates derived data and saves all modified data — this operation can be stopped by pressing **Esc<sup>C</sup>**.

While this process takes longer than a regular save, it makes the space ready with all information required to run the game.



Performs the same function as the **Process All Data** toolbar button<sup>A</sup> (  ).

- **File → Convert to advanced terrain<sup>B</sup>**

Opens the **Convert Space** dialog box, where the user can convert a simple terrain space to one with advanced terrain features.

For details, see “Convert Space dialog box” on page 48 .

- **File → Resize terrain texture blends<sup>B</sup>**

Opens the **Resize Terrain Blends** dialog box, where the user change the resolution of the texture layers blend map.

For details, see “Resize Terrain Blends dialog box” on page 57 .

- **File → Recent spaces**

Opens a sub-menu with a list of recent spaces.

For details, see “Resize Terrain Blends dialog box” on page 57 .

- **File → Exit<sup>B</sup>**

Closes the application.

- **Edit → Undo**

Undoes the most recent world-changing action.

Multiple actions can be undone. The *undo* list extends to the state of the world when WorldEditor was last started.

Each world-changing action that is undone is added to the *redo* list.

Performs the same function as the **Undo** toolbar button<sup>A</sup> (  ).

### Note

Only actions that effectively change the world are added to the *undo* list.

- **Actions added to the undo list:**

- Applying texture to terrain.
- Placing/deleting/moving/ rotating/scaling an object.
- Cutting a hole in terrain.

- **Actions not added to the undo list:**

- Changing the brush size and/or strength.
- Changing Object panel's Selection Filter.
- Changing camera height and/or angle.

- **Edit → Redo**

Redoes the most recently undone world-changing action.

Multiple actions can be redone.

The *redo* list contains one entry for each undone world-changing action.



Performs the same function as the **Redo** toolbar button<sup>A</sup> ( ).

- **Edit → Clear undo/redo history**

Clears the *undo* list and the *redo* list.

- **Edit → Select all**

Selects all objects in the space that match the current selection in **Object** panel's **Selection Filter** drop-down list box (for details on this drop-down list box, see “Object panel” on page 70 ).

- **Edit → Deselect all**

Deselects all selected objects.

- **Edit → Save shell as template**

Saves the selected shells as a template, adding the extension `.template` to the file name.

The template file will contain both chunk and lighting information.

If the user wants to also save models and/or shells, then save the selection as a prefab (via the **Edit → Save Selection As Prefab** menu item).

- **Edit → Save selection as prefab**

Saves the current selection as a `.prefab` file, which can then later be used to place a copy of the items in the terrain.

*Prefabs* are elements such as objects, models, lights, shells, and items that can be saved in WorldEditor. They allow the artist to save a carefully arranged group of items to a single file, so that it can be used elsewhere within the world without having to arrange the objects a second time.

While a template can only contain lighting information, a prefab can contain also models and other objects.

The user may place existing prefabs by selecting the **Asset Browser** panel's **Prefabs** virtual folder. For details, see “Asset Browser panel” on page 93 .

- **Edit → Hide Selection**

Hide the selected items. The hidden state affects items in the editor only, it has no effect on the client or the server.

- **Edit → Unhide Selection**

Unhide the selected items. To select hidden items, select them in the **Scene Browser** panel (see “Scene Browser panel” on page 96), or use the Hidden Objects selection filter in the **Object** panel (see “Object panel” on page 70 ).

- **Edit → Unhide All Selectable**

Unhide all the hidden items in the space that are selectable according to the Selection Filter of the **Object** panel (see “Object panel” on page 70 ).

- **Edit → Unhide All**

Unhide all the hidden items in the space.

- **Edit → Freeze Selection**

Freeze the selected items. The frozen state affects items in the editor only, it has no effect on the client or the server.

- **Edit → Unfreeze Selection**

Unfreeze the selected items. To select frozen items, select them in the **Scene Browser** panel (see “Scene Browser panel” on page 96), or use the Frozen Objects selection filter in the **Object** panel (see “Object panel” on page 70 ).

- **Edit → Unfreeze All Selectable**

Unfreeze all the frozen items in the space that are selectable according to the Selection Filter of the **Object** panel (see “Object panel” on page 70 ).

- **Edit → Unfreeze All**

Unfreeze all the frozen items in the space.

- **View → Toolbars → Main toolbar, View → Toolbars → Tools**

Toggles the toolbar visibility.

For details on toolbars, see “Toolbar” on page 17 .

- **View → Status bar**

Toggles the status bar visibility.

For details on the status bar, see “Status bar” on page 20 .

- **View → Show tool options panel<sup>A</sup>**

Toggles the visibility of the **Tool Options** panel, which displays the settings for the tool selected in the toolbar.

For details on each tool panel see:

- **Object panel** — See “Object panel” on page 70 .
- **Terrain Texturing panel** — See “Terrain Texturing panel” on page 74 .
- **Terrain Height panel** — See “Terrain Height panel” on page 84 .
- **Terrain Filtering panel** — See “Terrain Filtering panel” on page 87 .
- **Terrain Mesh Cut/Repair panel** — See “Terrain Mesh Cut/Repair panel” on page 88 .
- **Terrain Import/Export panel** — See “Terrain Import/Export panel” on page 89 .
- **Project panel** — See “Project panel” on page 92 .

- **View → Show asset browser<sup>A</sup>**

Displays/activates the panel (for details, see “Asset Browser panel” on page 93 ).

- **View → Show scene browser<sup>A</sup>**

Displays/activates the panel (for details, see “Scene Browser panel” on page 96 ).

- **View → Show post processing panel<sup>A</sup>**

Displays/activates the panel (for details, see “Post-Processing panel” on page 102 ).

- **View → Show properties panel<sup>A</sup>**

Displays/activates the panel (for details, see “Properties panel” on page 105 ).

- **View → Show general options panel<sup>A</sup>**

Displays/activates the panel (for details, see “General Options panel” on page 111 ).

- **View → Show navigation panel<sup>A</sup>**

Displays/activates the panel (for details, see “Navigation panel” on page 117 ).

- **View → Show weather options panel<sup>A</sup>**

Displays/activates the panel (for details, see “Weather Preview panel” on page 118 ).

- **View → Show environment options panel<sup>A</sup>**

Displays/activates the panel (for details, see “Environment Options panel” on page 121 ).

- **View → Show histogram panel<sup>A</sup>**

Displays/activates the panel (for details, see “Histogram panel” on page 128 ).

- **View → Show messages panel<sup>A</sup>**

Displays/activates the panel (for details, see “BigWorld Messages panel” on page 130 ).

- **View → Show chunk textures panel<sup>A</sup>**

Displays/activates the panel (for details, see “Chunk Textures panel” on page 108 ).

- **View → Show panels<sup>A</sup>**

Toggles the visibility of all panels.

- **View → Load default panel layout<sup>A</sup>**

Closes all customised panels, and displays WorldEditor's default panel.

- **View → Load most recent panel layout<sup>A</sup>**

Closes all current panels, and displays the customised panel layout previously used.

- **Options → Save camera position**

Saves the current camera position to `space.localsettings` file.

The camera will be initialised with this position on the next session of WorldEditor.

- **Options → Save start position**

Saves the current camera position to `space.settings` configuration file.

Your game can read this information as the starting point for the game character. Useful possibly only during development.

- **Options → Enable Umbra**

Toggles Umbra occlusion culling

- **Options → Preview Default Weather When Opening a Space**

If this option is enabled, then when you open a space in WorldEditor, the default weather selected for that space will automatically play. This is to enhance the WYSIWYG experience. If you find instead that this gets in your way while editing, you can turn this off. You can still select weather to preview in the Weather panel.

- **Languages → List of available languages**

Selects the language to use in the tool.

This list is compiled based on the `LanguageName` tags present in the XML files in the `<res>/helpers/languages` folder and in the file pointed by the `language` tag in `bigworld/tools/worldeditor/options.xml`.

- **Help → About WorldEditor**

Opens the **WorldEditor About** dialog box.

- **Help → Tools Reference Guide**

Opens this document.

- **Help → Content creation**

Opens the document Content Creation Manual.

- **Help → Shortcuts**

Opens the **Keyboard Shortcuts** dialog box.

For details on this dialog box, see “WorldEditor Shortcuts dialog box” on page 58 .

- **Help → Request feature/report bug**

Opens your e-mail program, with **To:** field automatically set to BigWorld's support e-mail address, and **Subject:** set to **WorldEditor - Feature Request / Bug Report**.

*A – For details on the panel system and its terminology, see Panel System on page 287 .*

*B – If there were changes to the world, user will be prompted to choose between saving the changes before proceeding, processing changes then saving before proceeding, proceeding without saving changes, or cancelling the operation. For details, see “Changed Files dialog box” on page 48 .*

*C – For details, see “Keyboard shortcuts” on page 25 .*

## 2.2. Toolbar

The list below describes the toolbar buttons available in WorldEditor:

-  – **Save**

Saves the data, without recalculating shadow/lighting/thumbnil information.

Performs the same function as the **File → Save** menu item.<sup>A</sup>



— **Process all data**

Recalculates shadow/lighting/thumbnil information, then saves them.

Performs the same function as the **File → Process Data** menu item.<sup>A</sup>



— **Undo**

Undoes the most recent action.

Performs the same function as **Edit → Undo** menu item.<sup>A</sup>



— **Redo**

Redoes the most recent undone action.

Performs the same function as **Edit → Redo** menu item.<sup>A</sup>



— **Orthographic view**

Sets the camera to top-down view.

In this mode, the mouse and keys will move along the x- and z- axes (where the y-axis is considered up when standing on the terrain).

For details on camera movement while in this mode, see “Mouse controls” on page 42 .

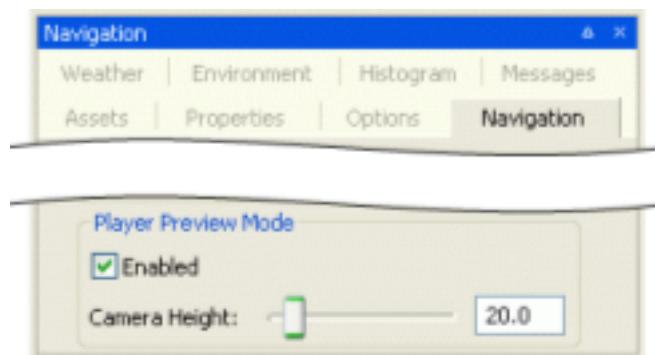


— **Player preview mode**

Toggles the *player walkthrough* mode, in which the camera moves in the world as if attached to the player.

The height of the camera on this mode is specified by the **Navigation** panel's **Camera Height** field (for details, see “Navigation panel” on page 117 ).

This button performs the same function as the **Navigation** panel's **Player Preview Mode** check box.



Navigation panel



— **Slow**, — **Medium speed**, — **Fast**, — **Super**

Specifies how fast the camera travels in response to appropriate key events (keys Q, W, E, A, S, and D).<sup>C</sup>

If Caps Lock is on, then the camera speed will be boosted.

Camera speed can also be set to **Slow**, **Medium**, **Fast** and **Super Fast** by the keyboard shortcuts Ctrl+1, Ctrl+2, Ctrl+3, and Ctrl+4, respectively.



— **Normal**,



— **Chunk borders**,



— **Pole markers**,



— **Wireframe**

Toggles between the various chunk visualisation modes.

For details, see “[Chunk visualisation modes](#)” on page 59 .



— **Edit in external editor**

Opens the current selected item in an external editor.

After saving the item in the editor, WorldEditor will automatically reload it to reveal the changes.

Currently, we only support particle systems (edited in ParticleEditor) and models (edited in ModelEditor).



— **Draw terrain as wireframe**

Draws the terrain mesh as wireframe.

Performs the same function as the **General Options** panel's, **Show** list box's, **Terrain → Wireframe** item (for details on this panel, see “[General Options panel](#)” on page 111 ).



— **Hide/show outside objects**

Toggles the visibility of all outside objects.



— **Object tool<sup>B</sup>**

Activates the *Object* mode — for details, see “[Object panel](#)” on page 70. This mode is also activated by pressing 1<sup>C</sup>.



— **Terrain texture tool<sup>B</sup>**

Activates the *Terrain texture* mode — for details, see “[Terrain Texturing panel](#)” on page 74. This mode is also activated by pressing 2<sup>C</sup>.



— **Terrain height tool<sup>B</sup>**

Activates the *Terrain height* mode — for details, see “[Terrain Height panel](#)” on page 84. This mode is also activated by pressing 3<sup>C</sup>.



— **Terrain filter tool<sup>B</sup>**

Activates the *Terrain filter* mode — for details, see “[Terrain Filtering panel](#)” on page 87. This mode is also activated by pressing 4<sup>C</sup>.



— **Terrain mesh cut/repair tool<sup>B</sup>**

Activates the *Terrain mesh cut/repair* mode — for details, see “Terrain Mesh Cut/Repair panel” on page 88 . This mode is also activated by pressing 5<sup>C</sup>.



— **Terrain import/ export tool<sup>B</sup>**

Activates the *Terrain import/export* mode — for details, see “Terrain Import/Export panel” on page 89 . This mode is also activated by pressing 6<sup>C</sup>.



— **Project tool<sup>B</sup>**

Activates the *Project* mode — for details, see “Project panel” on page 92. This mode is also activated by pressing 7<sup>C</sup>.

*A* — For details, see “Menu items” on page 12 .

*B* — It also displays/activates the tool’s panel. For details on panels, see Panel System on page 287 .

*C* — For details, see “Keyboard shortcuts” on page 25 .

## 2.3. Status bar

The status bar displays information about the current world, display settings, and mouse positioning.

A typical status bar is illustrated below:

Memory Load: 11% | -227.02, 179.70, -15.37 ffffff0 m: 9 pg: 9 | snaps free. | 81759 tris. | 18.9 fps. | 404 chunks loaded (52 dirty, 0 lods)

WorldEditor status bar

The list below describes the pieces of information displayed in the status bar, as they appear:

- **Memory Load** (in the example, **11%**)  
System memory load.
- **Mouse pointer position** (in the example, **-228.02, 179.70, -12.37**)  
Position of the mouse pointer, in world coordinates.
- **Chunk identification** (in the example, **ffffdffff0**)  
ID of the chunk over which the mouse is located.
- **Models in chunk** (in the example, **m:9**)  
Number of models in the chunk over which the mouse is located.
- **Primitive groups in chunk** (in the example, **pg: 9**)  
Number of primitive groups in chunk over which the mouse is located.
- **Current snap mode** (in the example, **free**)

Displays the current method for snapping objects in the world. This is specified in the **Object** panel's **Object Grid Snaps** group box (for details, see "Object panel" on page 70.).

- **Triangles rendered** (in the example, **81759 tris.**)

Number of triangles currently being rendered in the scene.

- **Frame rate** (in the example, **18.9 fps.**)

Frame rate used to display the scene.

- **Loaded chunks** (in the example, **404 chunks loaded**)

Number of loaded chunks.

By default, the Chunk Manager only loads the chunks in the area around the camera, up to the far plane (configured in the **General Options** panel's **Far Plane** field — for details, see "General Options panel" on page 111).

- **Dirty chunks** (in the example, **(52 dirty)**)

Number of dirty chunks.

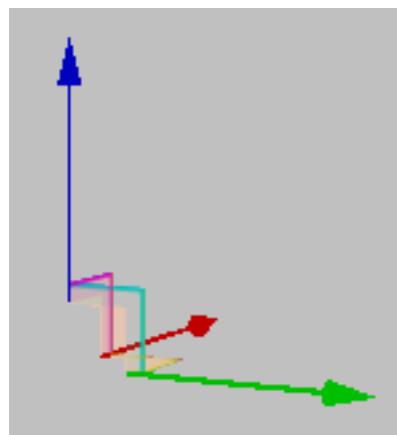
## 2.4. Gizmos

WorldEditor provides both context-sensitive gizmos and keyboard-activated gizmos that allow the configuration of world items. They are described in the sections below.

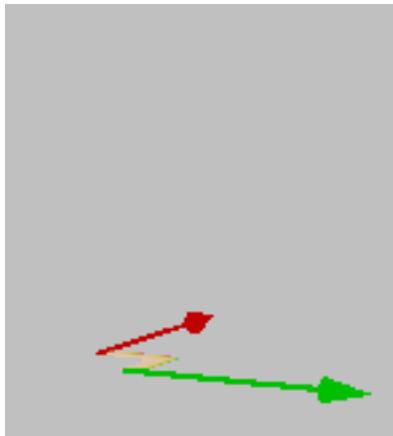
### 2.4.1. Movement gizmo

Displayed by default on all world items and represented by red-green-blue axes (or red-green axis if the **Object** panel's **Locking Mode** group box's **Terrain** option button is selected) ending in a arrow, this gizmo allows the item to be repositioned in the world.

Please note that if the **Objects** panel's **Drag On Select** check box is selected, then items can be moved by simply dragging them.



Movement gizmo (Free and Obstacle modes)

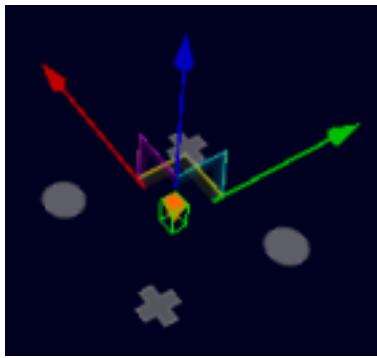


Movement gizmo (Terrain mode)

#### 2.4.2. User data object linking gizmo

Displayed automatically when a user data object with one or more UDO\_REF properties is selected. This gizmo contains two circles, which when dragged and dropped on top of another user data object creates a link between the two, and, if the user data object editor script implements it, two crosses that when dragged allow cloning the user data object.

For details on using this gizmo, see “Patrol path editing with User Data Objects” on page 135 .

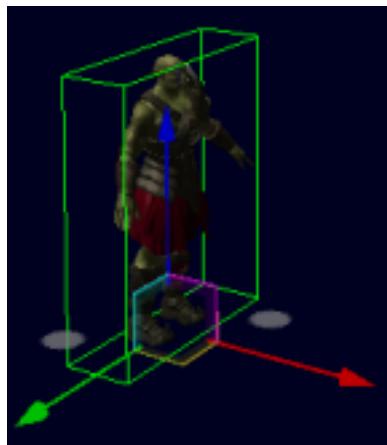


User data object linking gizmo

#### 2.4.3. Entity linking gizmo

Displays automatically when an entity that contains one or more UDO\_REF properties is selected. This gizmo is composed of two circles that can be dragged to a user data object to establish link to it, from the entity.

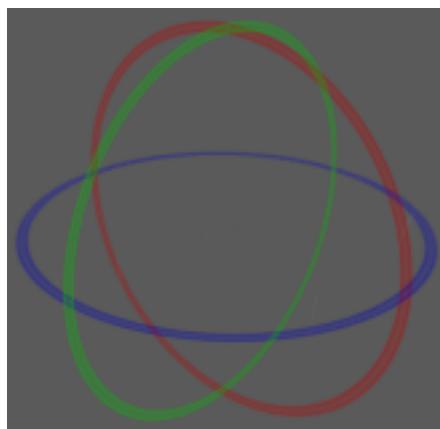
For details on how to configure an entity to support linking to user data objects and how to use this gizmo, see “Patrol path editing with User Data Objects” on page 135 .



Entity linking gizmo

#### 2.4.4. Rotation gizmo

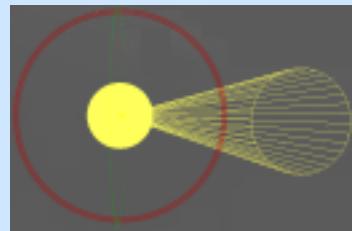
Activated by the Shift keyboard shortcut and represented by red-green-blue circles, this gizmo allows the item to be rotated in all directions.



Rotation gizmo

#### Note

Spot lights have an additional yellow circle that allows the user to change the **cone angle** property.

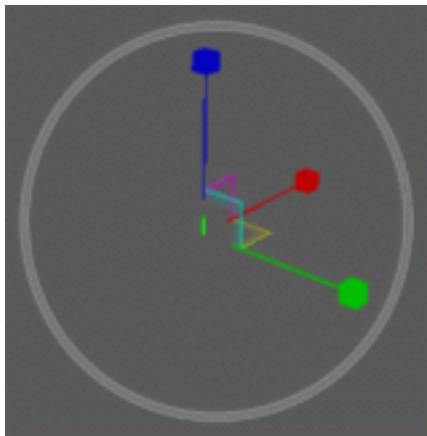


Rotation gizmo for spot lights

#### 2.4.5. Scale gizmo

Activated by the Alt keyboard shortcut and represented by red-green-blue axes ending in a square (for *regular scale* gizmo) and a white circle (for *uniform scale* gizmo), this gizmo allows the item to be scaled.

Dragging one of the squares at the end of an axis rescales the item only in that dimension. Dragging the white circle inwards or outwards uniformly shrinks or enlarges the item, respectively.

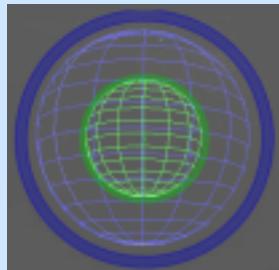


Scale gizmo

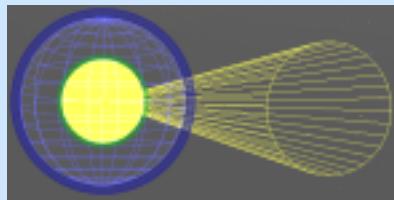
### Note

Lights have a different scale gizmo, with a green circle representing the inner radius and a blue circle representing the outer radius.

Spot lights have an additional yellow circle that allows the user to change the **cone angle** property.



Scale gizmo for lights



Scale gizmo for spot lights

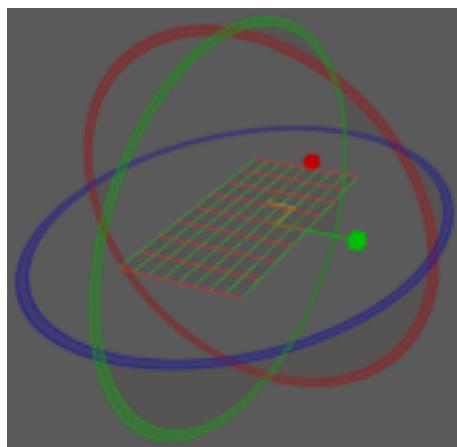
## 2.4.6. Texture projection/scale gizmo

Activated by pressing Shift while the **Terrain Texture** toolbar button<sup>A</sup> — — is selected or by clicking the **Terrain Texturing** panel's button<sup>B</sup>, this gizmo contains the following elements (each updating a different field in the panel):

- **Projection gizmo** (composed of red, green, and blue circles).
  - **Red circle** — updates the **Roll** field.
  - **Green circle** — updates the **Pitch** field.
  - **Blue circle** — updates the **Yaw** field.
- **Scale gizmo** (composed of red and green cubes and a red- and green-sided rectangle or grid).
  - **Red cube** — updates the **V** field.
  - **Green cube** — updates the **U** field.

*A* — For details, see “Toolbar” on page 17 .

*B* — For details, see “Terrain Texturing panel” on page 74 .



Texture projection/scale gizmo

## 2.5. Keyboard shortcuts

The list of WorldEditor's keyboard shortcuts can be displayed via the **Help → Shortcuts** menu item (for details, see “Menu items” on page 12 ).

The sections below list the WorldEditor's keyboard shortcuts.

### 2.5.1. Function keys

- **F1**

Displays the **WorldEditor Shortcuts** page, which can be left by pressing **Esc**.

- **F4**

Cycles through object locking modes:

- **Free**
- **Terrain**
- **Obstacle**

Performs the same function as the **Object** panel's **Locking Mode** group box<sup>A</sup>.



Object panel's Locking Mode group box

- **Ctrl+F5**

Activates the **Realtime Profiling** console, which can be left by pressing **Esc** (for details, see “Realtime Profiling console” on page 261 ).

- **F6**

Cycles through the chunk visualisation modes:

- **Normal** — same as the toolbar button.
- **Chunk borders** — same as the toolbar button.
- **Pole markers** — same as the toolbar button.
- **Wireframe** — same as the toolbar button.

Performs the same function as the **Chunk Visualisation** toolbar buttons (for details, see “Toolbar” on page 17 ).

For details, see “Chunk visualisation modes” on page 59 .

- **Ctrl+F7**

Activates the **Debug (Watcher)** console, which can be left by pressing **Esc** (for details, see “Debug (Watcher) console” on page 263 ).

- **F8**

Cycles through coordinate systems:

- **World**
- **Local**
- **View**

Performs the same function as the **Object** panel's **Coordinate System** group box<sup>A</sup>.



Object panel's Coordinate System group box

- **F9**



- If Terrain Texture Tool<sup>B</sup> — — is selected

Recalculates detail objects, such as flora, based on the texture predominant in the terrain.

For more details on flora calculation, see the document Content Creation Manual's lesson **Create and Use Flora** (the document is accessed by pressing F1 or by selecting the **Help → Content Creation** menu item — for details, see "Menu items" on page 12 ).

- **F11**

Activates the **Histogram** console, which can be left by pressing Esc (for details on this console, see "Histogram console" on page 266 ).

*A* — For details, see "Object panel" on page 70 .

*B* — For details, see "Terrain Texturing panel" on page 74 , and "Toolbar" on page 17 .

## 2.5.2. Key modifiers

---

- **Alt**

- If at least one object is selected

- If the mouse is being dragged (using the left button)

Deselects the items delimited by the area over which the mouse is dragged.

- Otherwise

While pressed, the key activates the scale gizmos (NOTE: the key does not toggle a scale mode).

The *uniform scale* gizmo is represented by a circle, and causes the object to have all its dimensions uniformly resized. The *regular scale* gizmo is represented by the usual red-green-blue axis gizmo, and causes the object to be rescaled only on the selected dimension.

For lights, the scale gizmo for inner radius (represented by a green circle) and outer radius (represented by a blue circle) are activated. For spot lights, the gizmo for the property **cone angle** (represented by a yellow area inside the gizmo for inner radius) is also activated.

The selected object can then be shrunk or enlarged, up to a maximum size of 100 metres.

The scale gizmos use the **Object** panel's **Coordinate system** and **Locking Mode** group boxes to determine which axis to scale on and whether to snap the objects while scaling (for details, see "Object panel" on page 70 ).



- If Terrain Texture Tool toolbar button<sup>C</sup> — — is selected



Activates the *texture sampler* tool (indicated by the cursor icon), which samples the dominant texture of the chunk under the cursor — the **Terrain Texturing** panel's **Active Texture** field<sup>C</sup> will be updated accordingly.

- If Terrain Texture Height toolbar button<sup>E</sup> —  — is selected
  - Activates the *height picker* tool (indicated by the  cursor icon), which samples the height underneath the cursor and assigns it to the **Terrain Height** panel's **Explicit Height** field (for details, see "Terrain Height panel" on page 84 ).
  
- If Terrain Import/Export toolbar button<sup>D</sup> —  — is selected
  - Activates the *height picker* tool (indicated by the  cursor icon), which samples the maximum height of the region selected by dragging the mouse and assigns it to the **Terrain Import/Export** panel's **Maximum Height** field (for details, see "Terrain Import/Export panel" on page 89 ).
  
- If Debug (Watcher) console<sup>B</sup> is active
  - If [0-9] key in the alphanumeric keypad is pressed:
    - Selects item 40+[0-9], or 50+[0-9] (if Shift is pressed).
  
- Alt+Ctrl
  - If Terrain Texture Tool toolbar button<sup>C</sup> —  — is selected
    - Activates the *texture/opacity sampler* tool (indicated by the  cursor icon), which samples the dominant texture of the chunk under the cursor and its opacity — the **Terrain Texturing** panel's **Active Texture** and **Opacity** fields<sup>C</sup> will be updated accordingly.
  
- Alt+Shift
  - If Terrain Texture Tool toolbar button<sup>C</sup> —  — is selected
    - Activates the *texture projection* tool (indicated by the  cursor icon — a red- and green-sided square indicates the clicked area), which adjusts the **Terrain Texturing** panel's **Projection** fields<sup>C</sup> to the values of that of the terrain under the cursor.
  
- If Debug (Watcher) console<sup>B</sup> is active
  - If [0-9] key in the alphanumeric keypad is pressed:
    - Selects item 50+[0-9].
  
- Alt+Page Down
  - If Debug (Watcher) console<sup>B</sup> is active
    - If the watcher is in Edit mode, then decreases the watcher's value by 1,000.
  
- Alt+Page Up

- **If Debug (Watcher) console<sup>B</sup> is active**

If the watcher is in Edit mode, then increases the watcher's value by 1,000.

- **Ctrl**

- **If at least one object is selected**

While pressed, the key enables the selection of multiple objects (NOTE: the key does not toggle an additive selection mode).

- **If used in conjunction with the mouse scroll wheel**

Rotates the selected shells according to the snapped portals.

- **If Debug (Watcher) console<sup>B</sup> is active**

- **If [0-9] key in the alphanumeric keypad is pressed:**

Selects item 20+[0-9], or 30+[0-9] (if Shift is pressed).

- **If Terrain Height Tool toolbar button<sup>E</sup> —  — is selected**

**Note:** This is only valid if the left Ctrl key is pressed.

Activates the *explicit height* brush (indicated by a green square), which immediately sets the terrain height to the value specified in the **Explicit Height** field (if the **Absolute** option button is selected), or immediately increases the terrain height by the value specified in the **Explicit Height** field (if the **Relative** option button is selected).

For details on absolute and relative explicit height modes, see “Terrain Height panel” on page 84 .

- **If Terrain Import/Export toolbar button<sup>D</sup> —  — is selected**

Activates the *height picker* tool (indicated by the  cursor icon), which samples the minimum height of the region selected by dragging the mouse and assigns it to the **Terrain Import/Export** panel's **Minimum Height** field.

- **Ctrl+Alt**

See the entry **Alt+Ctrl** in this list.

- **Ctrl+Shift**

- **If Debug (Watcher) console<sup>B</sup> is active**

- **If [0-9] key in the alphanumeric keypad is pressed:**

Selects item 30+[0-9].

- **Ctrl+Page Down**

- **If Debug (Watcher) console<sup>B</sup> is active**

If the watcher is in Edit mode, then decreases the watcher's value by 100.

- **Ctrl+Page Up**

- **If Debug (Watcher) console<sup>B</sup> is active**

If the watcher is in Edit mode, then increases the watcher's value by 100.

- **Shift**

- **If at least one object is selected**

While pressed, the key activates the rotation gizmo (NOTE: the key does not toggle a rotation mode).

The rotation gizmo uses the **Object** panel's **Coordinate system** and **Locking Mode** group boxes to determine which axis to rotate around and whether to snap the objects while rotating (for details, see “Object panel” on page 70 ).

- 

- **If Terrain Texture Tool toolbar button<sup>C</sup> –  – is selected**

Activates the *texture projection/scale* gizmo (for details, see “Terrain Texturing gizmos” on page 83).

The gizmo can also be activated by clicking the  button on top of the **Terrain Texturing** panel<sup>C</sup>.

- 

- **If Terrain Import/Export toolbar button<sup>D</sup> –  – is selected**

Locks the selected region being dragged to chunk boundaries.

- 

- **If Debug (Watcher) console<sup>B</sup> is active**

- **If [0-9] key in the alphanumeric keypad is pressed:**

Selects item 10+[0-9], 30+[0-9] (if Ctrl is pressed), or 50+[0-9] (if Alt is pressed).

- **Shift+Enter**

- **If Debug (Watcher) console<sup>B</sup> is active and watcher is in edit mode**

Displays the watcher modification history.

- **Shift+Alt**

See the entry **Alt+Shift** in this list.

- **Shift+Page Down**

- **If Debug (Watcher) console<sup>B</sup> is active**

If the watcher is in Edit mode, then decreases the watcher's value by 100.

- **Shift+Page Up**

- **If Debug (Watcher) console<sup>B</sup> is active**

If the watcher is in Edit mode, then increases the watcher's value by 100.

**A** – For details, see “Toolbar” on page 17 .

**B** – Activated by F7 (for details on the Python console, see “Python console” on page 268 ).

**C** – For details, see “Terrain Texturing panel” on page 74 .

**D** – For details, see “Terrain Import/Export panel” on page 89 .

**E** – For details, see “Terrain Height panel” on page 84 .

### 2.5.3. Edit keys

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- **Backspace**

- **If Debug (Watcher) console<sup>C</sup> is active**

Returns the list to the previous branch of the watcher tree.

- **Caps Lock**

- **ON**

Increases the current camera speed. It accelerates the camera movement, which speed is set by keyboard shortcuts (Ctrl+1, Ctrl+2, Ctrl+3, and Ctrl+4), or by the **Camera Speed** toolbar buttons



- **OFF**

Restores camera to the speed set by keyboard shortcuts or by the **Camera Speed** toolbar buttons<sup>A</sup>.

- **Delete**

Deletes the selected objects.

- **Enter**

- **If Object Tool toolbar button<sup>B</sup> –  – is selected**

Places the selected object under the mouse cursor.

- **If Python console<sup>E</sup>**

Executes the Python command, or exits the console if no command was specified.

- **If Realtime Profiling console<sup>D</sup> is active**

Expands or collapses the profiling element currently selected — elements with children are indicated by an ellipsis (...) next to it.

- **If Debug (Watcher) console<sup>C</sup> is active**

- **If the selected node is not a leaf**

Navigates one level down in the watcher tree.

- **If the selected node is a leaf**

Opens the selected watcher for editing, or accepts the typed value if it is already in Edit mode.

- **If watcher is in Editor mode and Shift is pressed**

Displays the watcher modification history.

- **Esc**

Deselects the selected objects.

- **If the File → Save or File → Process Data menu item has been selected, and is still saving/processing**

Cancels the operation (for details, see “Menu items” on page 12 ).

- **If any console is active**

Exits the console.

**NOTE:** The different modes and consoles are activated in the following way:

- **Help mode — F1**

- **Realtime profiling console — F5** (for details, see “Realtime Profiling console” on page 261 )

- **Debug (Watchers) console — F7** (for details, see “Debug (Watcher) console” on page 263 )

- **Histogram console — F11** (for details, see “Histogram console” on page 266 )

- **Python console — Ctrl+P** (for details, see “Python console” on page 268 )

- **If Debug (Watcher) console<sup>C</sup> is active**

- **If the watcher is in Edit mode**

Leaves Edit mode.

- **If the watcher is not in Edit mode**

Exits the console.

- **Home**

- **If Realtime Profiling console<sup>D</sup> is active**

Scrolls the list to display the first page.

- **If Debug (Watcher) console<sup>C</sup> is active**

Returns the list to the root of the watcher tree.

- **Page Down**

- **If Realtime Profiling console<sup>D</sup> is active**

Moves the selection to the next element in the list.

Performs the same function as the ] (square right bracket) keyboard shortcut.

- **If Debug (Watcher) console<sup>C</sup> is active**

- **If the watcher is not in Edit mode**

Moves the selection to the next item in the list.

- **If the watcher is in Edit mode**

Decreases the watcher's value by 1, 10 (if Shift is pressed), 100 (if Ctrl is pressed), or 1,000 (if Alt is pressed).

- **Page Up**

- **If Realtime Profiling console<sup>D</sup> is active**

Moves the selection to the previous element in the list.

Performs the same function as the [ (square left bracket) keyboard shortcut.

- **If Debug (Watcher) console<sup>C</sup> is active**

- **If the watcher is not in Edit mode**

Moves the selection to the previous item in the list.

- **If the watcher is in Edit mode**

Increases the watcher's value by 1, 10 (if Shift is pressed), 100 (if Ctrl is pressed), or 1,000 (if Alt is pressed).

*A – For details, see “Toolbar” on page 17 .*

*B – For details, see “Object panel” on page 70 , and “Toolbar” on page 17 .*

*C – Activated by F7 (for details, see “Debug (Watcher) console” on page 263 ).*

*D – Activated by F5 (for details, see “Realtime Profiling console” on page 261 ).*

*E – Activated by Ctrl+P (for details, see “Python console” on page 268 ).*

## 2.5.4. Symbols

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- **Numpad + (Plus sign)**

- **If Realtime Profiling console<sup>A</sup> is active**

Scrolls the screen one line down.

- **If Debug (Watcher) console<sup>B</sup> is active**

Scrolls the watcher list down.

- **, (Comma)**

- **If Terrain Filter Tool toolbar button<sup>C</sup> –  – is selected**

Selects the previous item in the **Filters** list box.

- **Numpad - (Minus sign)**

- **If Realtime Profiling console<sup>A</sup> is active**

Scrolls the screen one line up.

- **If Debug (Watcher) console<sup>B</sup> is active**

Scrolls the watcher list up.

- . (Period)

- If Terrain Filter Tool toolbar button<sup>C</sup> –  – is selected

Selects the next item in the **Filters** list box.

- [ (Left square bracket)

- If Terrain Texture Tool<sup>D</sup> –  –, Terrain Height Tool<sup>E</sup> –  –, Terrain Filter Tool<sup>C</sup> –  –, or Terrain Mesh Tool<sup>F</sup> –  – toolbar button is selected

Decreases the brush size.<sup>G</sup>

- If Realtime Profiling console<sup>A</sup> is active

Moves the selection to the profiling element in the list.

Performs the same function as the **Page Up** keyboard shortcut.<sup>I</sup>

- ] (Right square bracket)

- If Terrain Texture Tool<sup>D</sup> –  –, Terrain Height Tool<sup>E</sup> –  –, Terrain Filter Tool<sup>C</sup> –  –, or Terrain Mesh Tool<sup>F</sup> –  – toolbar button is selected

Increases the brush size.<sup>G</sup>

- If Realtime Profiling console<sup>A</sup> is active

Moves the selection to the next element in the list.

Performs the same function as the **Page Down** keyboard shortcut.<sup>I</sup>

- { (Left curly bracket)

- If Terrain Texture Tool<sup>D</sup> –  –, Terrain Height Tool<sup>E</sup> –  –, Terrain Filter Tool<sup>C</sup> –  –, or Terrain Mesh Tool<sup>F</sup> –  – toolbar button is selected

Decreases the brush strength.<sup>G</sup>

- } (Right curly bracket)

- If Terrain Texture Tool<sup>D</sup> –  –, Terrain Height Tool<sup>E</sup> –  –, Terrain Filter Tool<sup>C</sup> –  –, or Terrain Mesh Tool<sup>F</sup> –  – toolbar button is selected

Increases the brush strength.<sup>G</sup>

- ~ (Tilde)

Toggles the *player walkthrough* mode.



This mode can also be toggled by the **Player Preview Mode** toolbar button<sup>H</sup> — —, or by the **Navigation** panel's **Player Preview Mode** group box's **Enabled** check box.<sup>I</sup>

**A** — Activated by F5 (for details, see “Realtime Profiling console” on page 261 ).

**B** — Activated by F7 (for details, see “Debug (Watcher) console” on page 263 ).

**C** — For details, see “Terrain Filtering panel” on page 87 , and “Toolbar” on page 17 .

**D** — For details, see “Terrain Texturing panel” on page 74 , and “Toolbar” on page 17 .

**E** — For details, see “Terrain Height panel” on page 84 , and “Toolbar” on page 17 .

**F** — For details, see “Terrain Mesh Cut/Repair panel” on page 88 , and “Toolbar” on page 17 .

**G** — The mouse pointer must be located somewhere in the viewport for the shortcut to have effect.

**H** — For details, see “Toolbar” on page 17 .

**I** — For details, see “Navigation panel” on page 117 .

## 2.5.5. Numeric keys

---

- **Alphanumeric keypad**

- **1**

Activates the *Object* mode — for details, see “Object panel” on page 70. This mode is also activated by the toolbar button<sup>D</sup>.

- **2**

Activates the *Terrain texture* mode — for details, see “Terrain Texturing panel” on page 74. This mode is also activated by the toolbar button<sup>D</sup>.

- **3**

Activates the *Terrain height* mode — for details, see “Terrain Height panel” on page 84. This mode is also activated by the toolbar button<sup>D</sup>.

- **4**

Activates the *Terrain filter* mode — for details, see “Terrain Filtering panel” on page 87. This mode is also activated by the toolbar button<sup>D</sup>.

- **5**

Activates the *Terrain mesh cut/repair* mode — for details, see “Terrain Mesh Cut/Repair panel” on page 88 . This mode is also activated by the  toolbar button<sup>D</sup>.

- **6**

Activates the *Terrain import/export* mode — for details, see “Terrain Import/Export panel” on page 89 . This mode is also activated by the  toolbar button<sup>D</sup>.

- **7**

Activates the *Project* mode — for details, see “Project panel” on page 92. This mode is also activated by the  toolbar button<sup>D</sup>.

- **If Debug (Watcher) console<sup>B</sup> is active**

Depending on the key modifier pressed (if any), selects the following item (n is the pressed key):

- **n**

- **10+n** (if Shift is pressed)
- **20+n** (if Ctrl is pressed)
- **30+n** (if Ctrl+Shift is pressed)
- **40+n** (if Alt is pressed)
- **50+n** (if Alt+Shift is pressed)

- **Numeric keypad**

- **0**

- **If Histogram console<sup>A</sup> is active**

Toggles the graphing of luminance.

- **1**

- **If Histogram console<sup>A</sup> is active**

Toggles the graphing of the red component in the **RGB** histogram.

- **2**

- **If Histogram console<sup>A</sup> is active**

Toggles the graphing of the green component in the **RGB** histogram.

- **3**

- **If Histogram console<sup>A</sup> is active**

Toggles the graphing of the blue component in the **RGB** histogram.

- **4**
    - **If Histogram console<sup>A</sup> is active**

Toggles the rendering of the scene background on the histograms.
  - **5**
    - **If Histogram console<sup>A</sup> is active**

Decreases the vertical range ratio of the **Luminance** and **RGB** histograms.
  - **6**
    - **If Histogram console<sup>A</sup> is active**

Increases the vertical range ratio of the **Luminance** and **RGB** histograms.
- A – Activated by F11 (for details, see “Histogram console” on page 266 ).*
- B – Activated by F7 (for details, see “Debug (Watcher) console” on page 263 ).*
- C – For details, see “Terrain Texturing panel” on page 74 , and “Toolbar” on page 17 .*
- D – For details, see “Toolbar” on page 17 .*

## 2.5.6. Alphabetic keys

---

- **A**

Moves the camera to the left.
- **B**

Toggles the drawing of object's BSPs.

This value can also be set by the **General Options** panel's, **Show** list box's, **Scenery → BSP** item<sup>A</sup>.
- **C**

Clones selected objects.
- **D**

Moves the camera to the right.
- **E**

Moves the camera upwards.

  - **If Navigation panel is active**
    - **If the Player Preview Mode group box's Enabled check box is selected**

Increases the value of the **Player Preview Mode** group box's **Camera Height** field.
- **G**
  - **If Object panel<sup>C</sup> is active**

Toggles the snapping of objects to the grid specified in the **Object** panel.

This value is also set by the **Object** panel's **Object Grid Snaps** group box's **Enabled** check box.

- **If Realtime Profiling console<sup>B</sup> is active**

Draws a graph for the profiling element currently selected.

More than one element can be graphed at any one time. Each one will be assigned a different colour, which will be used to display the element's name, and draw the graph itself.

- **J**

Grants control to the joystick

- **K**

Grants control to the keyboard.

- **M**

Toggles the drag-on-select mode.

This value is also set by the **Object** panel's **Drag On Select** check box<sup>C</sup>.

- **Q**

Moves the camera downwards.

- **If the Navigation panel<sup>D</sup> is active**

- **If the Player Preview Mode group box's Enabled check box is selected**

Decreases the value of the **Player Preview Mode** group box's **Camera Height** field.

- **S**

Moves the camera backwards.

- **V**

- **If a shell is selected**

While pressed, causes the mouse middle button click to copy selected shell, and links both by a matching portal.

**Note:** **v** must be pressed before and during the middle mouse button click.

- **W**

Moves the camera forward.

**A** – For details, see “General Options panel” on page 111 .

**B** – Activated by **F5** (for details, see “Realtime Profiling console” on page 261 ).

**C** – For details, see “Object panel” on page 70 .

**D** – For details, see “Navigation panel” on page 117 .

## 2.5.7. Key combinations

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- **Alt+F4**

Accesses the **File → Exit** menu item.<sup>C</sup>

- **Alt+Page Down**

- If Debug (Watcher) console<sup>B</sup> is active and watcher is in edit mode

Decreases the watcher's value by 1,000.

- **Alt+Page Up**

- If Debug (Watcher) console<sup>B</sup> is active and watcher is in edit mode

Increases the watcher's value by 1,000.

- **Alt+[0-9]**

- If Debug (Watcher) console<sup>B</sup> is active and used alphanumeric keypad

Selects list item 4[0-9].

- **Alt+Ctrl**

- If Terrain Texture Tool toolbar button<sup>A</sup> —  — is selected

Activates the *texture/opacity sampler* tool (indicated by the  cursor icon), which samples the dominant texture of the chunk under the cursor and its opacity — the **Terrain Texturing** panel's **Active Texture** and **Opacity** fields<sup>C</sup> will be updated accordingly.

- **Alt+Ctrl+S**

Accesses the **File → Process Data** menu item.<sup>C</sup>

- **Alt+Shift**

- If Terrain Texture Tool toolbar button<sup>A</sup> —  — is selected

Activates the *texture projection* tool (indicated by the  cursor icon — a red- and green-sided square indicates the clicked area), which adjusts the **Terrain Texturing** panel's **Projection** fields<sup>C</sup> to that of the terrain under the cursor.

- **Alt+Shift+[0-9]**

- If Debug (Watcher) console<sup>B</sup> is active and used alphanumeric keypad

Selects list item 5[0-9].

- **Ctrl+Alt**

See the entry **Alt+Ctrl** in this list.

- **Ctrl+Alt+S**

See the entry **Alt+Ctrl+S** in this list.

- **Ctrl+Page Down**

- If Debug (Watcher) console<sup>B</sup> is active and watcher is in edit mode

Decreases the watcher's value by 100.

- **Ctrl+Page Up**

- If Debug (Watcher) console<sup>B</sup> is active and watcher is in edit mode

Increases the watcher's value by 100.

- **Ctrl+[0-9]**

Ctrl+1 turns the **Slow Camera** toolbar button<sup>A</sup> —  — on.

Ctrl+2 turns the **Medium Speed Camera** toolbar button<sup>A</sup> —  — on.

Ctrl+3 turns the **Fast Camera** toolbar button<sup>A</sup> —  — on.

Ctrl+4 turn the **Super Fast Camera** toolbar button<sup>A</sup> —  — on.

- If Debug (Watcher) console<sup>B</sup> is active and used alphanumeric keypad

Selects item 2[0-9].

- **Ctrl+Shift+[0-9]**

- If Debug (Watcher) console<sup>B</sup> is active and used alphanumeric keypad

Selects item 3[0-9].

- **Ctrl+A**

Accesses the **Edit → Select All** menu item.<sup>C</sup>

- **Ctrl+B**

Accesses the **Edit → Save Selection As Prefab** menu item.<sup>C</sup>

- **Ctrl+D**

Accesses the **Edit → Deselect All** menu item.<sup>C</sup>

- **Ctrl+H**

Accesses the **View → Show Panels** menu item.<sup>C</sup>

- **Ctrl+I**

Cycles through the available camera speeds.

This value can also be set by the **Camera Speed** group of toolbar buttons —  ,  ,  ,  .

- **Ctrl+K**

Accesses the **File → Reload All Chunks** menu item.<sup>C</sup>

- **Ctrl+P**

Activates the **Python** console, which can be left by pressing **Esc**. For details, see “[Python console](#)” on page 268 .

- **Ctrl+R**

Accesses the **File → Reload All Textures** menu item.<sup>C</sup>

- **Ctrl+S**

Accesses the **File → Save** menu item.<sup>C</sup>

- **Ctrl+T**

Accesses the **Edit → Save Shell As Template** menu item.<sup>C</sup>

- **Ctrl+Y**

Accesses the **Edit → Redo** menu item.<sup>C</sup>

- **Ctrl+Z**

Accesses the **Edit → Undo** menu item.<sup>C</sup>

**Note:** The mouse cursor must be over the viewport for shortcut to be enabled.

- **Shift+Alt**

See the entry **Alt+Shift** in this list.

- **Shift+Alt+[0-9]**

See the entry **Alt+Shift+[0-9]** in this list.

- **Shift+Ctrl+[0-9]**

See the entry **Ctrl+Shift+[0-9]** in this list.

- **Shift+Enter**

- **If Debug (Watcher) console<sup>B</sup> is active and watcher is in edit mode**

Displays the watcher modification history.

- **Shift+Page Down**

- **If Debug (Watcher) console<sup>B</sup> is active and watcher is in edit mode**

Decreases the watcher's value by 1.

- **Shift+Page Up**

- **If Debug (Watcher) console<sup>B</sup> is active and watcher is in edit mode**

Increases the watcher's value by 1.

- **Shift+ [**
  -  If Terrain Texture Tool toolbar button<sup>D</sup> —  — is selected
 

Decreases the brush strength.
  - **Shift+]**
  -  If Terrain Texture Tool toolbar button<sup>D</sup> —  — is selected
 

Increases the brush strength.
  - **Shift+F4**
  - Captures a copy of the current scene to bigworld/tools/worldeditor/shot<nnnn>.bmp, where <nnnn> is a sequential number.  
For details, see the document Client Programming Guide's section *3D Engine (Moo)* → “Taking Screenshots”.
- A — For details, see “Toolbar” on page 17 .*
- B — Activated by F7 (for details, see “Debug (Watcher) console” on page 263 ).*
- C — For details, see “Menu items” on page 12 .*
- D — For details, see “Terrain Texturing panel” on page 74 , and “Toolbar” on page 17 .*

## 2.6. Mouse controls

The list below describes the WorldEditor's mouse controls:

- **Left button click**
-  If Object Tool toolbar button<sup>B</sup> —  — is selected
 

If button was clicked on a selectable object, then select the object.

*Selected objects are indicated by white corners on their bounding boxes. Selectable objects are indicated by rendering their bounding boxes in green when the mouse hovers over them — the objects that can be currently selected are specified by the Object panel’s Selection Filter drop-down list box<sup>B</sup>. Objects that could not be loaded are indicated by a red box, and with a message in the BigWorld Messages panel<sup>J</sup>.*
-  If Terrain Texture Tool toolbar button<sup>C</sup> —  — is selected
  - **If Alt is pressed**
  - Samples the dominant texture of the chunk under the cursor — the **Terrain Texturing** panel’s **Active Texture** field<sup>C</sup> will be updated accordingly.
  - **Alt<sup>H</sup>** activates the *texture sampler* tool (indicated by the  cursor icon).
- **If Alt+Ctrl<sup>H</sup> is pressed**

Samples the dominant texture of the chunk under the cursor and its opacity — the **Terrain Texturing** panel's **Active Texture** and **Opacity** fields<sup>C</sup> will be updated accordingly.

Alt+Ctrl activates the *texture/opacity sampler* tool (indicated by the  cursor icon).

- If Alt+Shift<sup>H</sup> is pressed

Adjusts the **Terrain Texturing** panel's **Projection** fields<sup>C</sup> to that of the terrain under the cursor.

Alt+Shift activates the *texture projection* tool (indicated by the  cursor icon — a red- and green-sided square indicates the clicked area).

- If Terrain Height Tool toolbar button<sup>D</sup> —  — is selected

- If Alt<sup>H</sup> is pressed

Samples the height of the terrain under the cursor

Alt activates the *height picker* tool (indicated by the  cursor icon), which samples the height underneath the cursor and assigns it to the **Terrain Height** panel's **Explicit Height** field<sup>D</sup>.

- Left button drag

- If Object Tool toolbar button<sup>B</sup> —  — is selected

- If button was clicked on a selectable object

*Selected objects are indicated by white corners on their bounding boxes. Selectable objects are indicated by rendering their bounding boxes in green when the mouse hovers over them — the objects that can be currently selected are specified by the **Object** panel's **Selection Filter** drop-down list box<sup>B</sup>. Objects that could not be loaded are indicated by a red box, and with a message in the BigWorld Messages panel<sup>J</sup>.*

- If Object Tool panel's Drag On Select check box is selected

Draws a rectangle inside which all objects matching the current selection in the **Selection Filter** drop-down list box will be selected.

- If Object Tool panel's Drag On Select check box is cleared

Moves the selected objects in the direction of the drag. Dragging the mouse up and down will move the objects upwards and downwards, respectively.

- If button was NOT clicked on a selectable object

Draws a rectangle inside which all objects with a type that matches the **Object** panel's **Selection Filter** drop-down will be selected.

**NOTE:** The mouse cursor icon will vary according to selected **Locking Mode**. It will be a pink diamond if **Obstacle** is selected, or a yellow cross otherwise.

- If **Terrain Texture Tool** toolbar button<sup>C</sup> –  – is selected

Draws the **Active Texture** into the terrain, according to the settings specified in the **Terrain Texturing** panel.

- If **Terrain Height Tool** toolbar button<sup>D</sup> –  – is selected

Gradually increases the terrain height.

- If left **Ctrl**<sup>H</sup> is pressed

Activates the *explicit height* brush (indicated by a green square), which immediately sets the terrain height to the value specified in the **Explicit Height** field (if the **Absolute** option button is selected), or immediately increases the terrain height by the value specified in the **Explicit Height** field (if the **Relative** option button is selected).

For details on absolute and relative explicit height modes, see “Terrain Height panel” on page 84 .

- If **Terrain Filter Tool** toolbar button<sup>E</sup> –  – is selected

Gradually applies the selected filter onto the terrain.

- If **Terrain Mesh Tool** toolbar button<sup>F</sup> –  – is selected

Cuts or repairs the terrain, according to the settings in the panel.

- If **Terrain Import/Export** toolbar button<sup>I</sup> –  – is selected

Moves or resizes the selected area, depending on whether the mouse is clicked inside the selected area (in which case the *move* mode is activated) or in the blue border of the selected area (in which case the *resize* mode is activated).

- If **Alt** is pressed

Activates the *height picker* tool (indicated by the  cursor icon), which samples the maximum height of the region selected by dragging the mouse and assigns it to the **Terrain Import/Export** panel's **Maximum Height** field.

- If **Ctrl** is pressed

Activates the *height picker* tool (indicated by the  cursor icon), which samples the minimum height of the region selected by dragging the mouse and assigns it to the **Terrain Import/Export** panel's **Minimum Height** field.

- If **Project Tool** toolbar button<sup>G</sup> –  – is selected

Selects the area to be locked, have changes committed, or have changes discarded (depending on which button is clicked after selection).

- **Right button click**

- **Over a model, shell, or particle**

Opens a context menu.

- **If Terrain Texture Tool toolbar button<sup>A</sup> –  – is selected**

Displays the **Terrain Texturing** panel's<sup>C</sup> context menu (for details, see “Terrain Texturing viewport context menu” on page 80 ).

- **Right button drag**

- **If Orthographic View toolbar button<sup>A</sup> –  – is enabled**

Moves camera in the direction of the drag.

- **If Orthographic View toolbar button<sup>A</sup> –  – is disabled**

Rotates camera in the direction of the drag.

- **If Terrain Import/Export toolbar button<sup>I</sup> –  – is selected**

Pans the map according to the drag movement.

- **If Project Tool toolbar button<sup>G</sup> –  – is selected**

Pans the map according to the drag movement.

- **Middle button click**

- **If a shell is selected**

Links the selected shell to the clicked shell by a matching portal.

- **If V is pressed<sup>H</sup>**

Makes a copy of the selected shell, and links both by a matching portal.

**V must be pressed before and during the middle button click.**

- **If Terrain Texture Tool toolbar button<sup>C</sup> –  – is selected**

Picks texture assigned to current alpha channel from the chunk under cursor.

- **If Terrain Height Tool toolbar button<sup>D</sup> –  – is selected**

Gradually decreases terrain height.

- **If Terrain Import/Export toolbar button<sup>I</sup> –  – is selected**

Displays the clicked area in the viewport — the top view of the world is abandoned.

- **If Project Tool toolbar button<sup>G</sup> —  — is selected**

Displays the clicked area in the viewport — the top view of the world is abandoned.

- **Scroll wheel rotate**

Moves the camera forward and backwards.

- **If Shift is pressed and at least one object is selected**

Rotates the selected object(s).

- **If Space key is pressed**

Increases or decreases the camera speed, depending on the direction of the wheel rotation.

Performs the same functions as the , , , and  toolbar buttons.<sup>A</sup>

- **If Object Tool toolbar button<sup>B</sup> —  — is selected**

- **If Ctrl is pressed and a shell is selected**

Rotates the shell according to the snapped portal.

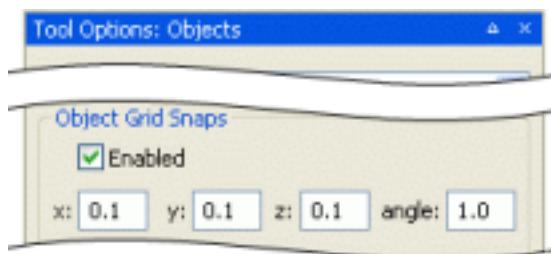
- **If Shift is pressed:**

Rotates the selected objects by 15 degrees.

- **If Object Grid Snap's Enabled field is selected**

Rotates the selected objects by the number of degrees specified in the Angle field.

If only one object is selected, then it will be rotated around itself. If more than one object is selected, then they will be rotated around their common centre.



Object panel's Object Grid Snaps group box

If only one object is selected, then it will be rotated around itself. If more than one object is selected, then they will be rotated around their common centre.

- **If Terrain Import/Export toolbar button<sup>I</sup> —  — is selected**

Zooms the world map in and out, according to the direction of scroll.

**If Project Tool toolbar button<sup>G</sup> –  – is selected**

Zooms the world map in and out, according to the direction of scroll.

*A* – For details, see “Toolbar” on page 17 .

*B* – For details, see “Object panel” on page 70 .

*C* – For details, see “Terrain Texturing panel” on page 74 .

*D* – For details, see “Terrain Height panel” on page 84 .

*E* – For details, see “Terrain Filtering panel” on page 87 .

*F* – For details, see “Terrain Mesh Cut/Repair panel” on page 88 .

*G* – For details, see “Project panel” on page 92 .

*H* – For details, see “Keyboard shortcuts” on page 25 .

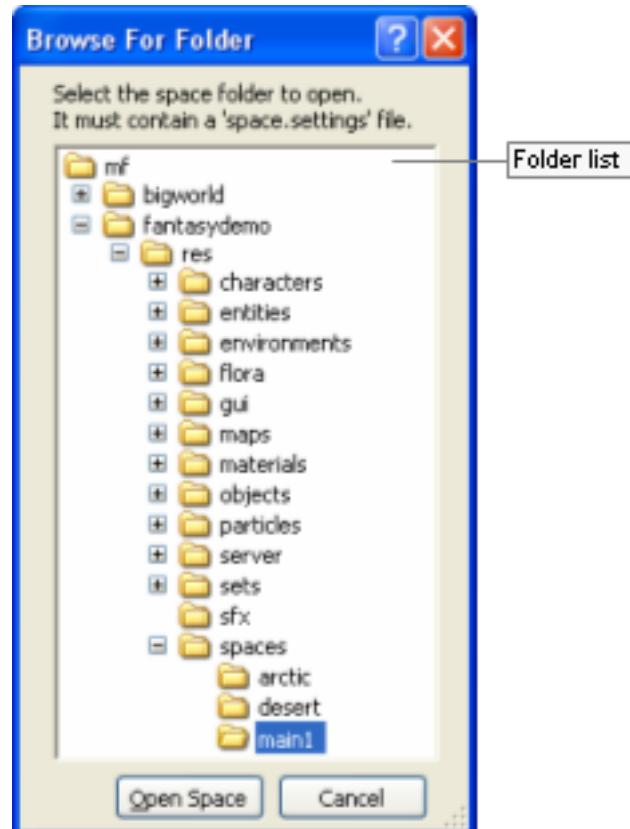
*I* – For details, see “Terrain Import/Export panel” on page 89 .

*J* – For details, see “BigWorld Messages panel” on page 130 .

## 2.7. Dialog boxes

### 2.7.1. Browse For Folder dialog box

Accessed via the **File → Open Space** menu item (for details, see “Menu items” on page 12), this dialog box allows you to choose the space to load in WorldEditor.



Browse For Folder dialog box

The list below describes the fields on this dialog box:

- **Folder list**

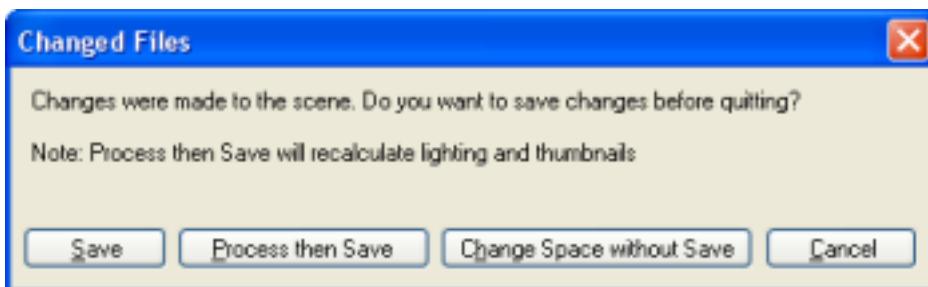
Lists of sub-folders available in the resources folder.

### **2.7.2. Changed Files dialog box**

Automatically invoked by WorldEditor when user chooses to perform an action that would otherwise discard unsaved changes (such as closing the application or changing space), it allows the user to specify how to handle these changes before proceeding.

The following actions will have WorldEditor invoke this dialog box in case there are unsaved changes:

- Creating a new space (via the **File → New Space** menu item)
- Opening an existing space (via the **File → Open Space** menu item)
- Reloading all chunks in current space (via the **File → Reload All Chunks** menu item or the **Ctrl+K** keyboard shortcut)
- Closing the application (via the **File → Exit** menu item, the window button, or any keyboard shortcut)



Changed Files dialog box

The list below describes the fields on this dialog box:

- **Save**

Saves changes to the world — without calculating shadow, lighting, thumbnail, or ecotype information —, before proceeding with operation.

- **Process then save**

Recalculates shadow, lighting, thumbnail, or ecotype information, then saves changes to the world, before proceeding with operation.

- **Change space without save**

Proceeds with operation without saving changes.

- **Cancel**

Closes the dialog box without performing any action.

### **2.7.3. Convert Space dialog box**

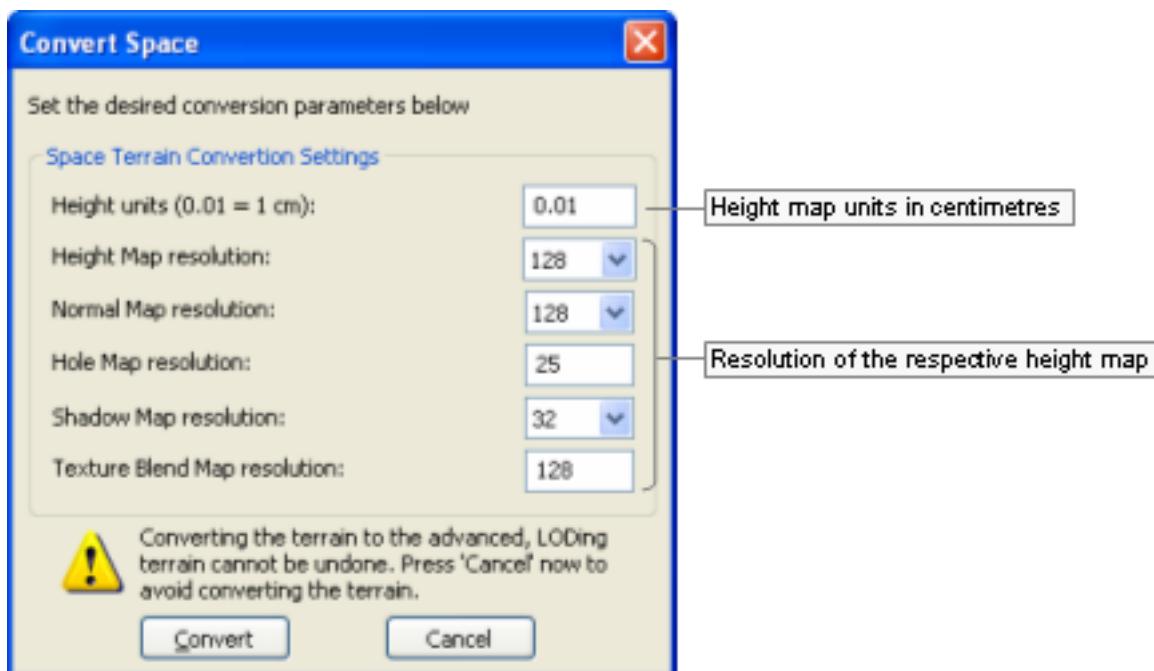
Accessed via the **File → Convert Space** menu item (for details, see “Menu items” on page 12), this dialog box allows you to convert the current *simple terrain* space to one with terrain advanced features.

### Note

A Simple Terrain is one created with BigWorld Technology 1.8 or earlier, or one created by selecting the **File → New Space** menu item, then clearing the **New Space** dialog box's **Use Simple Terrain** check box (for details, see "New Space dialog box" on page 49 ).

Simple Terrain has the following characteristics/limitations:

- Fixed resolution of 25x25 height poles.
- Only up to 4 texture layers.
- No texture LOD.



Convert Space dialog box

The fields in this dialog box have the same description as the **New Space** dialog box's **Space Terrain Creation Settings** group box (for details, see "New Space dialog box" on page 49 ).

- **Convert**

Converts the current space to one with terrain advanced features specified in the dialog box.

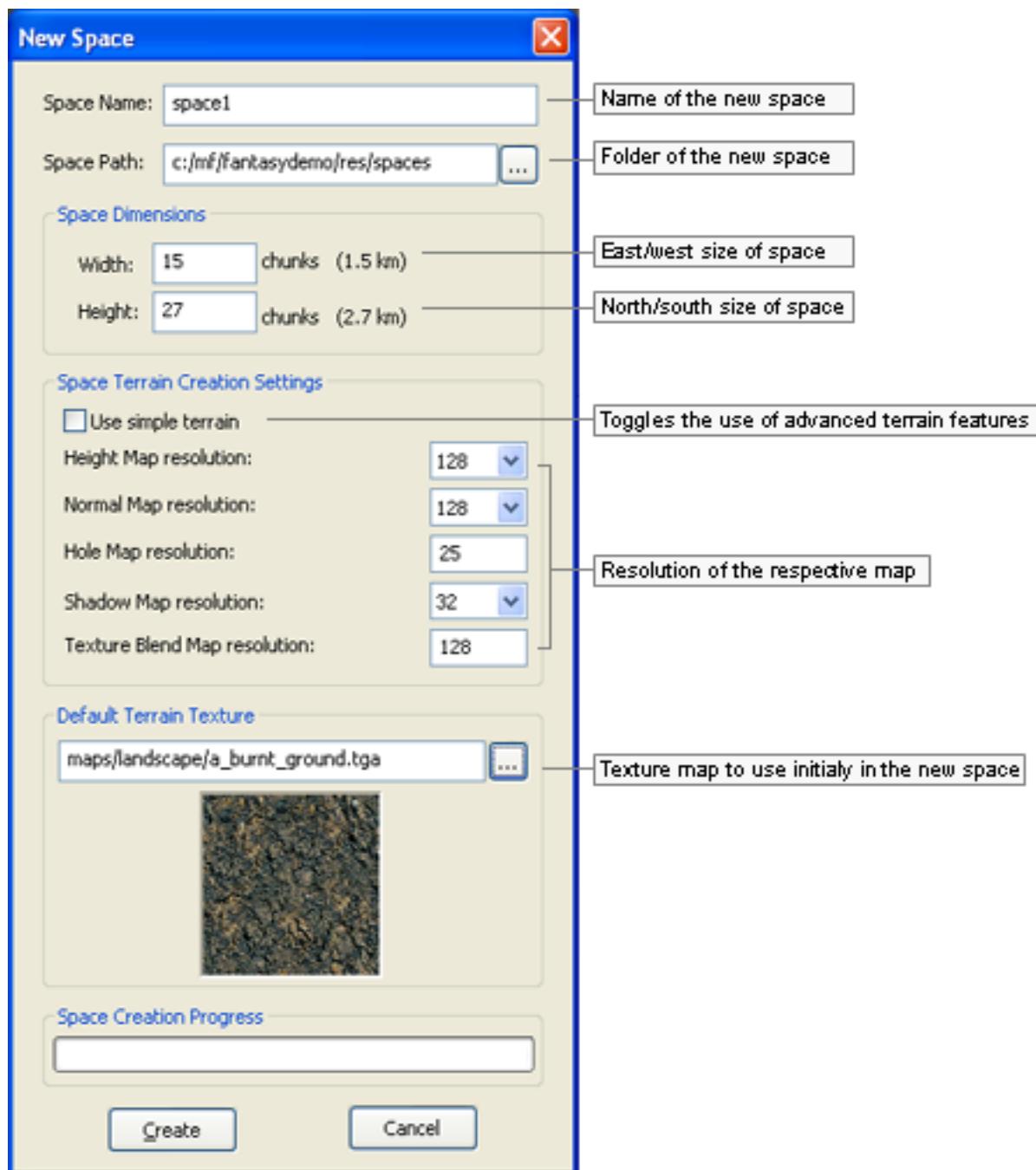
For details on the converted files, see the document Client Programming Guide's section *Chunks* → "Implementation files".

- **Cancel**

Closes the dialog box without performing any action.

#### 2.7.4. New Space dialog box

Accessed via the **File → New Space** menu item (for details, see "Menu items" on page 12), this dialog box allows you to create a new — blank — space according to the settings specified in it.



New Space dialog box

The list below describes the fields on this dialog box:

▪ **Space name**

Name of the space to create.

▪ **Space path**

Parent folder of the space to create. The **Browse** button (… ) opens the **New Space Folder** dialog box (for details, see “**New Space Folder dialog box**” on page 52 ).

▪ **Space dimensions**

- **Width, Height**

Number of chunks in the space, in the east/west and north/south direction, respectively.

- **Space terrain creation settings**

- **Use simple terrain**

Determines whether to use terrain advanced features in the creation of the new space.

If this check box is cleared, then the remaining fields in the group box are disabled and the terrain will have the following characteristics:

- Fixed resolution of 25x25 height poles.
- Only up to 4 texture layers.
- No texture LOD.

- **Height map resolution**

Resolution of the height map per chunk.

Higher values in this field result in a more detailed terrain geometry, but also in higher rendering times.

*Recommended value is 128.*

- **Normal map resolution**

Resolution of the normal map per chunk — this map contains information about the slope of the terrain, and is used for illumination.

- **Hole map resolution**

Resolution of the holes map per chunk — this map contains information about the holes in the terrain, which are needed to transition between the terrain and an indoor chunk (shell).

- **Shadow map resolution**

Resolution of the terrain shadow map per chunk — this map contains shadow information originated from objects (e.g., a house, which casts a shadow in the terrain) and from the terrain itself (e.g., a hill in the terrain, which casts a shadow onto itself).

Higher values in this field result in a longer time for shadow generation for the terrain.

*Recommended value is 32.*

- **Texture blend map resolution**

Resolution of the texture layers blend maps per chunk — this map contains a blend information similar to an opacity/alpha channel on how to blend the textures onto the terrain.

Higher values in this fields allow for a more detailed terrain texturing, but also result in higher memory use.

*Recommended value is 128.*

- **Default terrain texture**

Texture map to initially use for the terrain in the new space.

- **Create**

Creates space under the folder specified in Space Path.

For details on the created files, see the document Client Programming Guide's section *Chunks* → "Implementation files".

- **Cancel**

Closes the dialog box without performing any action.

## 2.7.5. New Space Folder dialog box

Accessed via the Browser button () in the **New Space** dialog box's **Space Folder** field (for details, see "New Space dialog box" on page 49), this dialog box allows you to create a folder for the new space, or choose an existing one.



New Space Folder dialog box

The list below describes the fields on this dialog box:

- **Folder list**

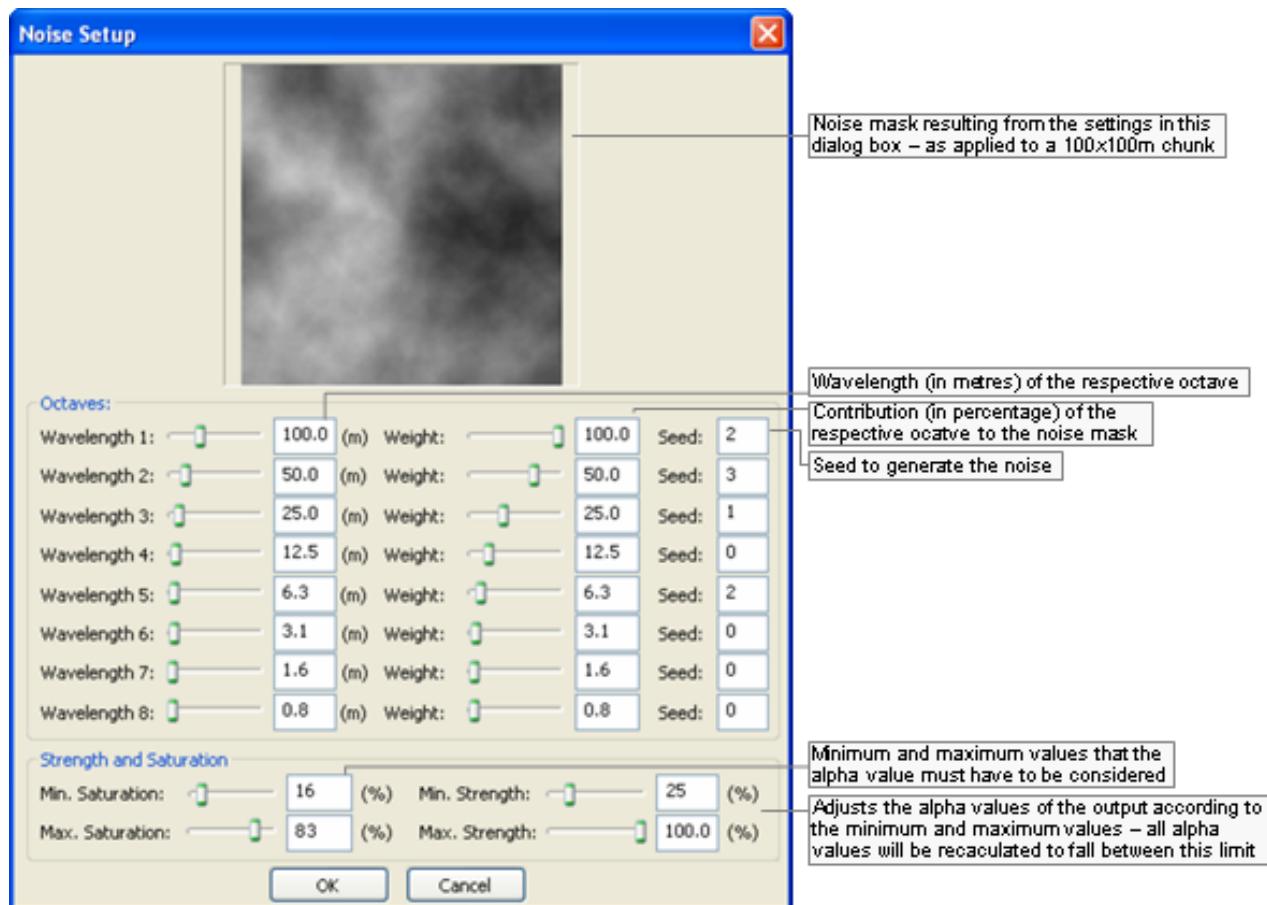
Lists the sub-folders available in the resources folder.

- **Make new folder**

Creates a new folder under the one currently selected in **Folder List**.

## 2.7.6. Noise Setup dialog box

Invoked by the **Terrain Texturing** panel's **Noise** group box's **Noise Setup** button (for details, see "Terrain Texturing panel" on page 74 ), this dialog box lets you configure the noise mask to be used in that panel.



Noise Setup dialog box

The list below describes the fields on this dialog box:

- **Octaves**

- **Wavelength**

Length (in metres) of the respective octave.

- **Weight**

Contribution (in percentage) of the respective octave in the noise mask.

- **Seed**

Seed to generate the noise.

- **Strength and saturation**

- **Min Saturation**

Minimum value that the alpha value must have to be used in the noise mask.

- **Max Saturation**

Maximum value that the alpha value might have to be used in the noise mask.

- **Min Strength**

Minimum value that the output alpha value will have — all alpha values will be recalculated to fit between **Min Strength** and **Max Strength**.

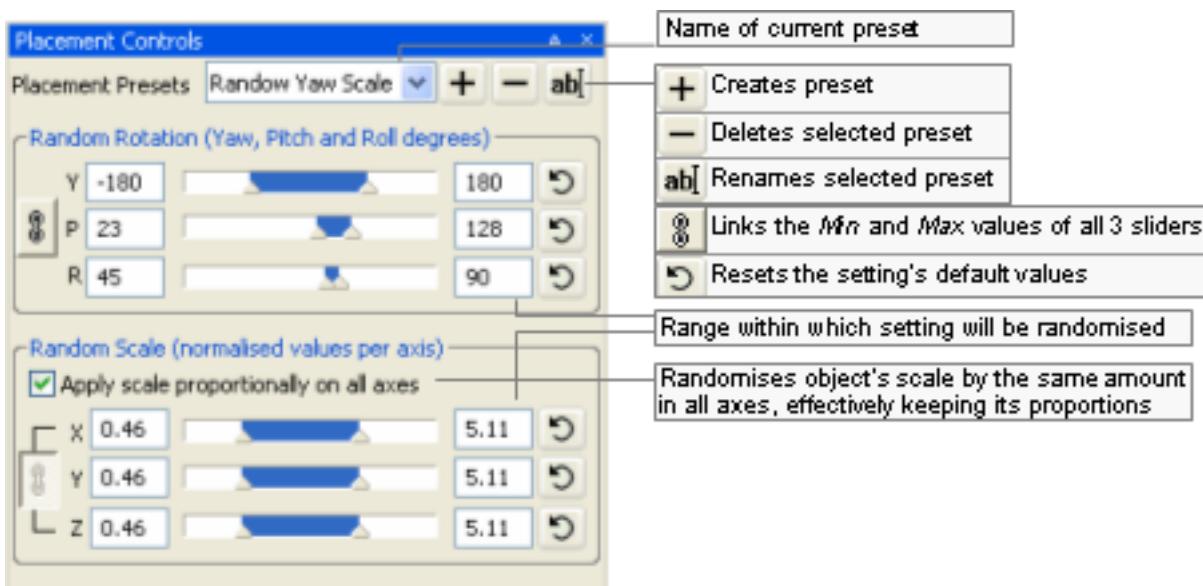
- **Min Strength**

Maximum value that the output alpha value will have — all alpha values will be recalculated to fit between **Min Strength** and **Max Strength**.

### 2.7.7. Placement Controls dialog box

Invoked by the **Object** panel's **Placement Method** drop-down list box (for details, see "Object panel" on page 70) when the value **(Edit Presets...)** is selected, this dialog box allows you to create a group of settings that determine the values between which to randomise the orientation and size during the placement of objects.

This allows the creation of worlds with greater variety, but with less work by the builder.



Placement Controls dialog box

The list below describes the fields on this dialog box:

- **Placement presets**

Name of current preset.



Opens the Placement Preset Name dialog box, where the user can specify the name of a new preset.

Once the name is specified, all rotation and scale fields are set to their default values.

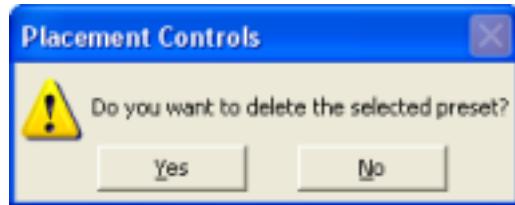


Placement Preset Name dialog box



Opens the **Placement Controls** dialog box, where the user is prompted to confirm the deletion.

After deleting the preset, Placement Presets drop-down list box is set to (Normal Placement).



Placement Controls deletion confirmation dialog box



Opens the Placement Preset Name dialog box, where the user can change the name of the preset.

#### ▪ **Random rotation**

Group of fields determining the range of values within which the object's rotation (yaw, pitch, and roll) should be randomised.



Links the Y, P, and R values to each other, for both Min and Max.

This means that when Min or Max value of a rotation component is changed, the others are automatically changed as well.

- **Y**

Min and Max values for yaw randomisation during object placement.

- **P**

Min and Max values for pitch randomisation during object placement.

- **R**

Min and Max values for roll randomisation during object placement.



Resets Min and Max values of the respective rotation component to its default value.

#### ▪ **Random scale**

Group of fields determining the range of values within which the object's scale (in x-, y-, and z-axes) should be randomised.

- **Apply scale proportionally on all axes**

Randomises object's scale by the same amount in all axes, effectively keeping its proportion.

The  toggle button is automatically selected when this option is selected, and cannot be cleared.



Links the X, Y and Z values to each other, for both Min and Max.

This means that when Min or Max value of a scale component is changed, the others are automatically changed as well.

- **X**

Min and Max values for scale randomisation along the x-axis.

- **Y**

Min and Max values for scale randomisation along the y-axis.

- **Z**

Min and Max values for scale randomisation along the z-axis.

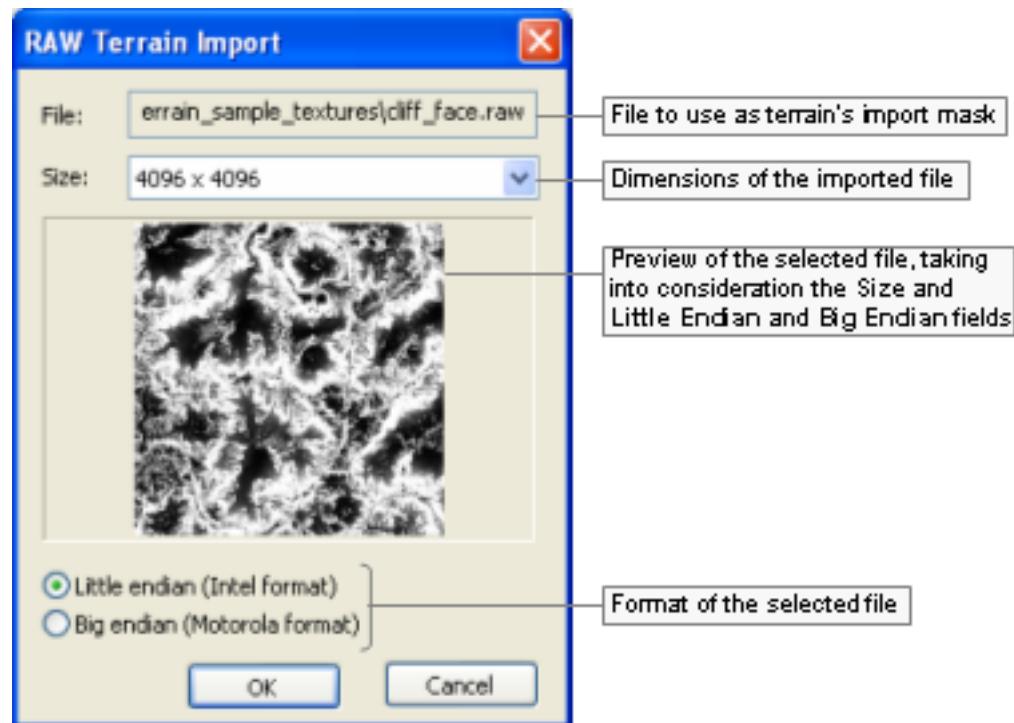


Resets Min and Max values of the respective scale component to its default value.

## **2.7.8. RAW Terrain Import dialog box**

---

Invoked by the **Terrain Texturing** panel's **Imported** group box's **Browse** button's **Open** dialog box (for details, see “Terrain Texturing panel” on page 74), this dialog box lets you select the file to be used as import mask in that panel.



RAW Terrain Import dialog box

The list below describes the fields on this dialog box:

- **File**

Path and name of the RAW file selected in the previous dialog box.

- **Size**

Dimensions of the imported file — this is not necessarily the original size of the file, but rather the size that you want it to have as a mask.

- **Little endian (Intel format)**

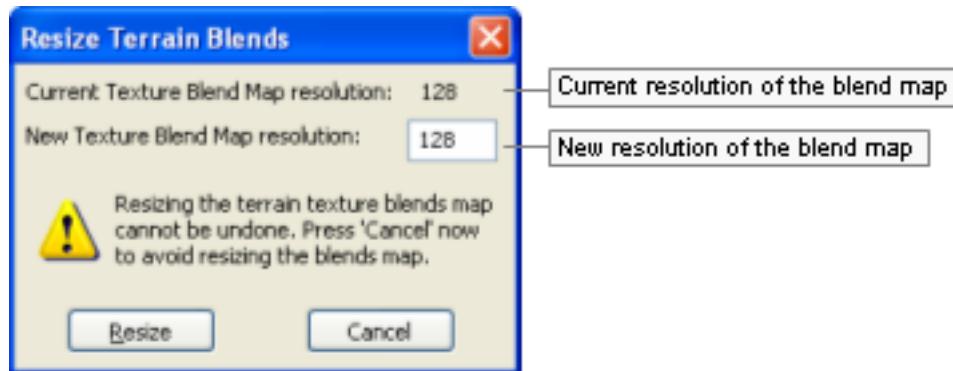
Determines whether the original mask was saved using the Intel format.

- **Big endian (Motorola format)**

Determines whether the original mask was saved using the Motorola format.

### **2.7.9. Resize Terrain Blends dialog box**

Accessed via the **File → Resize Terrain Texture Blends** menu item (for details, see “Menu items” on page 12 ), this dialog box allows you to change the resolution of the texture layers blend map — this map contains a blend information similar to an opacity/alpha channel on how to blend the textures onto the terrain.



Resize Terrain Blends dialog box

The fields in this dialog box have the same description as the **New Space** dialog box's **Space Terrain Creation Settings** group box (for details, see "New Space dialog box" on page 49 ).

- **New texture blend map resolution**

New resolution of the texture layers blend map.

Higher values in this fields allow for a more detailed terrain texturing, but also result in higher memory use.

*Recommended value is 128.*

- **Resize**

Resizes the current texture layers blend map to the specified resolution.

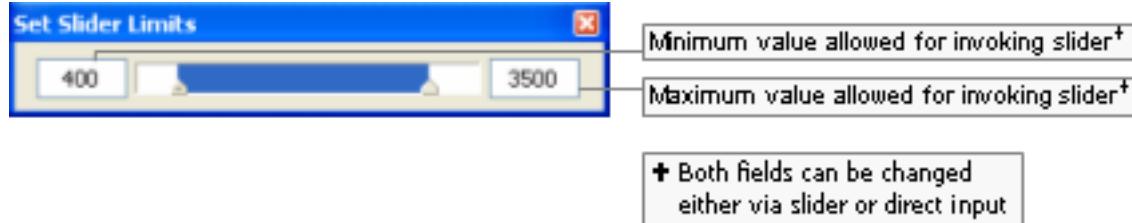
- **Cancel**

Closes the dialog box without performing any action.

## 2.7.10. Set Slider Limits dialog box



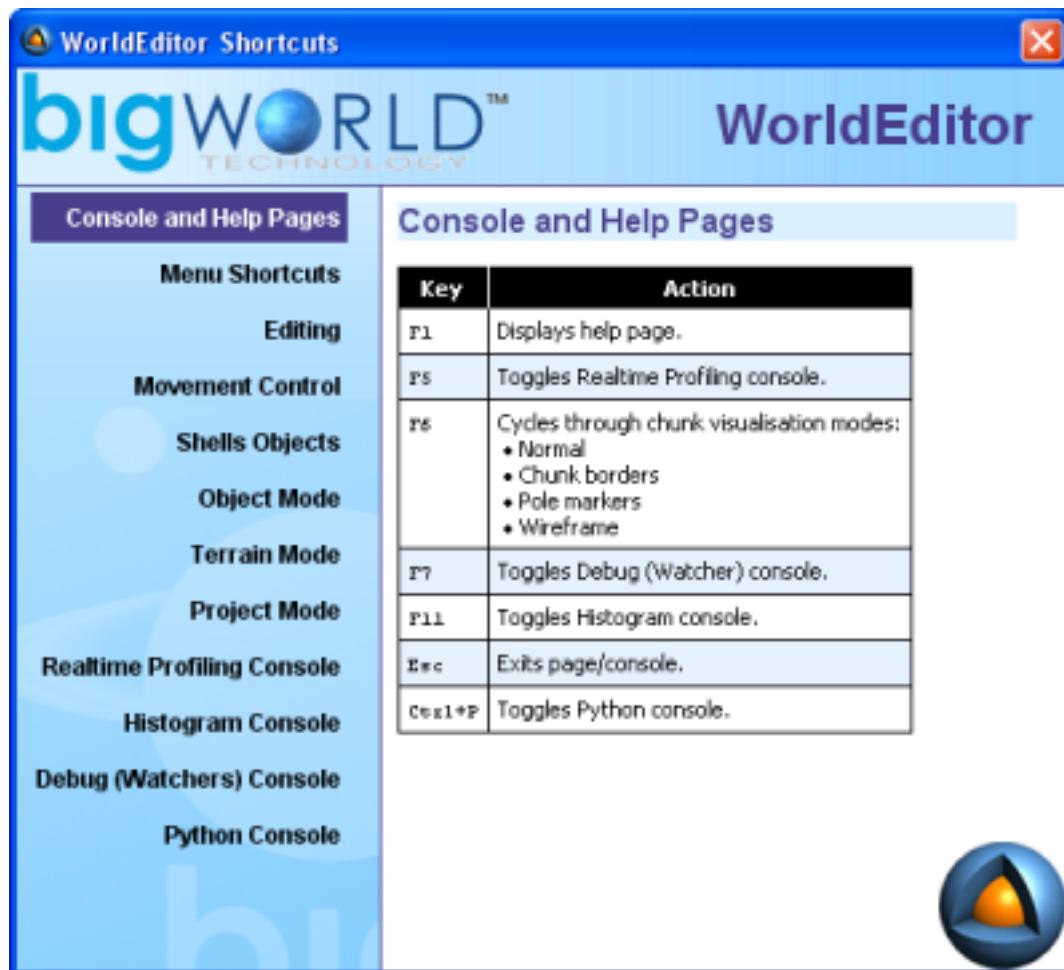
Accessed by the button in various sliders, this dialog box allows you to specify the minimum and maximum values for the slider that invoked it.



Set Slider Limits dialog box

## 2.7.11. WorldEditor Shortcuts dialog box

Accessed via the **Help → Shortcuts** menu item (for details, see "Menu items" on page 12), the WorldEditor Shortcuts dialog box displays a list of shortcuts available on WorldEditor. For details on the complete list, see "Keyboard shortcuts" on page 25 .



WorldEditor Shortcuts dialog box

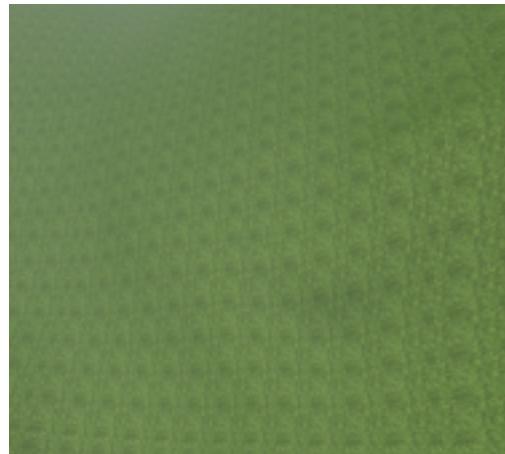
## 2.8. Chunk visualisation modes

BigWorld offers different ways to visualise the chunks in the scene, so that the world builder can choose the one most suitable for the task at hand.

The visualisation modes are switched by pressing F6 (for details, see “Function keys” on page 25), and are described below:

- **Normal**

Displays the terrain as it will be rendered in the scene — no overlay is applied on the interface.



Normal mode

- **Chunk borders**

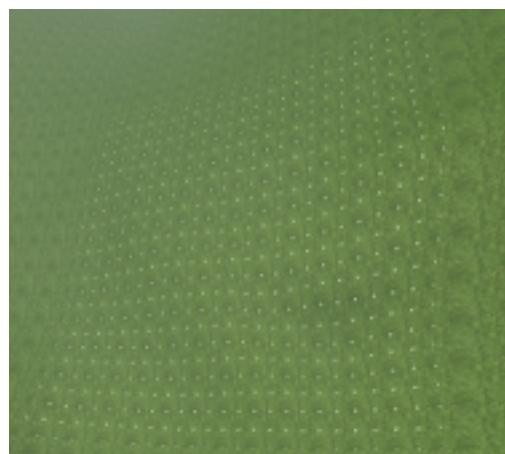
Overlays a continuous white line around the border of the chunk over which the mouse is positioned.



Chunk Borders mode

- **Pole markers**

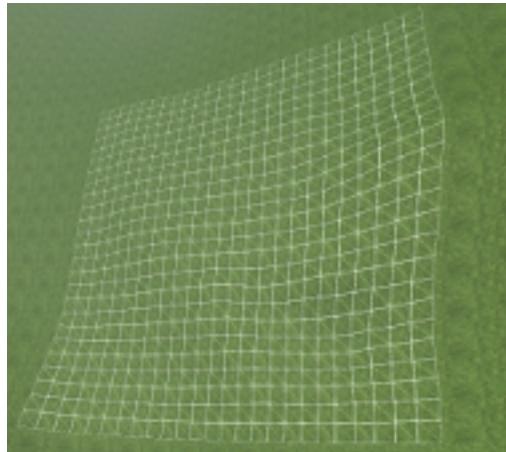
Divides the chunk over which the mouse is, and overlays pole markers icons on the corner of each one.



Pole Markers mode

- **Wireframe**

Divides the chunk over which the mouse is, and overlays the wireframe grid indicator over each one.



Wireframe mode

## 2.9. Assets

Assets used to populate the world are accessed via the **Asset Browser**. For details, see “Asset Browser panel” on page 93 .

### Note

Selected objects are indicated by white corners on their bounding boxes.

Selectable objects are indicated by rendering their bounding boxes in green when the mouse hovers over them — the objects that can be currently selected are specified by the **Object** panel’s **Selection Filter** drop-down list box (for details, see “Object panel” on page 70 ).

Objects that could not be loaded are indicated by a red box and a message in the **BigWorld Messages** panel — to view this kind of message, the **BigWorld Messages** panel’s **Assets** check box must be selected (for details, see “BigWorld Messages panel” on page 130 ).

### 2.9.1. Models

This node gives access to all exported .model files. Models refer to the basic props that can be placed in the world.

**Note**

For more information on models, see:

- document Client Programming Guide's section **Models**.
- document Content Creation Manual's lessons (the document is accessed by pressing F1 or by selecting the **Help → Content Creation** menu item — for details, see “Menu items” on page 12):
  - **Modify a Model in ModelEditor**
  - **Add Models to the World**
  - **Best Practices → Animation tree – Using LOD models to share animations**

For details on `.model` files' grammar, see the document File Grammar Guide's section `.model`.

## 2.9.2. Shells

Shells refer to the indoor chunks containing portals that you have exported to the shells folder.

A new indoor chunk is created by selecting a shell and placing it in the world. The new indoor chunk will contain all portals referenced in the shell.

**Note**

For more information on shells, see :

- “Potential problems placing models and shells” on page 133 .
- “Creating Shells” on page 325 .
- document Content Creation Manual's lessons (the document is accessed by pressing F1 or by selecting the **Help → Content Creation** menu item — for details, see “Menu items” on page 12):
  - **Create an Internal Shell**
  - **Create an Internal Area in WorldEditor Using Shells**
  - **Add Lights to the World → Lighting Environments**
  - **Outdoor-to-Indoor Transitions → Placing an interior shell**

## 2.9.3. Trees

This node gives access to all SpeedTree files (`.spt`) files.

**Note**

For more information on SpeedTree files, see:

- The document Third-Party Integrations chapter *SpeedTree*.
- document Content Creation Manual's lesson **Best Practices → Using SpeedTree** (the document is accessed by pressing F1 or by selecting the **Help → Content Creation** menu item — for details, see “Menu items” on page 12 )

## 2.9.4. Prefabs

This node gives access to items previously saved as prefabs, so you can place them in the terrain.

Prefabs are elements such as objects, models, lights, shells, and items that are saved in WorldEditor via the **Edit → Save Selection As Prefab** menu item (for details, see “Menu items” on page 12 ).

They allow the artist to save a carefully arranged group of items to a single file, so that they can be used elsewhere in the world, without having to arrange the objects a second time.

**Note**

For more information on prefabs, see the document Content Creation Manual's lesson **Create an Internal Area in WorldEditor Using Shells → Creating templates and prefabs** (the document is accessed by pressing F1 or by selecting the **Help → Content Creation** menu item — for details, see “Menu items” on page 12 ).

## 2.9.5. Entities

Comprised of .py files, scripted entities are the dynamic components of a BigWorld game. WorldEditor can insert an entity placeholder into a chunk, so that your initialisation script (also called a personality script) can read it and create the entity as the chunk is loaded (via `fetchEntitiesFromChunks` — for details, see the BaseApp C API's entry **Class List → FetchFromChunksJob**).

There are several placeholder models available in the `bigworld/tools/worldeeditor/resources/models` folder.

**Note**

For more information on entities, see:

- “Moving entities” on page 308 .
- document Client Programming Guide's chapter *Entities*.

For example, to create a new entity placeholder called `Monster`, follow the steps below:

1. Add new entry to `<res>/scripts/entities.xml`.

This is illustrated below:

```
<Monster/>
```

## 2. Create the file <res>/scripts/entity\_defs/Monster.def.

A .def file is used to describe the properties and methods of the new entity (for details, see the document Server Programming Guide's section *Physical Entity Structure for Scripting* → “The Entity Definition File”).

An example entity definition file is illustrated below:

```
<root>
<Properties>
...
<my_property>
    <Type>      INT8          </Type>  1
    <Flags>     OTHER_CLIENTS </Flags>
    <Default>   0             </Default>
    <Persistent> true          </Persistent>
    <Editable>   true          </Editable>  2
...

```

**1** For details, see “Supported data types” on page 64 .

**2** Must be set to true in order to make the property editable in WorldEditor.

## 3. Create the script file <res>/scripts/editor/Monster.py.

The function modelName specifies the model to represent the placeholder. Several models can be attached to one entity, which depends on the entity's attributes (for details, see `fantasydemo/res/scripts/editor/Creature.py`).

```
class Monster:
    def modelName( self, props ):
        return "helpers/props/standin.model"
```

### 2.9.5.1. Supported data types

WorldEditor directly supports only `UINT/INT` types, plus `STRING` and `FLOAT` (for details on the data types supported by BigWorld's game engine, see the document Server Programming Guide's section *Properties* → “Property Types” → “Primitive Types”).

You may create aliases for existing types by adding an entry to `<res>/scripts/entity_defs/alias.xml` (for details, see the document Server Programming Guide's section *Properties* → “Property Types” → “Primitive Types”).

Types supported by the game engine but not directly supported by WorldEditor are handled the following way:

1. WorldEditor uses Python's `repr()` function to get the string form of the data.
2. After using the data, WorldEditor uses the `eval()` function to convert the string representation back.

Therefore, data might be lost if for an object you have `eval(repr(obj))` different from `obj`. Also, changes will be lost (object will retain its original value) if you set it to some illegal data.

Besides these types, you can also use `ENUM` types, in which case you must create a function to return a list of available enumeration values, as illustrated below:

```
def getEnums_<AttributeName>( self ):
```

The code excerpt below illustrates the use of enumeration by the `Creature` object in `fantasydemo/res/scripts/editor/Creature.py`:

```
class Creature:
    UNKNOWN      = 0
    STRIFF       = 1
    STRIFF_YOUNG = 2
    CHICKEN      = 3

    modelNames = {
        UNKNOWN:      None,
        STRIFF:       "characters/npc/striff/striff.model",
        STRIFF_YOUNG: "characters/npc/striff/striff_young.model",
        CHICKEN:       "characters/npc/chicken/chicken.model"
    }

    def modelName( self, props ):
        return Creature.modelNames[ props[ "creatureType" ] ]

    def getEnums_creatureType( self ):
        return ((Creature.STRIFF      , "Striff"          ),
                (Creature.STRIFF_YOUNG , "Young Striff"   ),
                (Creature.CHICKEN     , "Chicken"         ))

    def getEnums_creatureAge( self ):
        return (("Old"        , "Striff"          ),
                ("Young"      , "Young Striff"  ),
                ("Evolved"    , "Chicken"        ))
# Creature.py
```

`fantasydemo/res/scripts/editor/Creature.py`

## 2.9.6. UserDataObject

This nodes gives access to user data objects that can be used to embed user defined data in Chunk files. User data objects are linkable objects which possess data that can be used by entities and scripts to achieve arbitrary tasks. User data objects can be placed in the world using WorldEditor, allowing users to edit their properties just like entities. The editor allows links to be added, edited, and deleted.

### 2.9.6.1. Creating the PatrolNode user data object

This section describes how to create the `PatrolNode` user data object as an example. These are the steps that were required to create the `PatrolNode` user data object type:

1. Add new entry to `<res>/scripts/user_data_object.xml`

```
<root>
  ...
  <PatrolNode />
  ...
</root>
```

2. Create the file `<res>/scripts/user_data_object_defs/PatrolNode.def`

A definition file is used to describe the properties and methods of the new user data object.

```
<root>
  <Domain> CELL </Domain>
  <Properties>
    <patrolLinks>
      <Type> ARRAY <of> UDO_REF </of> </Type>
      <Editable> true </Editable>
    </patrolLinks>
  </Properties>
</root>
```

For details on definition files, see the document Server Programming Guide's sections *Physical User Data Object Structure for Scripting* → “The User Data Object Definition File”.

### 3. Create script file <res>/scripts/editor/PatrolNode.py

There are several editor callback functions that can be implemented in the editor script

- **getEnum\_<PROPERTY\_NAME>** - This can be used to define the possible values for this property displayed in the WorldEditor.
- **modelName** - Used to define a custom model for this user data object type.
- **showAddGizmo** - Guard function used to control the display of the add gizmo.
- **canLink** - Guard function that checks if the user data object can link to the target object.
- **onDeleteObject** - A callback function that gets called just before the user data object is deleted.
- **onStartLinkMenu** - Returns the options that should appear in the custom context-sensitive menu for this user data object link.
- **onEndLinkMenu** - Calls a command function based on the users choice in the context-sensitive menu.
- **postClone** - A callback function that gets called just after the user data object is cloned.

#### 2.9.6.2. Using User Data Objects inside WorldEditor

User data objects can be found in the “User Data Objects” folder in the Asset Browser folder hierarchy. User data objects can be added to a space by click-dragging them from the asset browser into the space. When selected, user data object properties may have a link gizmo and/or a clone gizmo depending on their type.

- **Link Gizmo** - Properties of type UDO\_REF have a link gizmo. The link gizmo can be used to add a link to another user data object. If no link property is selected for the object, the first link property will be used to store the new link. If this property is a standard link property, the previous link will be discarded. If this property is a link array, the link will be added to the end of the array.
- **Clone Gizmo** - Properties that are arrays of UDO\_REF have a clone gizmo. The clone gizmo can be used to clone the current user data object. All properties are cloned except for the links, which are cleared. The postClone callback function allows scripters to decide how links behave using the clone gizmo, e.g. for PatrolNode objects, a link from the parent to the cloned node is created using this callback.

Selections of user data objects can be cloned using the <C> key. Linking information is retained when cloning selections of user data objects or when saving user data object prefabs.

Right-clicking on a user data object reveals its context-sensitive menu. In the first level the user data objects properties panel is selectable by default. If the user data object also has outgoing links, each property that

has one or more links will also appear in this first level of the context-sensitive menu. When a property is selected, the second level of the context-sensitive menu is displayed. A single "Delete" operation is displayed if the link property is a standard link, or a single "Delete all" operation is displayed if the link property is an array of links.

Right-clicking on a user data object link reveals its context-sensitive menu. By default, the "Delete all" operation is selectable. This will delete all links between the two user data objects. Some user data object types (the user data object `PatrolNode` for example) make use of the optional python scriptable custom menu. This menu can contain type specific operations. Note that this menu is based on the type of the user data object, not on the type of the link property. Currently one of the user data objects is selected at random to perform the link operation, so the script operations should be commutative to the order in which the user data objects are given.

When there exists a link between two user data objects, but only one of the user data object is loaded, a chunk link extends out from the loaded user data object. This chunk link points to the centre of the chunk that contains the unloaded linked user data object. When performing link operations, the user data objects on either end of the link must be loaded. If one of the user data objects is not loaded, it will be force loaded.

When using a lock server, only some regions of the space will be editable. This has the following implications on what operations can be applied to user data objects:

- **Uneditable Regions** - No operations can be applied to user data objects located in uneditable regions. These user data objects can not be moved, deleted, have changes made to their incoming or outgoing links, or have any of their properties changed.
- **Editable Regions** - User data objects located in editable regions are either fully editable or partially editable.
  - **Fully Editable** - User data objects that only link to user data objects in editable regions are fully editable. These user data objects can be moved, deleted, have their properties changed, and have incoming and outgoing links added and removed.
  - **Partially Editable** - User data objects that link to user data objects in uneditable regions are only partially editable. These user data objects can not be deleted, can only move inside their current outside chunk, and cannot edit incoming or outgoing links to user data objects in uneditable regions. These user data objects can however add and remove links to user data objects in editable regions.

Both standard links and chunk links that extend across a lock boundary have a red tint to indicate that they are uneditable.

Increasing the number of user data objects in a space and increasing the distance travelled by their links increases the load placed on WorldEditor in a number of ways. In order to control the amount of work that will be performed at any one time a set of options have been exposed in WorldEditor's `options.xml`, see the document File Grammar Guide's section → "WorldEditor".

There is a cost associated with recalculating the geometry of a link so that it conforms to the terrain as chunks are loaded in. The user can control the size of the jobs as well as how often recalculation are performed by editing the last three variables above.

Chunk links do not have a context-sensitive menu because it would be of limited usefulness. Chunk links have a different kind of mapping than standard links, chunk links being one-to-many, while standard links are one-to-one. A single chunk link represents one or more property links to one or more user data objects in a particular outside chunk. As such the only useful operation would be to delete all links between the loaded user data object or entity, and all user data objects or entities in the unloaded chunk. It is unlikely that such an operation would be useful in practice. Another issue is regarding ambiguity among chunk links. If a user data object or entity has many chunk links, how is the user supposed to know which chunk link points to which chunk, and what user data objects or entities are being linked to. Therefore it was decided to avoid this feature.

## 2.9.7. Lights

The light settings allow you to create a variety of in-game lighting conditions, and to easily preview how they will look in the final game. You can light your models from a variety of directions and using different colours.

WorldEditor provides some light definition files in the `bigworld/res/helpers/lights` folder.

The kind of lighting to apply to the world is determined by **General Options** panel's **Lighting** group box (for details, see "General Options panel" on page 111 ).

### Note

For more information on lights, see the document Content Creation Manual's lessons (the document is accessed by pressing F1 or by selecting the **Help → Content Creation** menu item — for details, see "Menu items" on page 12 ).

- **Add Lights to the World**
- **Best Practices → Using the complete range of textures and lighting**
- **Create an Internal Area in WorldEditor Using Shells → Creating templates and prefabs**
- **Outdoor-to-Indoor Transitions → Placing an interior shell**

For details on the grammar of light settings files, see the document File Grammar Guide's section "`<light>.xml`".

## 2.9.8. Particles

This node gives access to ambient particle systems created in ParticleEditor (for details, see *ParticleEditor* on page 207 ), so you can place them in your world.

Note that these particle systems must be time-triggered, otherwise you will not see any particles spawned.

### Note

For more information on particles, see:

- document Client Programming Guide's section *Particles*.
- document Content Creation Manual's lessons ((the document is accessed by pressing F1 or by selecting the **Help → Content Creation** menu item — for details, see "Menu items" on page 12 ).
- **Manage Resources → Particles**
- **Generate Particles for Special Effects**

For details on the grammar of particle files, see the document File Grammar Guide, section "`<particle>.xml`".

## 2.9.9. Textures

This node gives access to texture images, used to paint the terrain.

Texture files can be dragged into **Terrain Texturing** panel's **Texture In Chunk** fields.

### Note

For more information on textures, see:

- “Terrain Texturing panel” on page 74 .
- document Content Creation Manual's lesson **Create and Apply Terrain Texture Maps** (the document is accessed by pressing F1 or by selecting the **Help → Content Creation** menu item — for details, see “Menu items” on page 12 ).

## 2.9.10. Brushes

Terrain texture settings can be saved into .brush files that can be later loaded from the Asset Browser to help reduce the time needed to setup the many terrain texturing options.

## 2.9.11. Special Effects

These files can be used in the Weather panel, in its Properties list, to allow for special weather effects for different weather systems.

## 2.9.12. Misc

Custom chunk items can be dragged from this folder into the 3D world. BigWorld ships with one custom chunk item, water, represented by the `water.xml` file.

## 2.9.13. Post-Processing

The Asset Browser contains additional folders to aid in the creation of post-processing effects. These folders are:

- **Post-Processing Render Targets:** Defined in Python in `bigworld\res\scripts\client\PostProcessing\RenderTargets\__init__.py`.
- **Post-Processing Effects:** Defined in XML in the file `bigworld\tools\worldeditor\resources\post_processing_effects.xml`. Each effect listed in the XML file corresponds to an Effect from the PostProcessing Python module, defined in the folder `bigworld\res\scripts\client\PostProcessing\Effects`.
- **Post-Processing Phases:** Defined in XML in the file `bigworld\tools\worldeditor\resources\post_processing_phases.xml`. Phases are created through the Python script `bigworld\res\scripts\client\PostProcessing\EditorPhases.py`.
- **Post-Processing FX Files:** Lists .fx files from the folder `bigworld\res\shaders\post_processing`.
- **Post-Processing Textures:** Lists texture files from the folder `bigworld\res\system\maps\post_processing`.

For more information on the contents of these folders see “Post-Processing panel” on page 102 .

## 2.10. Panel summary

Options for the tool modes and other elements are displayed in configurable panels. These panels contains most of the GUI for interacting with the editor.

The position and size of these panels can be changed directly by dragging the border and edges. They can be docked on any edge of the screen, or collapsed into shared panels. The customised layout is automatically saved for future sessions (for details, see *Panel System* on page 287 ).

The descriptions in this section assume the WorldEditor's default layout — the default layout can be loaded via the **View → Load Default Panel Layout** menu item (for details, see "Menu items" on page 12 ).

The default layout consists of two main panels:

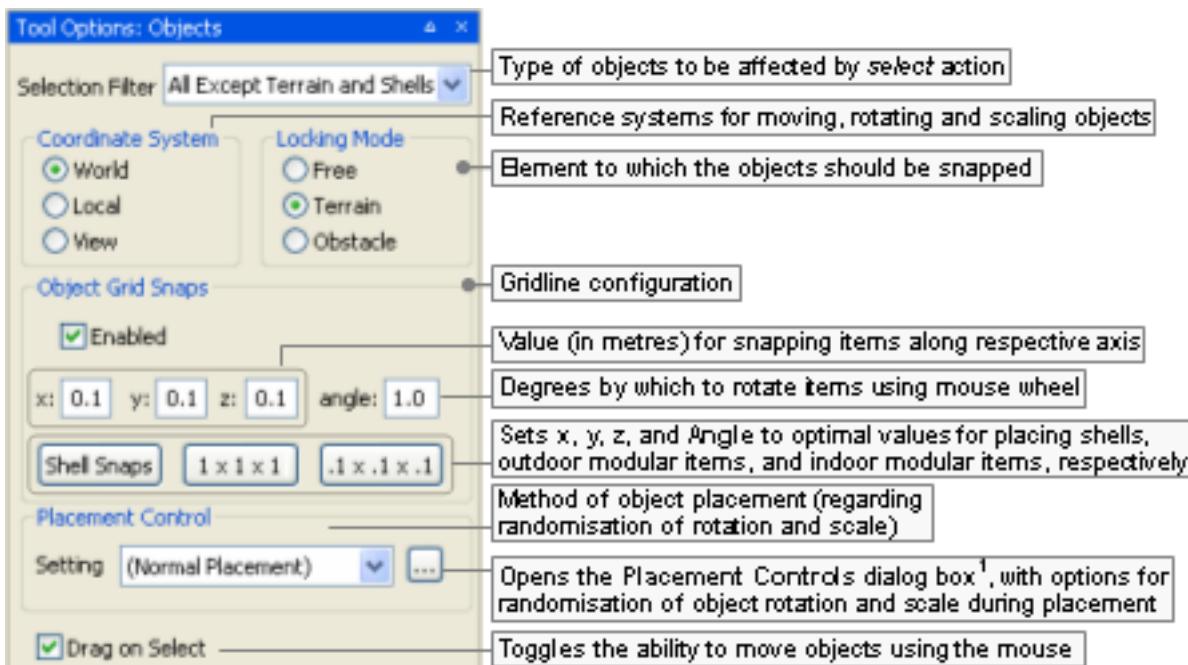
- **Tool Options panel**, which displays the options for the current tool. These tools are:
  - **Object panel** — See "Object panel" on page 70 .
  - **Terrain Texturing panel** — See "Terrain Texturing panel" on page 74 .
  - **Terrain Height panel** — See "Terrain Height panel" on page 84 .
  - **Terrain Filtering panel** — See "Terrain Filtering panel" on page 87 .
  - **Terrain Mesh Cut/Repair panel** — See "Terrain Mesh Cut/Repair panel" on page 88 .
  - **Terrain Import/Export panel** — See "Terrain Import/Export panel" on page 89 .
  - **Project panel** — See "Project panel" on page 92 .
- **Miscellaneous panel**, with various tabs that are independent of current mode. They are:
  - **Asset Browser panel** — See "Asset Browser panel" on page 93 .
  - **Scene Browser panel** — See "Scene Browser panel" on page 96 .
  - **Post-Processing panel** — See "Post-Processing panel" on page 102 .
  - **Properties panel** — See "Properties panel" on page 105 .
  - **Chunk Textures panel** — See "Chunk Textures panel" on page 108 .
  - **General Options panel** — See "General Options panel" on page 111 .
  - **Navigation panel** — See "Navigation panel" on page 117 .
  - **Weather Preview panel** — See "Weather Preview panel" on page 118 .
  - **Environment Options panel** — See "Environment Options panel" on page 121 .
  - **Histogram panel** — See "Histogram panel" on page 128 .
  - **BigWorld Messages panel** — See "BigWorld Messages panel" on page 130 .

The following sub-sections describe each panel, and the settings available on them.

## **2.10.1. Object panel**

---

This panel allows the user to configure overall options on how to handle objects, such as selection behaviour, reference coordinate system, snap mode, and placement randomisation settings.



Object panel

1 – For details, see “Placement Controls dialog box” on page 54 .

The list below describes the fields on this panel:

#### ▪ Selection filter

Sets the type of elements of the world that will be affected by a select action. This will affect selections made via the mouse (for details, see “Mouse controls” on page 42), the **Edit → Select All** menu item (for details, see “Menu items” on page 12), and the **Ctrl+A** keyboard shortcut (for details, see “Keyboard shortcuts” on page 25 ).

Also, as you move the mouse around the world, WorldEditor will display the bounding boxes only for selectable objects.

#### ▪ Coordinate system

Reference coordinate systems for moving, rotating and scaling objects.

##### ▪ World

Uses world coordinate system.

##### ▪ Local

Uses object coordinate system.

##### ▪ View

Uses camera coordinate system.

#### ▪ Locking mode

Element to which the objects should be snapped.

##### ▪ Free

Unlocks object movement — this is where the red, green, and blue direction axis can be used to drag the object along a single axis.

The height of the last placed object is used when placing new objects.

### Note

Mouse cursor icon for this mode is a cross ().

- **Terrain**

Sets object movement to slide along terrain.

This setting is ignored by the rotation gizmo (activated by pressing Shift — for details, see “Keyboard shortcuts” on page 25 ).

### Note

Mouse cursor icon for this mode is a cross ().

- **Obstacle**

Sets object movement to slide along obstacles, including terrain.

This setting causes the position gizmo to display a white sphere at its origin, which can be used to move the object along obstacles.

**Please note that the snapping is applied only when there is exactly one item selected.**

### Note

Mouse cursor icon for this mode is a diamond ().

- **Object grip snaps**

Snap options for the snapping behaviour of objects.

Shell snapping is automatically enforced when placing a shell in the world, overriding all settings in this group box. However, you can modify the shell snap settings by editing `bigworld/tools/worldeditor/options.xml`'s section `shellSnaps`. For details on this file's grammar, see the document File Grammar Guide's section → “WorldEditor”.

- **Enabled**

Enables the snapping of objects, according to **x**, **y**, **z**, and **Angle** values.

- **x**

Value (in metres) for snapping items along the x- axis.

- **y**

Value (in metres) for snapping items along the y- axis.

- **z**

Value (in metres) for snapping items along the z- axis.

- **Angle**

Number of degrees by which to rotate the selected item using the mouse wheel (for details, see “Mouse controls” on page 42 ).

If only one item is selected, then it will be rotated around itself. If more than one item is selected, then they will be rotated around their common centre.

If the **Enabled** check box is cleared, then this value will be ignored, and selected object(s) will be rotated by 15°.

- **Shell snaps**

Sets x, y, z and Angle to the optimal values for placing shells.

- **1 x 1 x 1**

Sets x, y, z and Angle to the optimal values for placing outdoor modular items.

- **.1 x .1 x .1**

Sets x, y, z and Angle to the optimal values for placing indoor modular items.

- **Placement control**

Method of object placement (regarding randomisation of rotation and scale).

- **Setting**

Specifies how to place new objects in the world.

You can determine that objects should be placed as they are, or apply random rotation and/or scale. The latter is useful to give a natural look to the finished world, as each instance of the object will have orientation and size different from others.

The drop-down list box has the following options:

- **(Normal Placement)**

Objects will be placed with their original size and orientation.

- **Preset list**

Objects will be placed in the world with rotation and scale randomised according to values defined for the named preset in the **Placement Controls** dialog box (for details, see “Placement Controls dialog box” on page 54 ).

- 

Opens the **Placement Controls** dialog box (for details, see “Placement Controls dialog box” on page 54 ), where you can specify ranges within which rotation and scale will be randomised during object placement.

- **Drag on select**

Toggles the ability to move selected items via the mouse.

If turned off, objects can only be moved via the position gizmo.

## 2.10.2. Terrain Texturing panel

### Note

To distinguish from other modes, the brush is a purple dotted circle.



Terrain Texturing brush

Because this panel allow a great number of ways in which to interact with the terrain, the following sub-sections should also be consulted:

- “Terrain Texturing viewport context menu” on page 80

This sub-section details the menu items available in the viewport's context menu (accessed by right-clicking an area in the viewport ).

- “Terrain Texturing keyboard shortcuts” on page 82

This sub-section details the keyboard shortcuts that are unique to this mode.

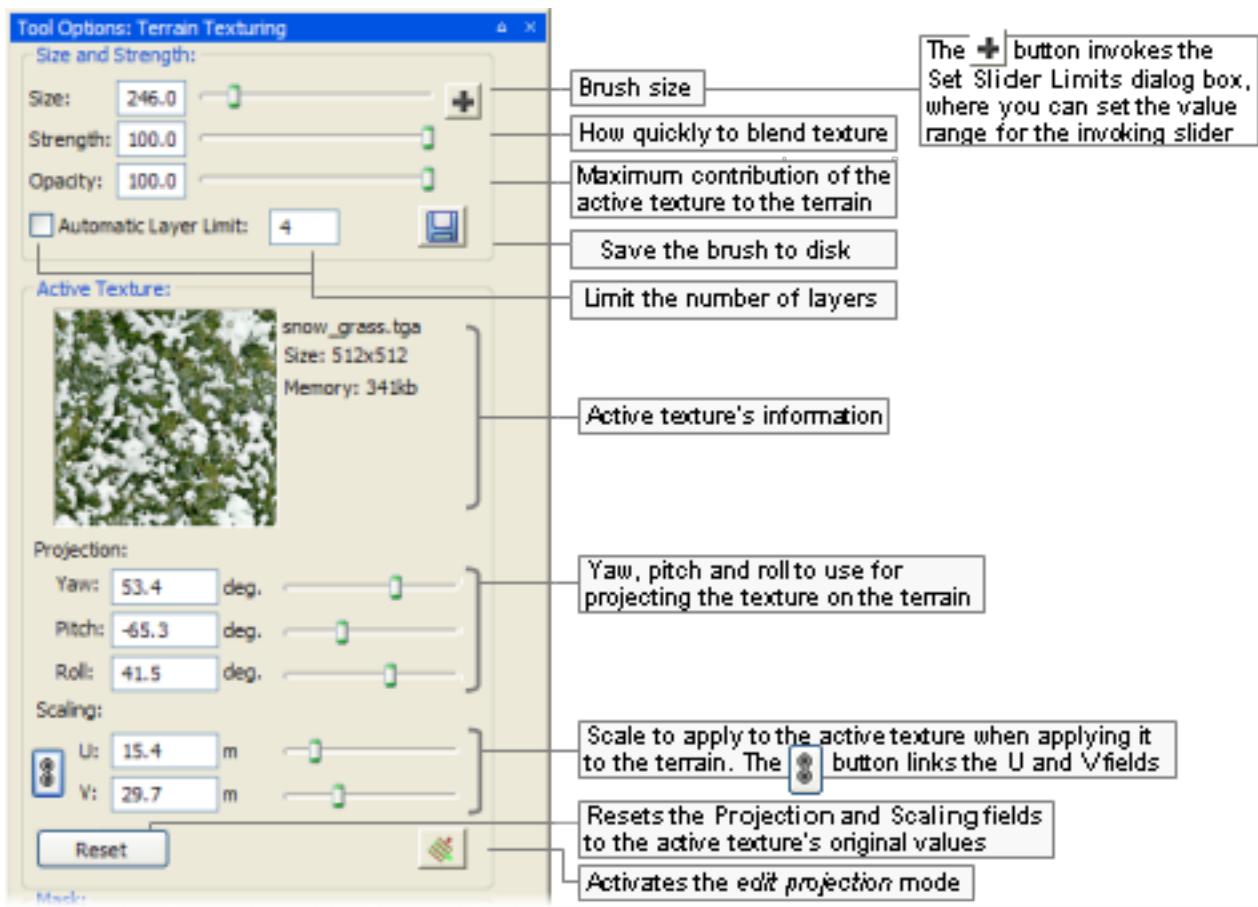
- “Terrain Texturing mouse controls” on page 82

This sub-section details the mouse controls that are unique to this mode.

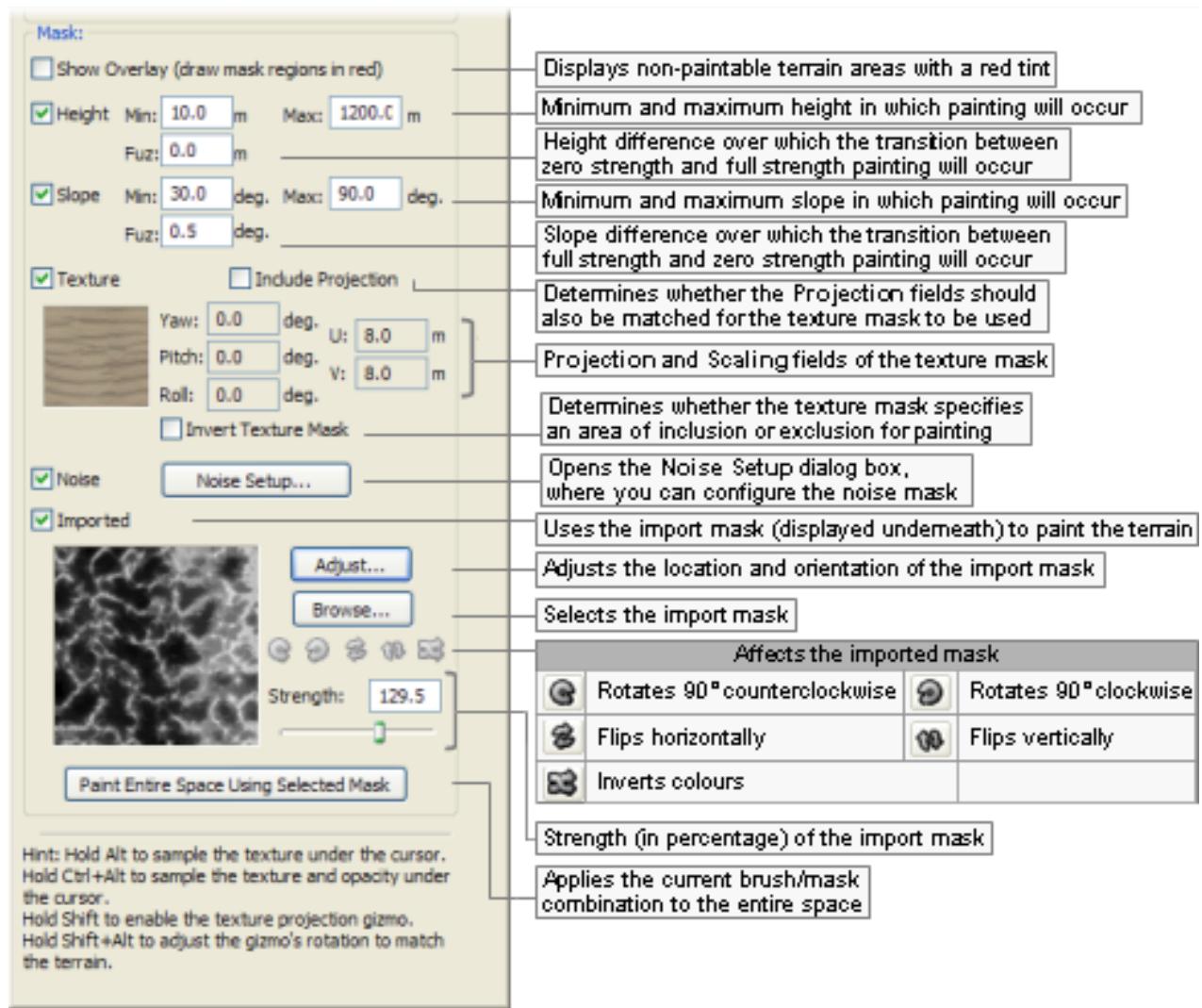
- “Terrain Texturing gizmos” on page 83

This sub-section details the gizmos that are unique to this mode.

For more details on using terrain textures, see the document Content Creation Manual's lesson **Create and Apply Terrain Texture Maps**.



Terrain Texturing panel (top)



Terrain Texturing panel (bottom)

The list below describes the fields on this panel:

#### ▪ Size

Sets the size of the brush (in metres) used to paint the selected texture onto the terrain.

The [ (square left bracket) and ] (square right bracket) keys<sup>A</sup> decrease and increase the size of the brush, respectively.

#### ▪ Strength

Strength of the brush when blending texture onto terrain area underneath brush icon.

As you hold the left mouse button, the texture underneath the brush icon is gradually blended into the existing terrain texture. Small **Strength** values cause the blending to occur slowly, while the opposite happens for big **Strength** values.

Dragging the left mouse button blends the selected texture to the underlying terrain. Shift+[ (square left bracket) and Shift+] (square right bracket) keys<sup>A</sup> decrease and increase the strength of the brush, respectively.

- **Opacity**

Maximum contribution of the **Active Texture** to the terrain under the cursor.

- **Save the brush to disk**

This saves the brush settings to disk. The saved brush will appear in the **Brushes** section of the **Asset Browser**. The saved settings include the orientation and size of the brush, the texture used, the strength, the opacity, all of the mask settings except the import mask.

- **Automatic layer limit**

This limits the number of texture layers that terrain painting can create.

- **Active texture**

- **Active texture's information**

Displays a thumbnails of the active texture, alongside its filename, size, and memory footprint.

- **Projection**

Group of fields configuring the projection that should be applied to the **Active Texture** when painting or replacing the texture in the terrain.



All fields in this group can be automatically updated by the *texture projection* tool (indicated by the *texture projection* icon — a red- and green-sided square indicates the clicked area), which adjusts the **Projection** fields to that of the terrain under the cursor.

- **Yaw**

Rotation about the y-axis to apply to the texture when painting or replacing the texture in the terrain.

- **Pitch**

Rotation about the x-axis to apply to the texture when painting or replacing the texture in the terrain.

- **Roll**

Rotation about the z-axis to apply to the texture when painting or replacing the texture in the terrain.

- **Scaling**

Group of fields configuring the scaling to be applied to the **Active Texture** when painting or replacing the texture in the terrain.

- **U**

Scale in the u-direction to apply to the texture when painting or replacing the texture in the terrain.

- **V**

Scale in the v-direction to apply to the texture when painting or replacing the texture in the terrain.



Links the **U** and **V** fields, so that the texture is uniformly scaled.

- **Reset**

Resets the **Project** and **Scaling** groups of fields to the **Active Texture**'s original values.



Activates the *edit projection* mode, in which the *texture projection/scale* gizmo (for details, see “Terrain Texturing gizmos” on page 83 ) is displayed for the last-edited area.

**Note**

You can activate the *texture projection/scale* gizmo for a different area by clicking it while pressing Shift (for details, see “Terrain Texturing keyboard shortcuts” on page 82 and “Terrain Texturing mouse controls” on page 82 ).

- **Mask**

Group of fields configuring how to apply the import mask to the terrain.

- **Show overlay**

Determines whether non-paintable areas of the terrain (as determined by the import mask) should be rendered with a red tint.

- **Height**



Determines whether the texture painting should be restricted to a height range.

- **Min**

Minimum terrain height in which texture painting should occur.

- **Max**

Maximum terrain height in which texture painting should occur.

- **Fuz**

Height difference over which the transition between zero strength and full strength painting will occur.

This can be used to create fuzzy edges. If the value is set to 0, then painting around the **Min** or **Max** heights will result in a sharp edge.

- **Slope**



Determines whether the texture painting should be restricted to a slope range.

- **Min**

Minimum terrain slope in which texture painting should occur.

- **Max**

Maximum terrain slope in which texture painting should occur.

- **Fuz**

Slope difference over which the transition between zero strength and full strength painting will occur.

This can be used to create fuzzy edges. If the value is set to 0, then painting around the **Min** or **Max** slopes will result in a sharp edge.

- **Texture**

- 

Determines that the texture will only be painted over areas that match the texture mask settings, i.e. it will only paint over the texture mask's selected texture (or if it should exclude those areas, if the **Invert Texture Mask** check box is selected). This can be useful for replacing textures.

- **Include projection**

Determines whether the projection of the terrain under the cursor should be matched for applying the mask.

- **Yaw, Pitch, Roll, U, V**

**Projection** and **Scaling** fields that the texture underneath the cursor must have for the painting to be enabled (or disabled, if the **Invert Texture Mask** check box is selected).

- **Invert texture mask**

Determines whether the texture mask should be used to specify the areas where texture painting will occur, or specify the areas where it will be excluded.

- **Noise**

- 

Determines whether the texture painting should use the specified noise mask.

- **Noise setup**

Opens the **Noise Setup** dialog box (for details, see "Noise Setup dialog box" on page 52), where you can configure the noise mask.

- **Imported**

- 

Determines whether to use the import mask to paint the **Active Texture** onto the terrain.

- **Adjust**

Allows you to adjust how to use the import mask, by doing the following:

- Displaying a top view of the space, where you can relocate and resize the import mask.
- Enabling the **Browse** button.

- Enabling the buttons.
- Enabling the **Strength** field.
- **Browse**  
Opens the **Open** dialog box, where you specify the import mask, which can have the **.r16**, **.raw**, or **.bmp** extension.  
If a RAW file is specified, then the **RAW Terrain Import** dialog box is displayed after clicking the **Open** button — for details, see “RAW Terrain Import dialog box” on page 56.
- Rotates the import mask 90° counterclockwise.
- Rotates the import mask 90° clockwise.
- Flips the import mask horizontally.
- Flips the import mask vertically.
- Inverts the colours in the import mask.
- **Strength**  
Strength (in percentage) of the import mask.
- **Paint entire space using selected mask**  
Applies the current brush/mask combination to the entire space.  
This is a quick way to paint, for example, snow peaks or rock faces.

### 2.10.2.1. Terrain Texturing viewport context menu

Accessed by right-clicking the viewport while the **Terrain Texture Tool** toolbar button ( ) is selected, it contains the following items:

- **Track cursor<sup>A</sup>**  
Determines whether the **Chunk Textures** panel<sup>B</sup> should be automatically updated with texture information on the chunk under the cursor.

*Please note that this option will update the information on the **Chunk Textures** panel, but will not automatically activate it.*

- **Manage textures<sup>A</sup>**

Displays/activates the **Chunk Textures** panel<sup>B</sup>, already updated with texture information on the chunk under the cursor (for details, see “**Chunk Textures** panel” on page 108 ).

- **Deselect chunk<sup>A</sup>**

*This menu item is only displayed if the **Manage Textures** menu item has been previously selected.*

Deselects the chunk previously selected by the **Manage Textures** menu item, and which is currently displayed in the **Chunk Textures** panel.

- **Select texture for painting**

- **List of textures under the mouse cursor<sup>C</sup>**

Changes the active texture to the one selected in this sub-menu.<sup>D</sup>

- **Select texture and opacity for painting**

- **List of textures under the mouse cursor (with Opacity in parenthesis)<sup>C</sup>**

Changes the active texture to the one selected in this sub-menu<sup>D</sup>, and sets the **Opacity** field to the value displayed in parenthesis in this sub-menu.

- **Select texture for mask**

- **List of textures under the mouse cursor<sup>C</sup>**

This enables the **Texture** mask in the **Terrain Textures** panel and sets the mask texture to the one selected in this sub-menu. The **Include Projection** and **Invert Texture Mask** check boxes are turned off. Subsequent painting will replace any textures selected in the sub-menu with the **Active Texture**.

- **Select texture and projection for mask**

- **List of textures under the mouse cursor<sup>C</sup>**

This enables the **Texture** mask in the **Terrain Textures** panel and sets the mask texture to the one selected in this sub-menu. The **Invert Texture Mask** check box is turned off. The **Include Projection** check box is turned on and the **Yaw**, **Pitch**, **Roll** and **U**, **V** fields are set to match the yaw, pitch, roll, u and v-scale of the texture selected in the sub-menu. Subsequent painting will replace the texture mask texture with the **Active Texture**, but only for texture layers whose yaw, pitch, roll, u and v-scales match those of the texture selected in the sub-menu.

- **Edit projection and scale**

- **List of textures under the mouse cursor<sup>C</sup>**



Performs the same function as the button on top of the **Terrain Texturing** panel (*i.e.*, it activates the *edit projection* mode for the texture selected in this sub-menu<sup>D</sup>, and activates the *texture projection/scale* gizmo — for details, see “**Terrain Texturing** gizmos” on page 83 ).

**A** — If the **Manage Textures** menu item is selected, then the chunk in which it was selected will remain as the current one in the **Chunk Textures** panel<sup>B</sup>, and the **Track Cursor** option will become temporarily inactive — to reactivate it, select the **Deselect Chunk** menu item.

**B** — For details, see “*Chunk Textures panel*” on page 108 .

**C** — The textures in this sub-menu are listed from most solid to least solid.

**D** — The **Active Texture** field is automatically updated with the selected texture.

### 2.10.2.2. Terrain Texturing keyboard shortcuts

Please note that for completeness, the information provided in this section is also available in “*Keyboard shortcuts*” on page 25 .

The list of WorldEditor's keyboard shortcuts can be displayed via the **Help → Keyboard Shortcuts** menu item (for details, see “*Menu items*” on page 12 ).

The list below describes the keyboard shortcuts that are unique to this mode:

- **Alt**



Activates the *texture sampler* tool (indicated by the cursor icon), which samples the dominant texture of the chunk under the cursor — the **Active Texture** field will be updated accordingly.

- **Alt+Ctrl**



Activates the *texture/opacity sampler* tool (indicated by the cursor icon), which samples the dominant texture of the chunk under the cursor and its opacity — the **Active Texture** and **Opacity** fields will be updated accordingly.

- **Alt+Shift**



Activates the *texture projection* tool (indicated by the cursor icon — a red- and green-sided square indicates the clicked area), which adjusts the **Projection** fields to that of the terrain under the cursor.

- **Shift**

Activates the *texture projection/scale* gizmo (for details, see “*Terrain Texturing gizmos*” on page 83 ).

### 2.10.2.3. .Terrain Texturing mouse controls

Please note that for completeness, the information provided in this section is also available in “*Mouse controls*” on page 42 .

The list of WorldEditor's mouse controls can be displayed via the **Help → Keyboard Shortcuts** menu item (for details, see “*Menu items*” on page 12 ).

The list below describes the mouse controls that are unique to this mode:

- **Left button click**

- **If Alt is pressed**

Samples the dominant texture of the terrain under the cursor — the **Active Texture** field will be updated accordingly.

 **Alt<sup>A</sup>** activates the *texture sampler* tool (indicated by the  cursor icon).

- **If Alt+Ctrl is pressed**

Samples the dominant texture of the terrain under the cursor and its opacity — the **Active Texture** and **Opacity** fields will be updated accordingly.

 **Alt+Ctrl<sup>A</sup>** activates the *texture/opacity sampler* tool (indicated by the  cursor icon).

- **If Alt+Shift is pressed**

Adjusts the **Projection** fields to that of the terrain under the cursor.

 **Alt+Shift<sup>A</sup>** activates the *texture projection* tool (indicated by the  cursor icon — a red- and green-sided square indicates the clicked area).

- **Left button drag**

Draws the **Active Texture** into the terrain, according to the settings specified in the **Terrain Texturing** panel.

- **Right button click**

Displays the **Terrain Texturing** panel's context menu (for details, see “Terrain Texturing viewport context menu” on page 80 ).

*A* — For details, see “Terrain Texturing keyboard shortcuts” on page 82 .

#### 2.10.2.4. Terrain Texturing gizmos

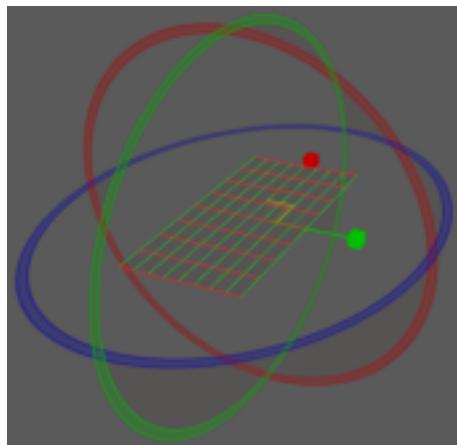
Please note that for completeness, the information provided in this section is also available in “Gizmos” on page 21 .

- **Texture projection/scale gizmo**

Activated by pressing Shift while the **Terrain Texture** toolbar button —  — (for details, see “Toolbar”

on page 17) is selected, or by clicking the **Terrain Texturing** panel's  button, this gizmo contains the following elements (each updating a different field in the panel):

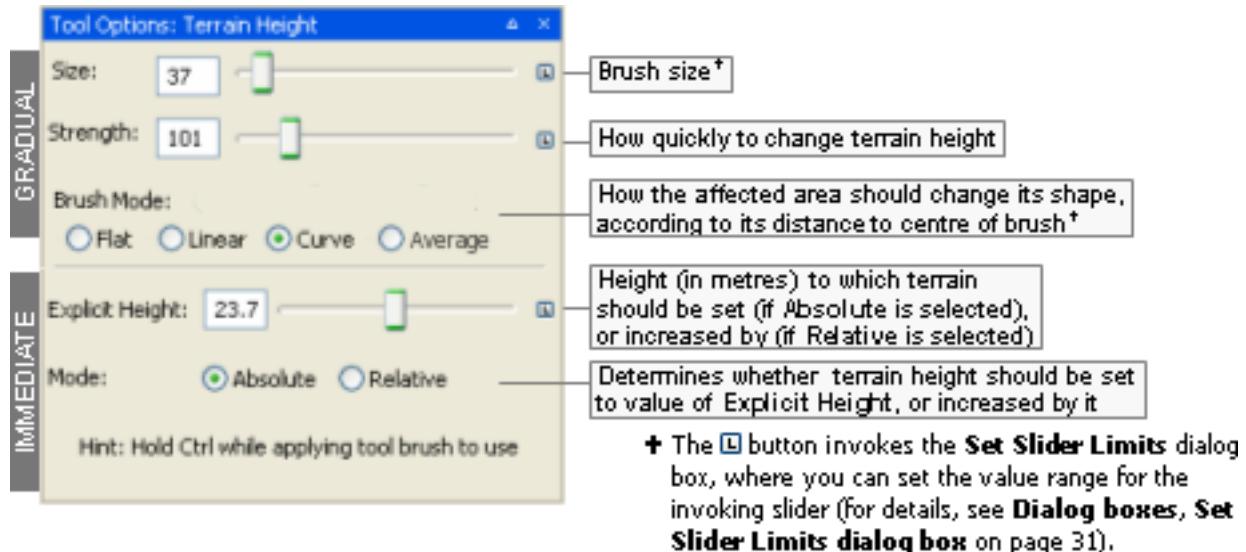
- **Projection gizmo** (composed of red, green, and blue circles).
  - **Red circle** — updates the **Roll** field.
  - **Green circle** — updates the **Pitch** field.
  - **Blue circle** — updates the **Yaw** field.
- **Scale gizmo** (composed of red and green cubes and a red- and green-sided rectangle or grid).
  - **Red cube** — updates the **V** field.
  - **Green cube** — updates the **U** field.



Texture projection/scale gizmo

### 2.10.3. Terrain Height panel

This panel contains the options for the Terrain Height tool.



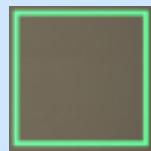
Terrain Height panel

## Note

To distinguish from other modes, the brush is a green dotted circle. The brush for explicit height mode (activated by Ctrl) is a green square.



Terrain Height brush



Terrain Explicit Height brush

There are two basic modes of operation for the terrain brush:

- **Normal use** (settings specified on top half of panel)

To gradually increase the height of the terrain, drag over the desired area while holding the left mouse button. To decrease the height, perform the same operation while pressing the middle mouse button (for details, see “Mouse controls” on page 42 ). Brush strength sets how fast the terrain height will change.

You can use the **Shift** key to toggle between this tool and the Terrain Filtering tool, which is very useful to allow for quickly smoothing out the terrain as you paint the heights.

- **Explicit Height** (activated by pressing **Ctrl** — for details, see “Keyboard shortcuts” on page 25 ).

Terrain can immediately have its height changed *to* a certain value (absolute explicit height mode) or *by* a certain value (relative explicit height mode).

- **To a certain height:**

To immediately set the height of an area:

1. Set the **Explicit Height** field to the desired value.
2. Select the **Absolute** radio button.
3. Drag over the desired area while pressing **Ctrl** — the brush icon changes to a square, indicating the area that will be affected.

- **By a certain amount:**

To gradually increase the height of an area:

1. Set the **Explicit Height** field to the desired value.
2. Select the **Relative** option button.
3. Drag over the desired area while pressing **Ctrl** — the brush icon changes to a circle, indicating the area that will be affected.

The list below describes the fields on this panel:

- **For gradual changes**

- **Size**

Sets the size of the brush (in metres) used to apply the specified height onto the terrain.

The brush size is used both for incremental height changes (when the area affected is indicated by a round brush icon), and absolute height changes (when the area affected is indicated by a square brush icon).

The [ (square left bracket) and ] (square right bracket) keys<sup>A</sup> decrease and increase the size of the brush, respectively.

- **Strength**

Sets the strength of the brush when incrementally applying the specified height to the terrain area underneath the brush icon.

As you hold the left mouse button, the height is gradually incremented to the area indicated by the round brush icon. Small Strength values cause the height to be incremented slowly, while the opposite happens for big Strength values.

`Alt+ [` (square left bracket) and `Alt+ ]` (square right bracket) keys<sup>A</sup> decrease and increase the strength of the brush, respectively.

- **Brush mode**

How affected terrain should change its shape.

- **Flat**

Brush's strength does not fall off until it reaches its edge. This results in plateaus with sharp cliff transitions.

- **Linear**

Brush's strength falls off linearly away from its centre. Useful for producing pointy triangular heights.

- **Curve**

Brush's strength falls off gradually away from its centre. This produces more rounded, softer heights.

- **Average**

This mode samples the terrain height at the cursor position and flattens the area around it to that height. This mode is particularly useful for creating roads, paths, terraces and other terrain features.

- **For immediate changes**(activated by `Ctrl`<sup>A</sup> key)

- **Explicit height**

Number of metres by which to change affected terrain.

- **Mode**

Determines whether terrain height should be set to **Explicit Height**, or incremented by it.

- **Absolute**

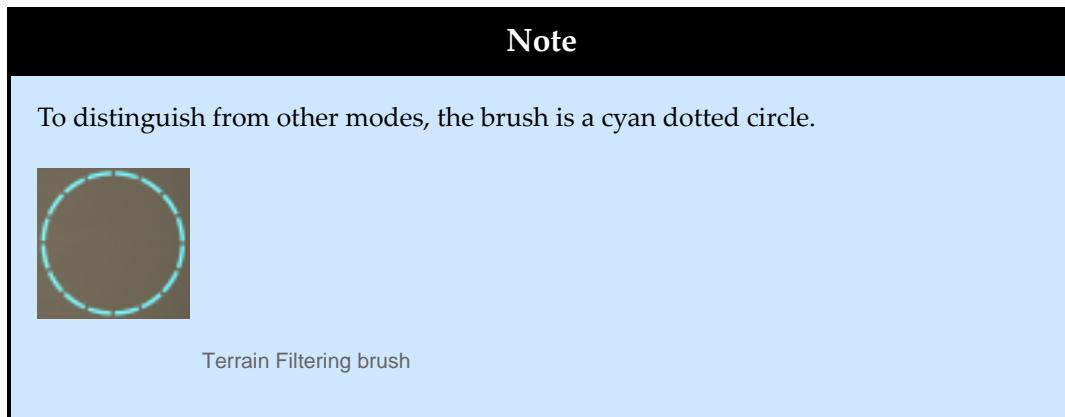
Sets terrain height to **Explicit Height** when mouse is dragged over the area while  $\text{Ctrl}^A$  is pressed.

- **Relative**

Increases terrain height by **Explicit Height** when mouse is dragged over the area while  $\text{Ctrl}^A$  is pressed.

*A — For details, see “Keyboard shortcuts” on page 25 .*

#### 2.10.4. Terrain Filtering panel

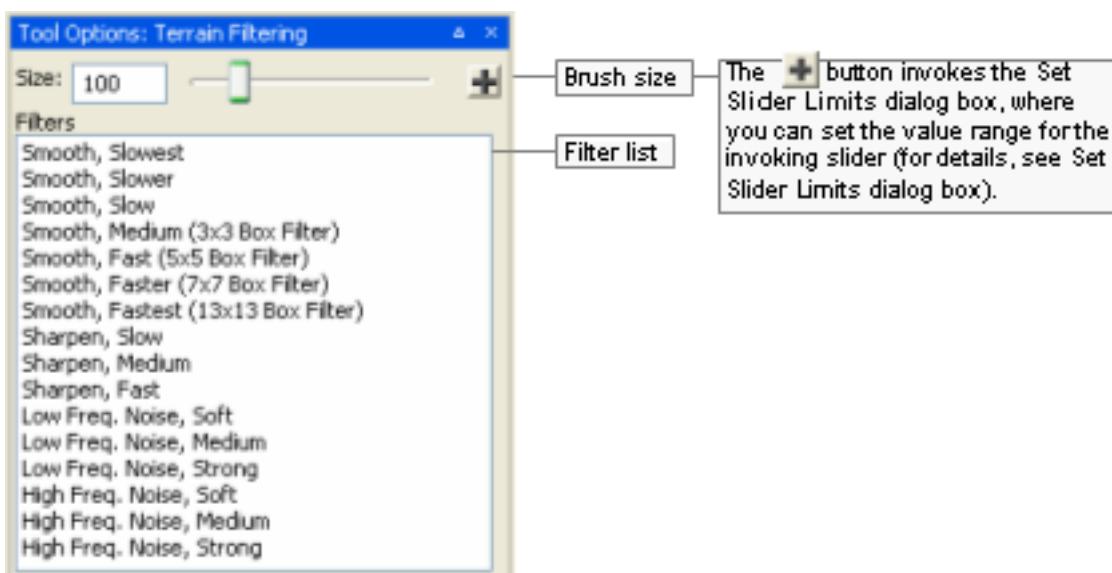


This panel contains options for the terrain filter brush. The brush applies filtering operations to the terrain height. Each filter is a convolution kernel of the type often found in image editing software.

Filters give you the ability to make adjustments to the terrain, with a mechanism similar to the height-sculpting tool.

The most commonly used filters are the smooth ones. They help smooth the terrain, and reduce the jagged polygon appearance of the terrain.

For more details on filters, see the document Content Creation Manual's lesson **Sculpt Terrain → Adding refinement filters**. (document is accessed by pressing F1 or by selecting the **Help → Content Creation** menu item — for details, see “Menu items” on page 12 ).



## Terrain Filtering panel

The list below describes the fields on this panel:

- **Size**

Sets the size of the brush (in metres) used to apply the chosen filter to the terrain area underneath the brush icon.

The [ (square left bracket) and ] (square right bracket) keys<sup>A</sup> decrease and increase the size of the brush, respectively.

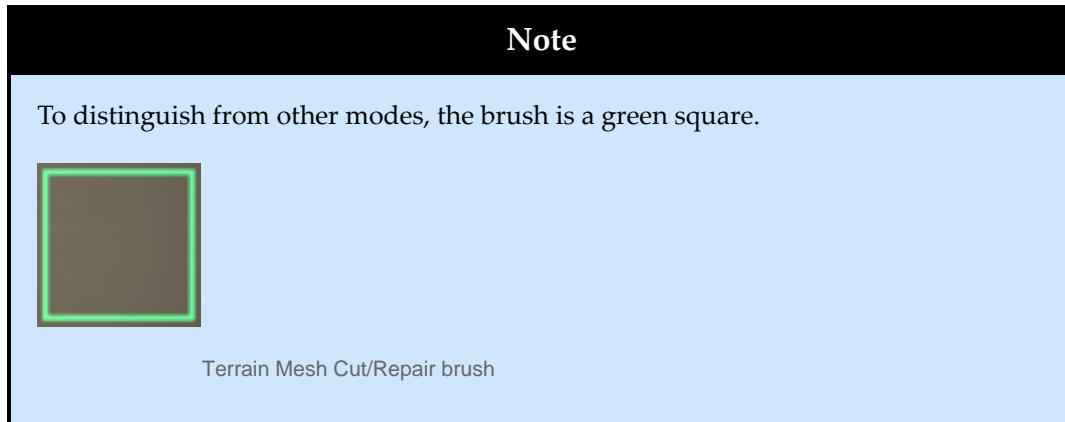
- **Filter list**

List of filters available for adjusting the terrain.

You can use the Shift key to toggle between this tool and the Terrain Height tool, which is very useful to allow for quickly smoothing out the terrain as you paint the heights.

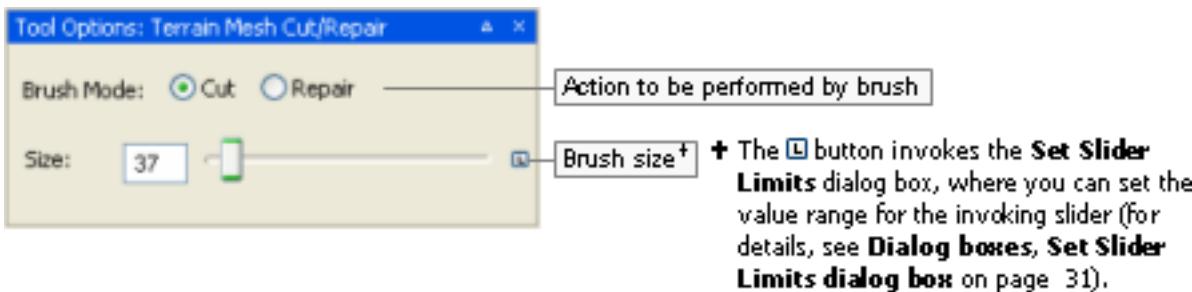
*A – For details, see “Keyboard shortcuts” on page 25 .*

## 2.10.5. Terrain Mesh Cut/Repair panel



This panel allows you to cut or repair holes in the terrain.

Holes in the terrain are especially useful for cutting out the area underneath shells so that the shell geometry does not z-fight with the terrain. It can also be used to cut entrances to underground shells.



Terrain Mesh Cut/Repair panel

The list below describes the fields on this panel:

- **Brush mode**

Action to be performed with the brush on the terrain underneath it.

- **Cut**

Removes the terrain under the brush.

- **Repair**

Restores the terrain under the brush.

You can also use the Shift key to toggle between Cut and Repair.

- **Size**

Sets the size of the brush (in metres) used to apply the chosen filter to the terrain area underneath the brush icon.

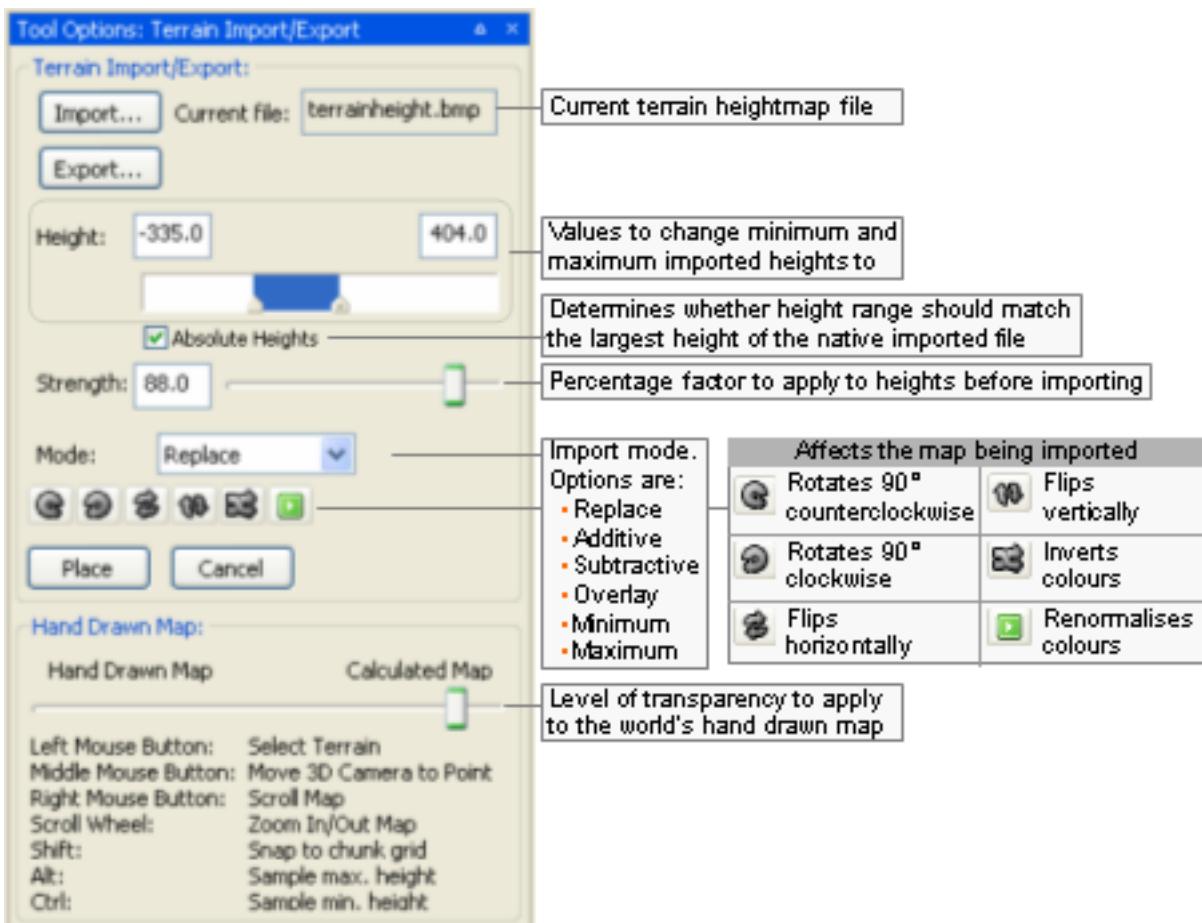
The [ (square left bracket) and ] (square right bracket) keys<sup>A</sup> decrease and increase the size of the brush, respectively.

*A – For details, see “Keyboard shortcuts” on page 25 .*

## 2.10.6. Terrain Import/Export panel

This panel allows the user to import terrain height data from other tools, such as PhotoShop and WorldMachine, and to tweak how it should be applied to selected area.

It also allows the user to export terrain height data of the selected area.



## Terrain Import/Export panel

The list below describes the fields on this panel:

- **Import**

Opens the Open dialog box, where you can specify the terrain height map file to be imported.

Accepted extensions are:

- **Greyscale heightmaps** — .r16, .raw, .bmp
- **Terragen files** — .ter
- **DTED2 files** — .dt2

- **Current file**

Terrain heightmap file to be imported.

- **Export**

Opens the **Save As** dialog box, where you can specify the terrain heightmap file to which export height data about the selected area. Accepted extensions are:

- **Bitmap files** (.bmp)
- **Raw files** (.r16, .raw)
- **Terragen files** (.ter)

**Note**

If you are planning to use WorldMachine to open the exported file, then please export it as a .raw, since WorldMachine cannot read .r16 files correctly.

- **Height**

Minimum and maximum height of imported terrain.

- **Min, Max**

Height of lowest and highest points in imported terrain map.

If the **Absolute heights** check box is selected, then all points in the imported map will have their heights adjusted to correspond to the **Min** and **Max** values.

When **Current File** is specified via the **Import** button, then **Min** is automatically set to 0.

- **Absolute heights**

Determines whether the minimum and maximum heights in the imported file(s) should be adjusted to the values in the **Height** fields.

This field is especially useful when you want importing multiple files for areas next to one another. For example, suppose you have two RAW files that are to be placed next to one another — one with a mountain range and the other with a plain. If this check box is selected, and the **Height** field's **Min** value is set to the lowest point in the plain, and the **Height** field's **Max** value is set to the highest point in the mountains, then importing the two areas will result in terrain without seams. If this check box is cleared, then the maximum height of the plain will be the same as the maximum height of the mountains.

- **Strength**

Percentage to apply to height in each point of map being imported when calculating result.

- **Mode**

Terrain import mode.

Contains the following options:

- **Replace**

Replaces the current terrain with the one being imported.

- **Additive**

For each point in terrain, height is added to the one in map being imported.

- **Subtractive**

For each point in terrain, height is subtracted from the one in map being imported.

- **Overlay**

Finds the median height in map being imported. Then, considering this median height as being 0 metres high, applies the Additive mode.

- **Minimum**

For each point in terrain, height is set to the one in map being imported, if it is lower than the one in current map.

- **Maximum**

For each point in terrain, height is set to the one in map being imported, if it is higher than the one in current map.

- **Map buttons**

Affect the map being imported.



Rotates map 90° counter-clockwise.



Rotates map 90° clockwise.



Flips map horizontally.



Flips map vertically.



Inverts colours in map.



Renormalises colours in map, to reflect changes to **Height**.

If minimum and maximum heights are changed via the **Height** field, the colours of map being imported will be out-of-date, until this button is clicked.

- **Place**

Imports the selected map.

- **Cancel**

Cancels the import.

- **Hand drawn map**

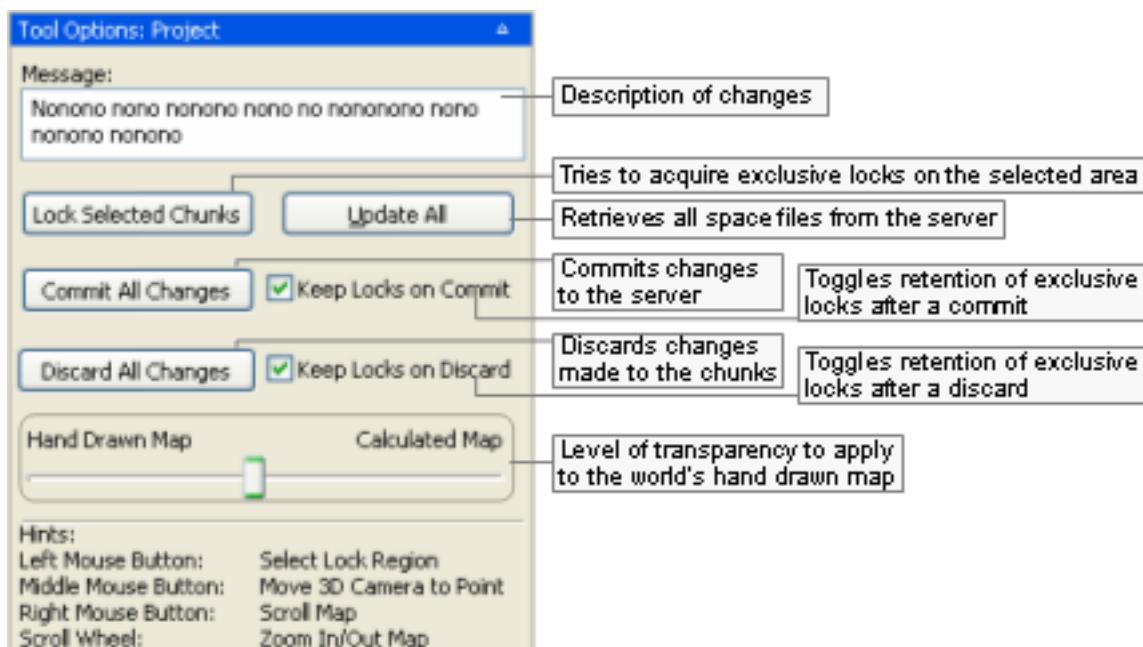
Changes the level of transparency applied to the world's hand drawn map layer that is rendered over the world's game map.

This allows users to compare between the world as initially specified by the game designer (**Hand Drawn Map**), and the one implemented by the world builders (**Calculated Map**).

## 2.10.7. Project panel

This panel gives you access to multi-user editing of the world, implemented by the Lock Server (for details, see *Lock Server (BWLckD)* on page 333 ).

It also allows you to quickly navigate through large worlds by clicking the desired area with the mouse's middle button or scroll wheel (for details on mouse controls while in **Project View** mode, see "Mouse controls" on page 42 ).



## Project panel

The list below describes the fields on this panel:

- **Message**

Description of the changes to the world.

- **Lock selected chunks**

Tries to obtain an exclusive lock of the region selected on the map.

Locking a selection is useful for multi-user editing of the world, as it prevents two people from working in the same area.

For details, see “Locking an area” on page 338 .

- **Update all**

Reads all space files from the server and updates the world.

- **Commit all changes**

Writes to the repository all changes made to the world.

After committing, other users will be able to see your changes.

- **Keep locks on commit**

Toggles the retention of exclusive locks after committing your changes.

- **Discard all changes**

Rejects the changes you made to the world, overwriting them with current version.

- **Keep locks on discard**

Toggles the retention of exclusive locks after discarding your changes.

- **Hand drawn map vs. Calculated map**

Changes the level of transparency applied to the world's hand drawn map layer that is rendered over the world's game map.

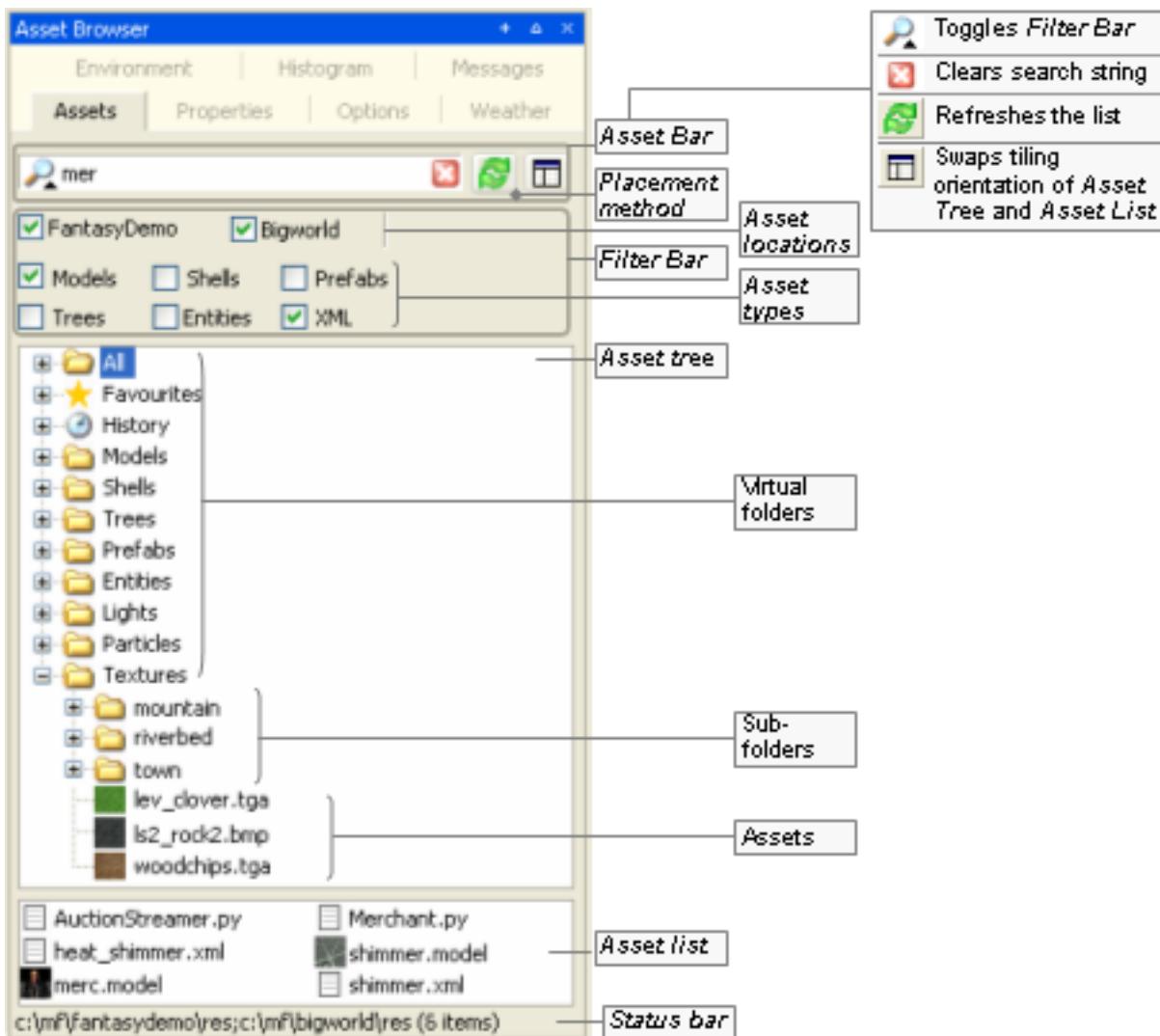
This allows users to compare between the world as initially specified by the game designer (**Hand Drawn Map**), and the one implemented by the world builders (**Calculated Map**).

## 2.10.8. Asset Browser panel

---

This panel gives access to assets through the Asset Browser, an interface that is available in WorldEditor, ModelEditor, and ParticleEditor. For details, see *Asset Browser* on page 275 .

It also allows you to choose how objects should be placed in the world.



Asset Browser panel

The list below describes the fields on this panel:

- **UAL fields**

For details, see *Asset Browser* on page 275 .

The interaction between the different BigWorld asset types and WorldEditor via the Asset Browser is described in the sections below.

To place an asset in the world:

- Drag its thumbnail in the **Asset List** and drop it in the viewport.  
— or —
- Select its thumbnail in the **Asset List**, place the mouse pointer in the desired location in the world, then press Enter (for details, see “Keyboard shortcuts” on page 25 ).

### 2.10.8.1. Drag-and-drop

Drag-and-drop operation is specific to the tool that implements it, and the type of asset being dragged, as described in the table below (asset types are listed in the order in which they appear in the **Asset Tree**):

| Asset type                     | Drop location <sup>A</sup>                                       | Effect  |
|--------------------------------|--|---|
| Models                         | 3D Viewport  | Places the dragged asset in the space.  |
| Shells                         |  |   |
| Trees                          |  |   |
| Prefabs                        |  |   |
| Entities                       |  |   |
| User Objects                   | Data   |   |
| Lights                         |  |   |
| Particles                      |  |   |
| Misc                           |  |   |
| Textures                       | Terrain Texturing panel's Active Texture or Mask Texture fields. | If dropped onto the <b>Active Texture</b> then the texture becomes the texture used when painting. If dropped onto the <b>Mask Texture</b> then the texture becomes the texture replace when painting.  |
| Brushes                        | Terrain Texturing panel.   | Changes the current terrain painting brush to the one in the brush file.  |
| Post-Processing Effects        | Post-Processing panel's graph view                               | Adds the Effect and its phases into the post-processing chain at the drop position.   |
| Post-Processing Phases         | Post-Processing panel's graph view                               | Adds the Phase into a post-processing Effect in the chain at the drop position.   |
| Post-Processing Textures       | Post-Processing panel's graph view or properties                 | If dragged on top of a Phase node in the graph view, a popup appears showing the texture properties for the Phase, and you can drop the texture onto one of these properties. It can also be dropped over a texture property of the selected Phase in the properties area.  |
| Post-Processing Render Targets | Post-Processing panel's graph view or properties                 | If dragged on top of a Phase node in the graph view, a popup appears showing the render target and texture properties for the Phase, and you can drop the render target onto one of these properties. It can also be dropped over a render target or texture property of the selected Phase in the properties area. |
| Post-Processing FX Files       | Post-Processing panel's graph view or properties                 | If dragged on top of a Phase node in the graph view, a popup appears showing the FX properties for the Phase, and you can drop the FX file onto one of these properties. It can also be dropped over an FX property of the selected Phase in the properties area.   |

Drag-and-drop operation in WorldEditor's Asset Browser panel

*A — If the asset file is dropped in the **Favourites** special virtual folder, then it is added to that folder. For details, see “Asset file” on page 282 .*

## 2.10.8.2. Virtual folders

Defined in Asset Browser's configuration file (for details, see “Customisation” on page 282), virtual folders list files of a specific asset type.

For details on the listed asset types, see “Assets” on page 61 .

## 2.10.9. Scene Browser panel

This panel provides functionality for easy listing, searching, selecting and managing of the objects that are currently loaded in the space. This panel provides the following features:

- Browse the list of objects currently loaded in the space, sorted by any column or property.
- View the list of objects in collapsible groups, grouped by chunk, asset type, file path, number of triangles, number of primitive calls, etc.
- Easily select objects in the space by selecting items in the Scene Browser list.
- Search for objects in the space, by searching in some or all properties of the objects, using multiple keywords and/or DOS-style wild cards.
- Zoom to an object from the list.
- Configure which columns or properties to view, and save different configurations as presets.
- Hide or Unhide objects in the space, one by one, to improve editing of complex spaces.
- Freeze or Unfreeze objects in the space, one by one, to avoid modifying objects accidentally.
- Toggle boolean properties of one item or the whole selection with a single click. For example, it allows to change properties such as "casts shadow" and "reflection visible", or the hidden or frozen state, with a single click.

More details follow each of the screen shots below.

### Browsing and Selecting:

| Chunk                      | Asset Name                 | Asset Type          | Path   | Tris   | Pri... |
|----------------------------|----------------------------|---------------------|--|--------|--------|
| -                          | MontereyCypress_RT.spt     | ChunkTree           | speedtree/Conifers/monterey_cypress/MontereyCypress...     | 3138   | 3      |
| -                          | MontereyCypress_RT.spt     | ChunkTree           | speedtree/Conifers/monterey_cypress/MontereyCypress...     | 3138   | 3      |
| -                          | MontereyCypress_RT.spt     | ChunkTree           | speedtree/Conifers/monterey_cypress/MontereyCypress...     | 3138   | 3      |
| -                          | MontereyCypress_RT.spt     | ChunkTree           | speedtree/Conifers/monterey_cypress/MontereyCypress...     | 3138   | 3      |
| -                          | MontereyCypress_RT.spt     | ChunkTree           | speedtree/Conifers/monterey_cypress/MontereyCypress...     | 3138   | 3      |
| -                          | MontereyCypress_RT.spt     | ChunkTree           | speedtree/Conifers/monterey_cypress/MontereyCypress...     | 3138   | 3      |
| -                          | JoshuaTree_RT.spt          | ChunkTree           | speedtree/Palms_Cacti_Cycads/joshua_tree/JoshuaTree...     | 1828   | 3      |
| - 00010005o<br>(2 items)   | fd_rock_sharp_high.model   | ChunkModel          | sets/temperate/props/fd_rock_sharp_high.model              | 598    | 1      |
| -                          | MontereyCypress_RT.spt     | ChunkTree           | speedtree/Conifers/monterey_cypress/MontereyCypress...     | 3138   | 3      |
| - 00010006o<br>(3 items)   | fd_rock_sharp_high.model   | ChunkModel          | sets/temperate/props/fd_rock_sharp_high.model              | 598    | 1      |
| -                          | fd_rock_sharp_medium.model | ChunkModel          | sets/temperate/props/fd_rock_sharp_medium.model            | 398    | 1      |
| -                          | MontereyCypress_RT.spt     | ChunkTree           | speedtree/Conifers/monterey_cypress/MontereyCypress...     | 3138   | 3      |
| - 0001ffffao<br>(20 items) | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir/DouglasFir_RT.spt           | 1603   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir/DouglasFir_RT.spt           | 1603   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir/DouglasFir_RT.spt           | 1603   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir/DouglasFir_RT.spt           | 1603   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir/DouglasFir_RT.spt           | 1603   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir/DouglasFir_RT.spt           | 1603   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir/DouglasFir_RT.spt           | 1603   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir_full/DouglasFir_RT_Full.spt | 2299   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir_full/DouglasFir_RT_Full.spt | 2299   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir_full/DouglasFir_RT_Full.spt | 2299   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir_full/DouglasFir_RT_Full.spt | 2299   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir_full/DouglasFir_RT_Full.spt | 2299   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir_full/DouglasFir_RT_Full.spt | 2299   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir_full/DouglasFir_RT_Full.spt | 2299   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir_full/DouglasFir_RT_Full.spt | 2299   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir_full/DouglasFir_RT_Full.spt | 2299   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir_full/DouglasFir_RT_Full.spt | 2299   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir_full/DouglasFir_RT_Full.spt | 2299   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir_full/DouglasFir_RT_Full.spt | 2299   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir_full/DouglasFir_RT_Full.spt | 2299   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir_full/DouglasFir_RT_Full.spt | 2299   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir_full/DouglasFir_RT_Full.spt | 2299   | 3      |
| -                          | DouglasFir_RT.spt          | ChunkTree           | speedtree/Conifers/douglas_fir_full/DouglasFir_RT_Full.spt | 2299   | 3      |
| -                          | CameraNode                 | ChunkUserDataObject | scripts/user_data_object_defs/	CameraNode.def              | 0      | 0      |
| - 0001ffffeo<br>(1 items)  | fx_butterflies2.xml        | ParticleSystem      | particles/fx_butterflies2.xml                              | 172255 | 276    |
| -                          | Guard                      | ChunkEntity         | scripts/entity_defs/Guard.def                              | 0      | 0      |

Selected 14/7510 items loaded, 32186/9916281 triangles, 42/15163 primitive groups

### Scene Browser Panel - Selecting Objects

This screen shot shows the elements of the Scene Browser panel. On the top of the panel we see the search field, the grouping drop-down list, and the tool bar, taking most of the panel's area is the object list, and at the bottom is the status bar. The tool bar includes buttons to hide, unhide, freeze, unfreeze and auto-zoom to object:

- Hide / Unhide: Allow temporarily hiding objects in order to simplify editing of complex scenes. Hidden objects cannot be selected or seen in the 3D view, but they can be seen in the Scene Browser. The hidden state is an editor-only state, and will not have any effect on the client engine or the server.
- Freeze / Unfreeze: Allow temporarily freezing objects to avoid accidentally modifying it. Frozen objects cannot be selected or modified in the 3D view, but they can be selected in the Scene Browser. The frozen state is an editor-only state, and will not have any effect on the client engine or the server.
- Auto-zoom: When enabled, it will zoom to an object as soon as it is selected in the Scene Browser list. When disabled, the user can still zoom to objects by double-clicking or right-clicking on the list.

Selections can be made using the standard selection keys and click combinations, such as Ctrl + click to add/remove to the selection, Shift + click to select a range of items, and so on. Because the Scene Browser supports searching and sorting, it makes it the ideal as an alternative view for selecting items. The screen shot shows the objects grouped by chunk. The search and grouping functionalities will be discussed next.

### Searching:

| Scene Browser |                |                            |            |   |      |          |
|---------------|----------------|----------------------------|------------|---|------|----------|
| Asset Type    |                | Asset Name                 | Chunk      | Path  | Tris | Pri...   |
| -             | ChunkTree      | bwcrabapple_rt_flowers.spt | 0007ffffd0 | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 52720 60 |
| (20 items)    |                | bwcrabapple_rt_flowers.spt | 0007ffffd0 | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | 0006ffffeo | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | 0006ffffd0 | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | 0006ffffd0 | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | 0006ffffd0 | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | 0006ffffd0 | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | 0006ffffd0 | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | 0006ffffd0 | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | 0004ffffeo | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | 0004ffffeo | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | 0004ffffeo | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | 0004ffffeo | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | ffffffffeo | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | ffffffffeo | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | ffffffffeo | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | ffffffffeo | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | ffffffffeo | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | ffffffffeo | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | ffffffffeo | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
|               |                | bwcrabapple_rt_flowers.spt | ffffffffeo | - - speedtree/Broadleaves/crab_apple/bwcrabapple_rt_flow... | ✓ -  | 2636 3   |
| -             | ParticleSystem | crab_apple_flowers.xml     | 0006ffffd0 | - particles/crab_apple_flowers.xml                          | - -  | 0 0      |
| (16 items)    |                | crab_apple_flowers.xml     | 0007ffffd0 | - particles/crab_apple_flowers.xml                          | - -  | 0 0      |
|               |                | crab_apple_flowers.xml     | 0007ffffd0 | - particles/crab_apple_flowers.xml                          | - -  | 0 0      |
|               |                | crab_apple_flowers.xml     | 0007ffffd0 | - particles/crab_apple_flowers.xml                          | - -  | 0 0      |
|               |                | crab_apple_flowers.xml     | 0006ffffeo | - particles/crab_apple_flowers.xml                          | - -  | 0 0      |
|               |                | crab_apple_flowers.xml     | 0006ffffd0 | - particles/crab_apple_flowers.xml                          | - -  | 0 0      |
|               |                | crab_apple_flowers.xml     | 0006ffffd0 | - particles/crab_apple_flowers.xml                          | - -  | 0 0      |
|               |                | crab_apple_flowers.xml     | 0006ffffd0 | - particles/crab_apple_flowers.xml                          | - -  | 0 0      |
|               |                | crab_apple_flowers.xml     | 0006ffffd0 | - particles/crab_apple_flowers.xml                          | - -  | 0 0      |
|               |                | crab_apple_flowers.xml     | 0004ffffeo | - particles/crab_apple_flowers.xml                          | - -  | 0 0      |
|               |                | crab_apple_flowers.xml     | 0004ffffeo | - particles/crab_apple_flowers.xml                          | - -  | 0 0      |
|               |                | crab_apple_flowers.xml     | 0004ffffeo | - particles/crab_apple_flowers.xml                          | - -  | 0 0      |
|               |                | crab_apple_flowers.xml     | 0004ffffeo | - particles/crab_apple_flowers.xml                          | - -  | 0 0      |
|               |                | crab_apple_flowers.xml     | ffffffffeo | - particles/crab_apple_flowers.xml                          | - -  | 0 0      |
|               |                | crab_apple_flowers.xml     | ffffffffeo | - particles/crab_apple_flowers.xml                          | - -  | 0 0      |

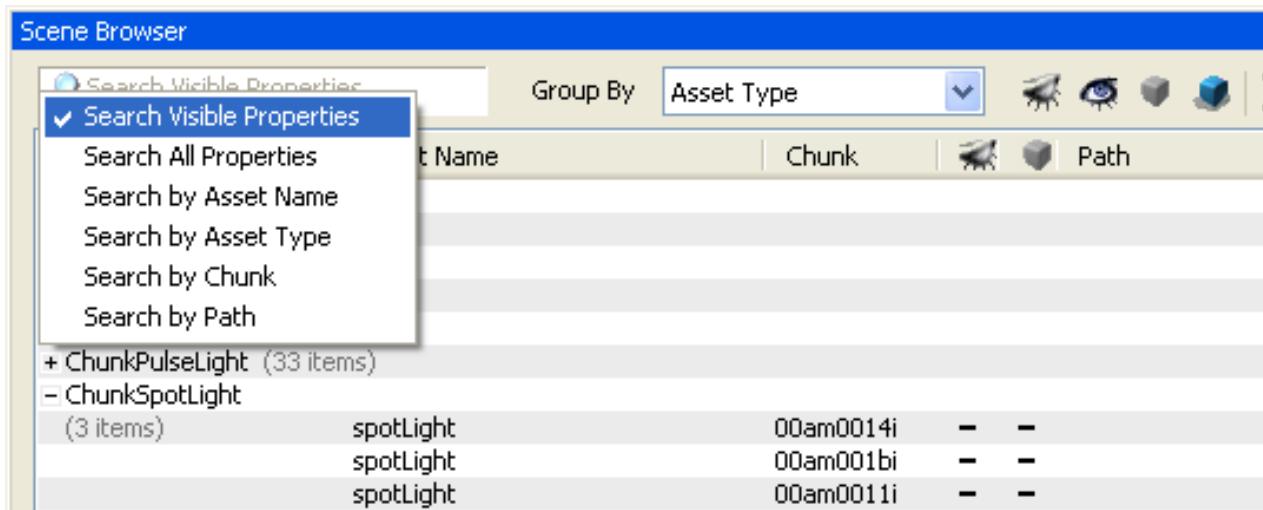
36 items found, 52720 triangles, 60 primitive groups

### Scene Browser Panel - Searching

In this screen shot, the keywords "crab" and "flower" have been typed into the search field in the top-left of the panel. The search results are quickly shown down in the list, and when specifying multiple keywords,

separated by a space, the Scene Browser searches for objects that match all the keywords in the field. Additionally, it is possible to use DOS-style wild cards, using the wild card characters "\*" and "?". The search is matched against one or more of the object properties, depending on the search filter selected (see the next screen shot).

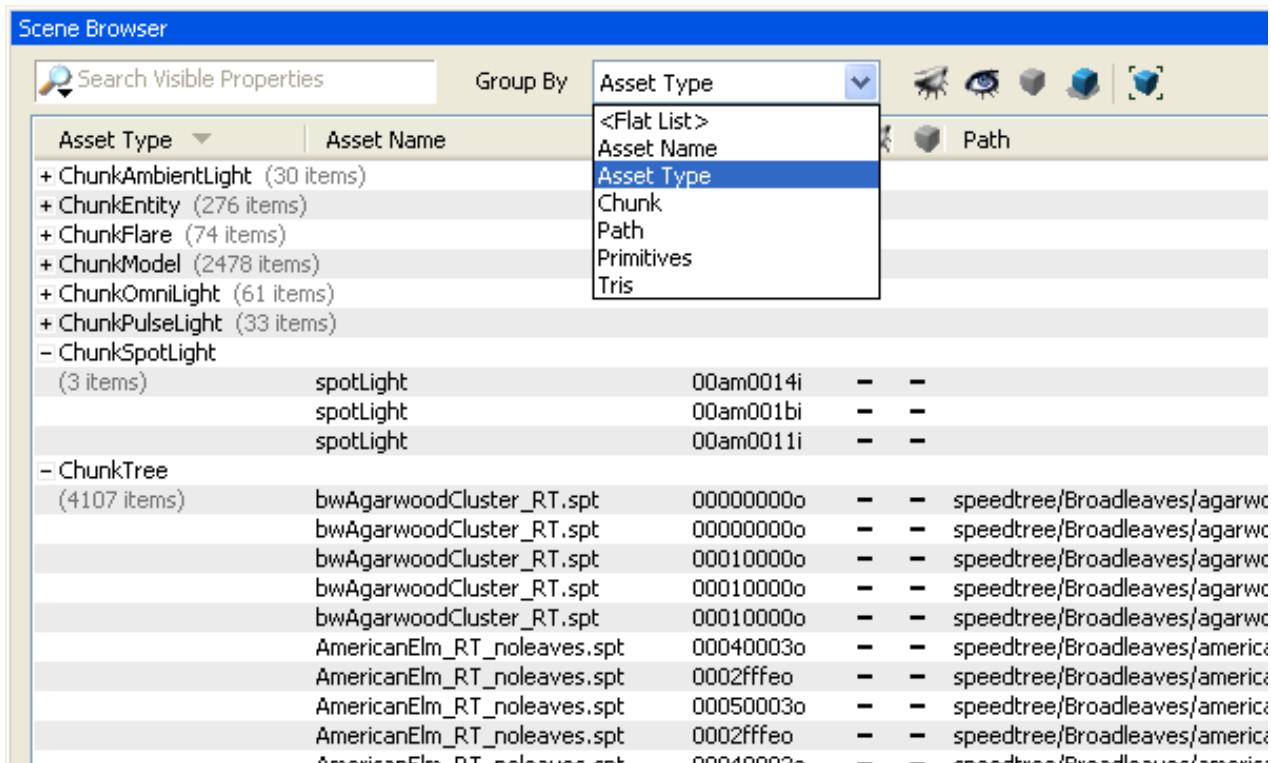
### Search Filters:



Scene Browser Panel - Search Filters

By clicking on the magnifying glass icon, the user can select one of the different search options, to search in the visible properties only, in all properties, or in one of the built-in common properties.

### Grouping:



## Scene Browser Panel - Grouping

The list can be viewed as a flat list, sorted by any column or property, or it can be viewed with objects grouped by one of the grouping criteria provided in the "Group By" drop-down list. In the screen shot, the list is being grouped by "Asset Type". Groups can be collapsed or expanded, and show some basic statistics for the group, such as the number of items in the group, the number of triangles used by the group, and the number of primitive calls.

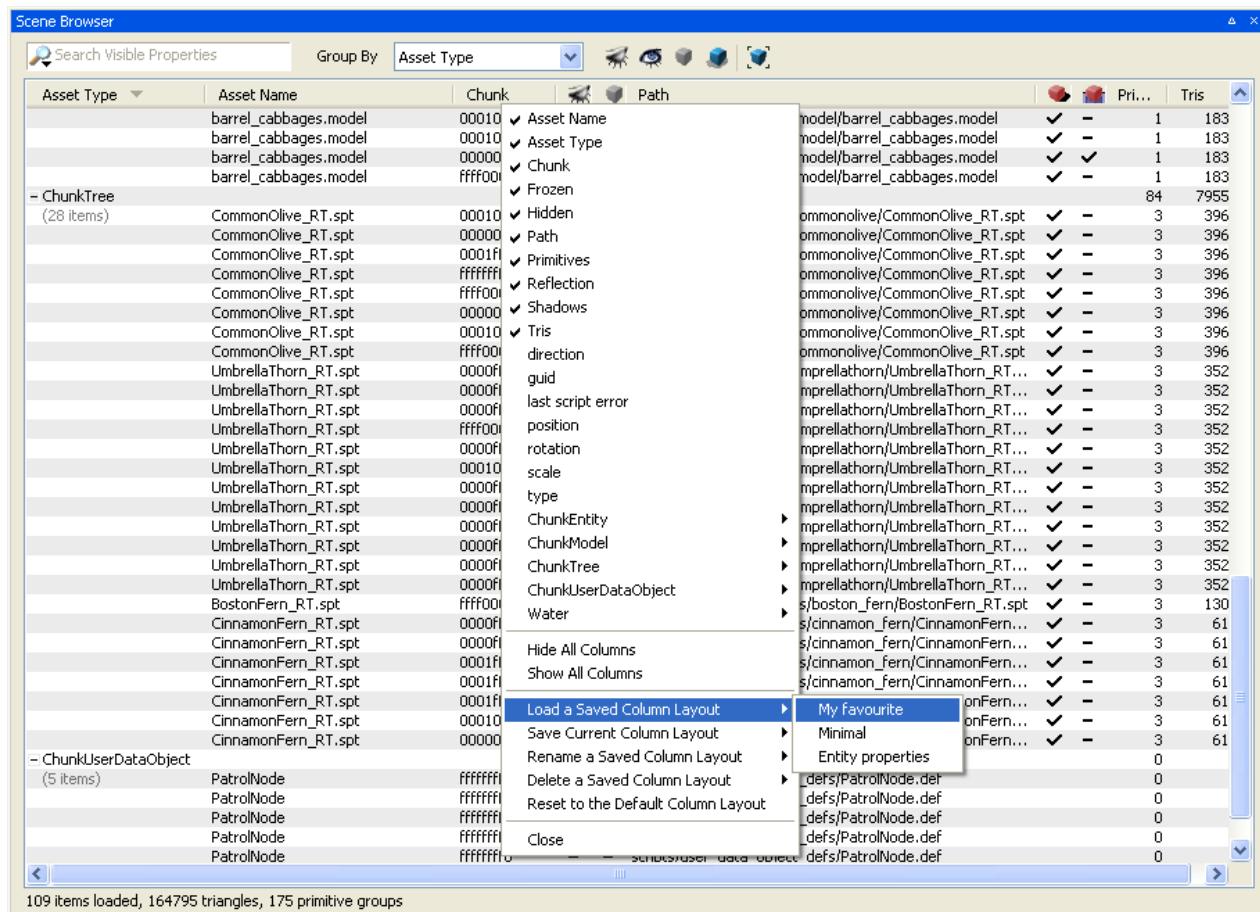
**Columns:**

| Asset Type                         | Asset Name            | Chunk  | Path                                     | Pri...                                   | Tris    |
|------------------------------------|-----------------------|--|--|--|---------|
|                                    | barrel_cabbages.model | ✓ Asset Name                                 | s/barrels/model/barrel_cabbages.model    | ✓ -                                      | 1 183   |
|                                    | barrel_cabbages.model | ✓ Asset Type                                 | s/barrels/model/barrel_cabbages.model    | ✓ -                                      | 1 183   |
|                                    | barrel_cabbages.model | ✓ Chunk                                      | s/barrels/model/barrel_cabbages.model    | ✓ ✓                                      | 1 183   |
|                                    | barrel_cabbages.model | ✓ Frozen                                     | s/barrels/model/barrel_cabbages.model    | ✓ -                                      | 1 183   |
| - ChunkTree<br>(28 items)          | CommonOlive_RT.spt    | ✓ Hidden                                     |  |  | 84 7955 |
|                                    | CommonOlive_RT.spt    | ✓ Path                                       | deaves/commonolive/CommonOlive_RT.spt    | ✓ -                                      | 3 396   |
|                                    | CommonOlive_RT.spt    | ✓ Primitives                                 | deaves/commonolive/CommonOlive_RT.spt    | ✓ -                                      | 3 396   |
|                                    | CommonOlive_RT.spt    | ✓ Reflection                                 | deaves/commonolive/CommonOlive_RT.spt    | ✓ -                                      | 3 396   |
|                                    | CommonOlive_RT.spt    | ✓ Shadows                                    | deaves/commonolive/CommonOlive_RT.spt    | ✓ -                                      | 3 396   |
|                                    | CommonOlive_RT.spt    | ✓ Tris                                       | deaves/commonolive/CommonOlive_RT.spt    | ✓ -                                      | 3 396   |
|                                    | CommonOlive_RT.spt    | direction                                    | deaves/commonolive/CommonOlive_RT.spt    | ✓ -                                      | 3 396   |
|                                    | UmbrellaThorn_RT.spt  | guid   | deaves/umprellathorn/UmbrellaThorn_RT... | ✓ -                                      | 3 352   |
|                                    | UmbrellaThorn_RT.spt  | last script error                            | deaves/umprellathorn/UmbrellaThorn_RT... | ✓ -                                      | 3 352   |
|                                    | UmbrellaThorn_RT.spt  | position                                     | deaves/umprellathorn/UmbrellaThorn_RT... | ✓ -                                      | 3 352   |
|                                    | UmbrellaThorn_RT.spt  | rotation                                     | deaves/umprellathorn/UmbrellaThorn_RT... | ✓ -                                      | 3 352   |
|                                    | UmbrellaThorn_RT.spt  | scale  | deaves/umprellathorn/UmbrellaThorn_RT... | ✓ -                                      | 3 352   |
|                                    | UmbrellaThorn_RT.spt  | type   | deaves/umprellathorn/UmbrellaThorn_RT... | ✓ -                                      | 3 352   |
|                                    | UmbrellaThorn_RT.spt  | ChunkEntity                                  | deaves/umprellathorn/UmbrellaThorn_RT... | ✓ -                                      | 3 352   |
|                                    | UmbrellaThorn_RT.spt  | ChunkModel                                   | animation                                | iThorn_RT...                             | 3 352   |
|                                    | UmbrellaThorn_RT.spt  |  | animation speed                          | iThorn_RT...                             | 3 352   |
|                                    | UmbrellaThorn_RT.spt  | ChunkTree                                    | grave_gargoyle_cracks                    | iThorn_RT...                             | 3 352   |
|                                    | CinnamonFern_RT.spt   | ChunkUserDataObject                          | model name                               | Fern_RT.spt                              | 3 130   |
|                                    | BostonFern_RT.spt     |  | outside only                             | jamonFern...                             | 3 61    |
|                                    | CinnamonFern_RT.spt   |  |  | jamonFern...                             | 3 61    |
|                                    | CinnamonFern_RT.spt   |  |  | bs_flowers/cinnamon_fern/CinnamonFern... | 3 61    |
|                                    | CinnamonFern_RT.spt   |  |  | bs_flowers/cinnamon_fern/CinnamonFern... | 3 61    |
|                                    | CinnamonFern_RT.spt   |  |  | bs_flowers/cinnamon_fern/CinnamonFern... | 3 61    |
|                                    | CinnamonFern_RT.spt   |  |  | bs_flowers/cinnamon_fern/CinnamonFern... | 3 61    |
| - ChunkUserDataObject<br>(5 items) | PatrolNode            | Hide All Columns                             |  |  | 0       |
|                                    | PatrolNode            | Show All Columns                             |  |  | 0       |
|                                    | PatrolNode            | Load a Saved Column Layout                   |  |  | 0       |
|                                    | PatrolNode            | Save Current Column Layout                   |  |  | 0       |
|                                    | PatrolNode            | Rename a Saved Column Layout                 |  |  | 0       |
|                                    |                       | Delete a Saved Column Layout                 |  |  | 0       |
|                                    |                       | Reset to the Default Column Layout           |  |  | 0       |
|                                    |                       | Close  |  |  | 0       |
|                                    |                       | scripts\user data object defs\PatrolNode.def |  |  | 0       |

109 items loaded, 164795 triangles, 175 primitive groups

## Scene Browser Panel - Column Visibility

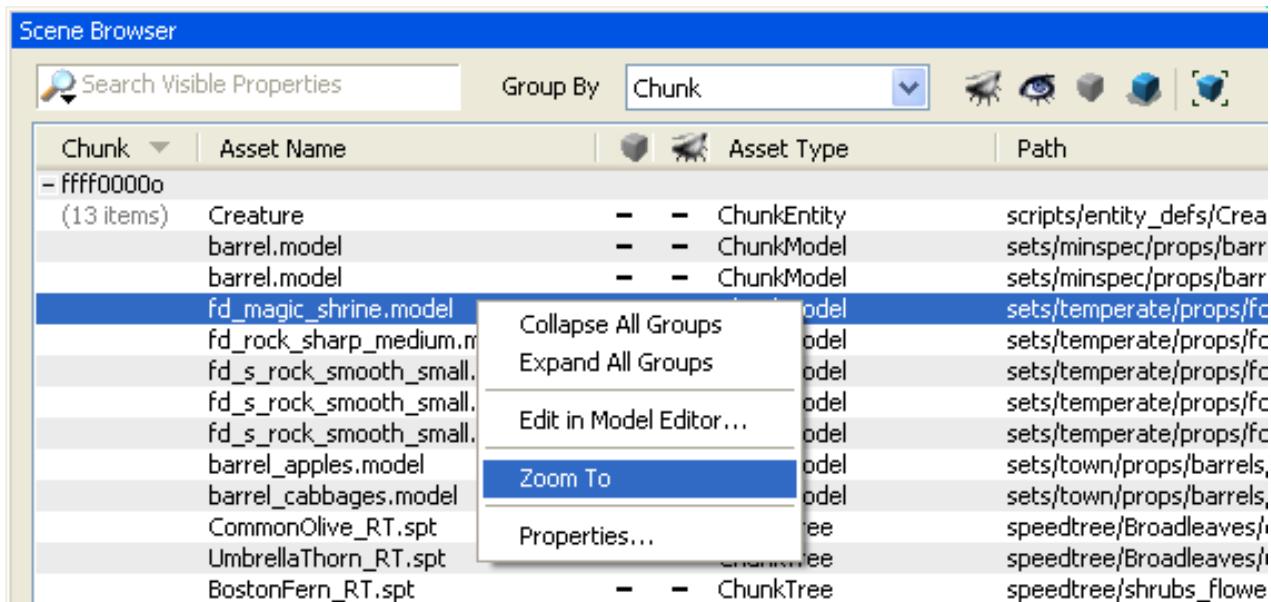
At the top of the list is a header containing the column names for the properties being shown in the list. These columns are generated from the object properties. Right-clicking on the column header displays the columns menu. This menu allows for showing only the columns that are of interest to the user. The common columns are listed first, then the asset type specific columns below it. After editing the column visibility, the user can just click outside the menu, or click the "Close" menu item at the bottom to close it.



Scene Browser Panel - Column Layouts

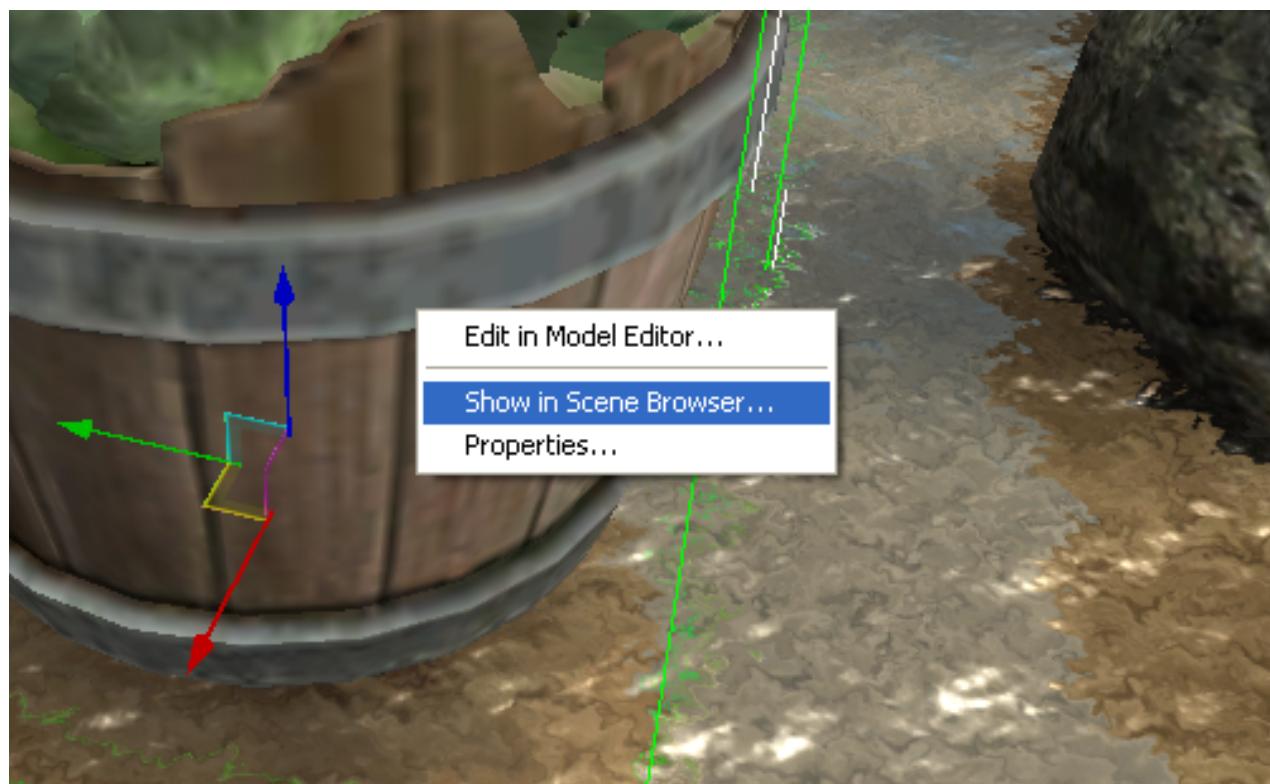
It is also possible to save and load column layouts. In the columns menu, the user can load a previously saved layout, save the current layout to a new layout file, save the current layout on top of a preexisting layout, rename or delete previously saved layouts, or simply reset the current layout to the default layout. This allows the user to have different sets of columns depending on the kind of world building he or she is doing.

### Context Menus:



Scene Browser Panel - List Context Menu

A context menu is also displayed when right-clicking on an object, displaying the same menu items as the context menu of the 3D view, but with the additional option to zoom to the item in the 3D view. Also, it displays menu items to collapse or expand all groups.



Scene Browser Panel - 3D View Context Menu

In the 3D view, an additional option has also been added to the context menu which allows finding the selected object inside the Scene Browser's list.

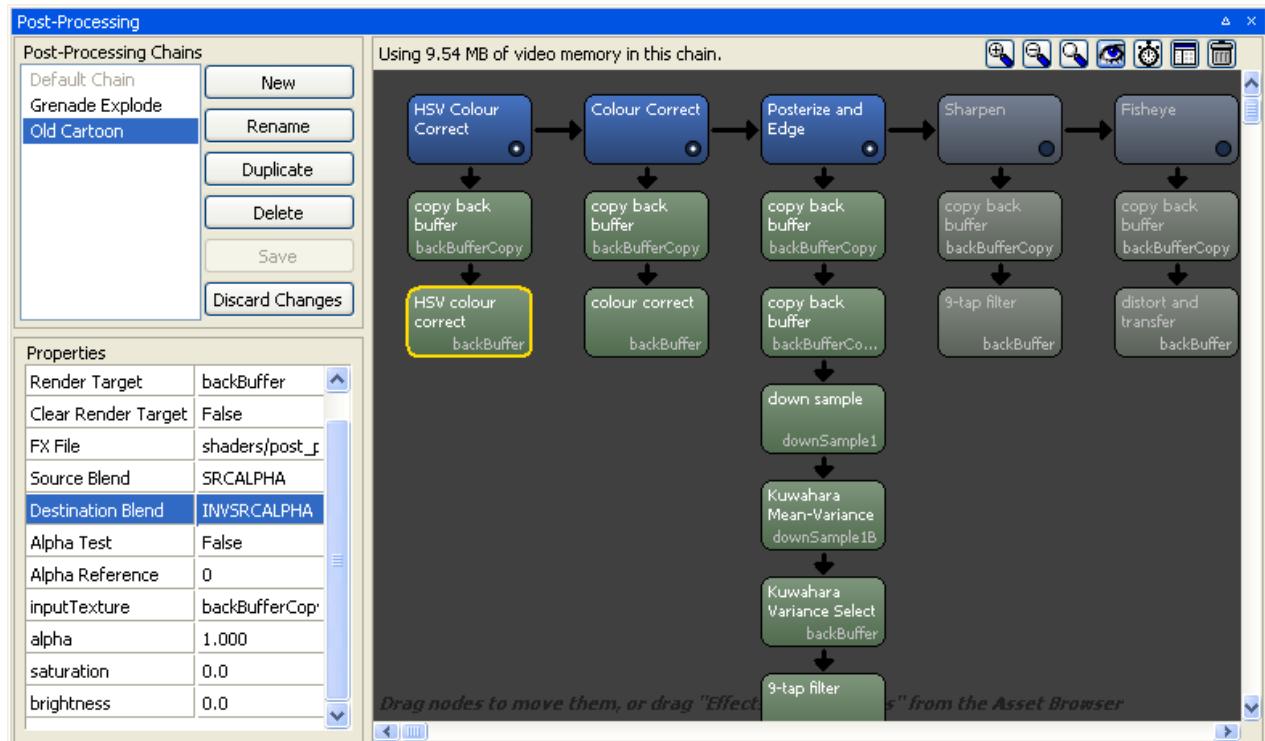
#### Additional Notes:

- The Scene Browser works on the currently loaded objects only. The number of objects loaded depends on how far the far plane is set, but it's important to keep in mind that a large value for the far plane will require too much memory, depending on the complexity of the space.
- There can be a delay from when an object is loaded, unloaded, or one of its properties is modified, and when the Scene Browser list reflects the change. This is by design, to keep the performance of the application as unaffected by the Scene Browser as possible.

## 2.10.10. Post-Processing panel

This panel allows creating, editing and previewing post-processing effects that can be later used in the game.

The panel itself is divided in three main areas, as shown in the following image:



Post-Processing Panel - The Three Main Areas

### Post-Processing Chains Area:

Contains the list of available post-processing chains and buttons for performing actions specific to post-processing chains editing.

In the chains list, there is a special item representing the system chain, called the Default Chain. When this chain is selected, it allows other subsystems to modify the post-processing chain as they would in the game. For example, changing the Post-Processing graphics setting in the Options panel will set a completely different chain depending on the setting chosen, and changing the weather in the Weather panel will make slight modifications to the system chain to better represent the weather selected.

The action buttons are, from top to bottom:

- New:** Creates a new chain.
- Rename:** Renames the currently selected chain.
- Duplicate:** Copies the currently selected chain into a new chain.
- Delete:** Deletes the selected chain

- **Save:** Saves changes made to the currently selected chain.
- **Discard Changes:** Brings the chain back to how it was before being modified.

By default, chains are saved as .ppchain files into the `bigworld\res\system\post_processing\chains` folder. If necessary, the chains folder can be changed by adding the tag `<chainsFolder>` inside a `<post_processing>` tag, containing the desired path, in WorldEditor's `options.xml` file.

### Graph view and Tool bar Area:

At the top of this area is a small tool bar that contains summary information about the current chain and three action buttons. The three zoom buttons    allow for zooming in, zooming out, and going back to the default zoom respectively. The Preview button  toggles previewing of each Phase's result in-place. The Profiling button  toggles measuring the time spent by the post-processing chain in the GPU. **Important:** Please note that WorldEditor's performance will decrease when using the Preview or Profiling modes. The Layout button  cycles through the different area arrangements available, to help improve the panel's usability depending on the panel's proportions. The Delete All button  removes all the Effects and Phases from the current chain (will ask for confirmation first).

Bellow the tool bar is the chain graph view, which shows the different stages in the current post-processing chain in a graphic way. Each stage is called an Effect (blue nodes), and each Effect can contain stages, each called a Phase (green nodes). The post-processing engine will execute each Phase from each Effect, going from top to bottom and from left to right.

These are the ways you can interact with the graph view:

- Selected an Effect or Phase: Click on an Effect or Phase to select it, showing its properties in the Properties area.
- Pan: If you press the left mouse button on the background of the view and hold it down, you can move the mouse to pan the nodes in the view. You can also press space before pressing the mouse down on top of a node to pan, which is useful when the view is too small and doesn't have background areas in view.
- Zoom In/Out: Use the mouse wheel to zoom in or out into the view, making the nodes bigger. This is particularly useful when in Preview mode .
- Delete an Effect or Phase: When the mouse cursor is positioned on top of an Effect or Phase, a red close button appears in the top right corner of the node. Click it to delete the Effect or Phase.
- Enable or Disable an Effect: You can click the button on the bottom right corner of the Effect node  to enable or disable that Effect in the chain. Having an Effect disabled might make sense, for example, if that effect will be turned on by script in the game (a grenade explosion, a particular bloom effect, etc).
- Rearrange Effects: Drag and drop can be used to change the order of Effects in the chain.
- Rearrange Phases: Drag and drop can also be used to change the position of a Phase in an Effect, or to move the Phase into another Effect.
- Add an Effect or Phase: It's possible to add a new Effect or a new Phase to an Effect by dragging the desired Effect or Phase from the Asset Browser's *Post-Processing Effects* or *Post-Processing Phases* folders respectively.
- Clone an Effect or Phase: Drag and drop while holding the CTRL key.

- Assign a Render Target, a Texture or an FX file to a Phase: Simply drag a render target, a texture or an fx file from the Asset Browser over a Phase. Before you release the mouse button, a pop-up menu appears displaying the Phase's properties that can receive the dragged asset.
- Assign a Phase's output Render Target to another Phase: Simply drag the handle next to the Phase's output render target name on top of the desired destination Phase, and before you release the mouse button, a pop-up menu appears displaying the Phase's properties that can receive the render target.

### Properties Area:

Allows editing the properties of the currently selected Effect or Phase in the graph view. Effects and Phases properties are discussed below:

- **Effect properties:**

All Effects have only two properties, Effect Name and Bypass. The Effect Name is used only as a label in the editor, and won't necessarily affect its usage in the game. The Bypass property is a vector of four floats that determines if the Effect is enabled and if it should be applied during rendering or not. At the moment,

this value is tied with the Bypass button on the bottom right corner of the node , and only the alpha value is used (0 for disabled or non 0 for enabled).

- **Phase properties:**

There are several different types of Phases, and each type has its own set of properties that can be defined in either Python or C++, but a few deserve special attention:

- *Render Target*: Contains the name of the output render target for the Phase. This render target can be filled in by copy & paste from another Phase's Render Target field, or can be dragged from the Asset Browser's *Post-Processing Render Targets* folder. Render Targets are defined in script by the game programmers beforehand. A special render target identified as "backBuffer" represents the screen's back buffer.
- *Clear Render Target*: If set to true, the output render target is cleared before applying the Phase's result. If set to false, the results are accumulated.
- *FX File*: Some Phases have an associated DirectX .fx file which contains the shader code to perform the desired processing. The user can type it in, browse for it using a standard file open dialog, or can drag it from the Asset Browser's *Post-Processing FX Files* folder.
- *Source Blend* and *Destination Blend*: Allows choosing the desired blending modes for the Phase.
- *inputTexture*: Some phases contain one or more fields for textures and/or render targets to be used as inputs by the Phase's shader. In most cases, the user will want to use the previous Phase's *Render Target* output as the input texture for the Phase, but in general this field can be set to any *Render Target* or texture. For example, a clever post-processing chain will have a down sampling Effect which outputs to an internal render target, and this render target can then be used one or more times as input in Phases of other Effects (such as the Bloom in the default chain).
- *alpha, additionalAlpha*: These field control how much of the Phase's processing is actually blended into the output render target. In some cases an Effect won't have any visible impact on the screen, even when the Bypass button is on, because the alpha value is 0.

Care has been taken into giving all properties sensible names and informative tool-tips, so they are self explanatory. It's also recommended that you study the system's default chain to understand better how specific Phase properties are set.

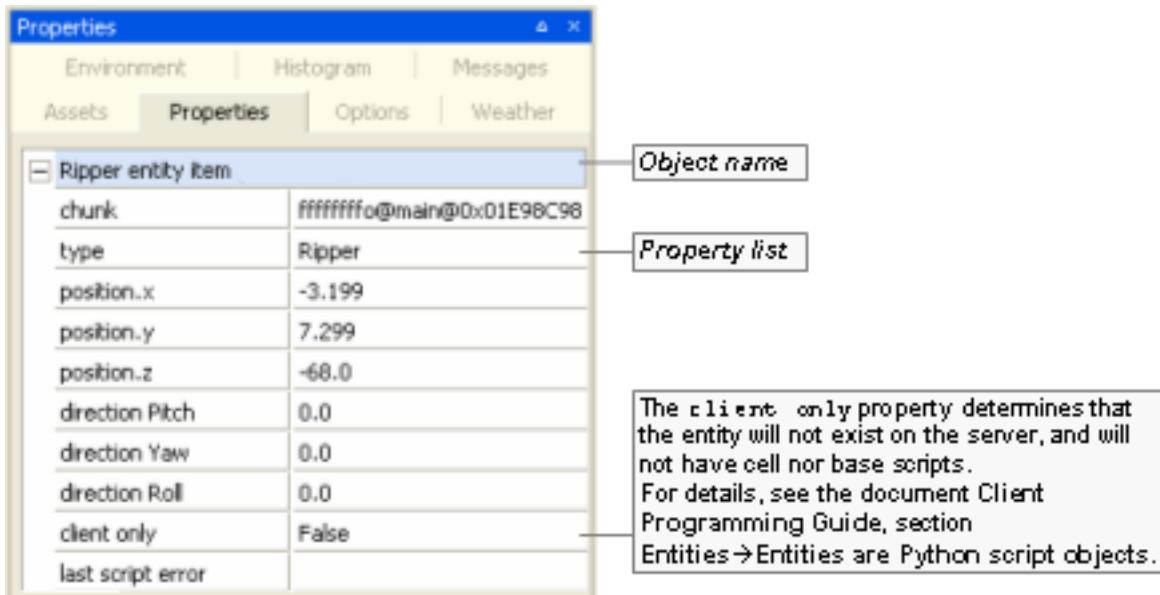
If custom Phases or Render Targets are needed in addition to the included ones, your client engine programmer will have to add them by editing the post-processing scripts. Once the artist has created a set

of chains to be used in the game, the game programmer can load these chains when needed from the game engine. For more information, see the Client Programming Guide.

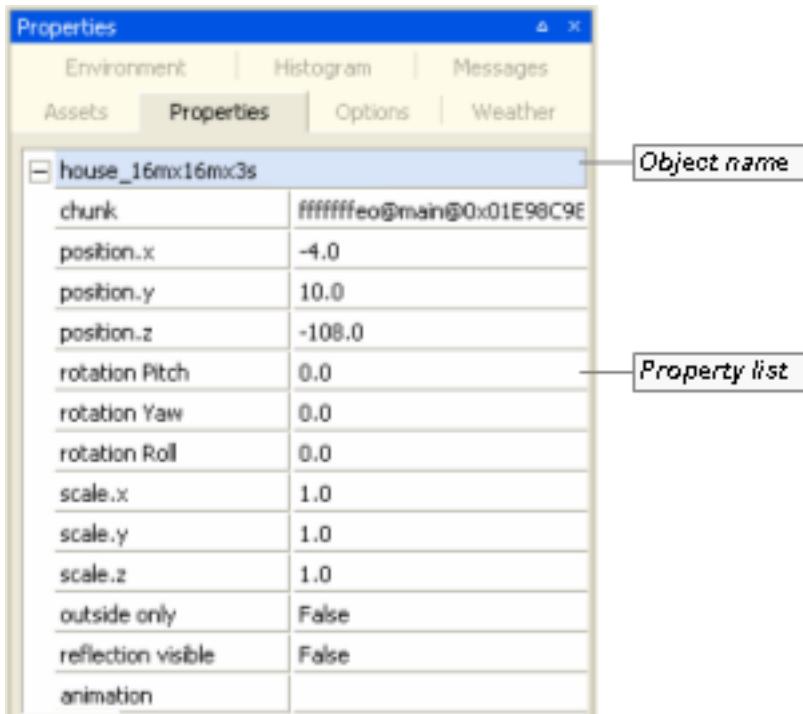
### 2.10.11. Properties panel

This panel allows you to edit the properties for the currently selected item or group of items (except for chunk properties). Note that this action will flag the current chunk as dirty.

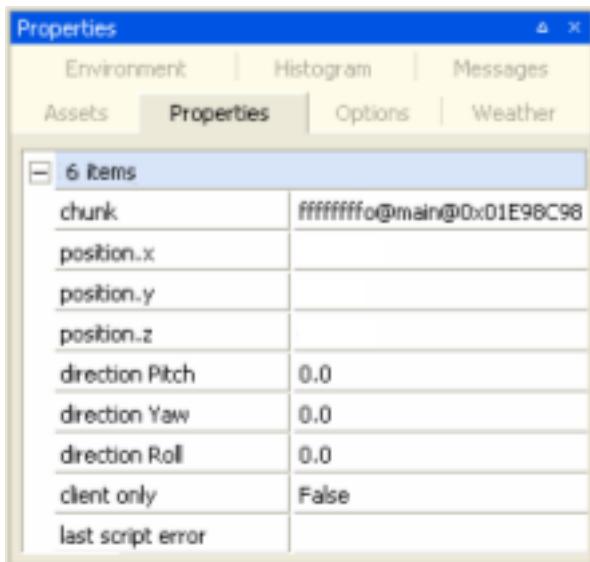
The list of displayed properties depends on the item selected — for details, see Client Programming Guide's section *3D Engine (Moo)* → "EffectMaterial" → "Artist-editable/tweakable variables".



Example of an entity's properties



Example of a model's properties



Common properties when multiple objects are selected

The list below describes some of the fields that appear on this panel:

- **Object name**

Name of the selected object.

- **Property list**

- **Animation**

List of animations specified for the model in the .model file (for details on this file's grammar, see the document File Grammar Guide's section *.model*).

Value is set to the animation currently being played.

- **Animation speed**

Speed of the animation being currently played.

- **Chunk**

Chunk where the item is located.

- **Client only**

Determines that the entity will not exist on the server, and will not have cell nor base scripts.

For details, see the document Client Programming Guide's section *Entities* → “Entity scripts”.

- **Colour**

RGB colour of the selected item, in hexadecimal format.

- **Cone angle**

Sets the angle of the cone of light generated by spot light.

The angle at which the light is placed in relation the ground or model affects its intensity.

*Available only for spot lights.*

- **Dynamic**

Specifies that light should be applied to dynamic, *i.e.*, moving objects.

*Available only for directional lights, omni lights, and spot lights.*

- **Direction pitch, Direction yaw, Direction roll**

Pitch, yaw, and roll of direction of the light.

*Available only for directional lights and spot lights.*

- **Inner radius**

Sets the area over which the light will be at full intensity.

*Available only for omni lights and spot lights.*

- **Model name**

Model file (for details on this file's grammar, see the document File Grammar Guide's section `.model`).

- **Multiplier**

Sets the multiplier for the RGB value of the colour.

The RGB values will be multiplied by the value set for this field, effectively making the item brighter.

*Available only for lights.*

- **Outer radius**

Sets the total area influenced by light.

The area starting at Inner Radius will have light at full intensity, which will be faded away until it is completely off when it reaches Outer Radius.

*Available only for omni lights and spot lights.*

- **Outside only**

Specifies whether the object can only be placed on outside chunks.

If an object placed in an inside chunk has this property set to true, then WorldEditor will move it to a suitable outside chunk.

This property is used in cases when a model is to be rendered from outdoors, and acts as a facade for an indoor shell. This prevents the model from being recognised as belonging to the indoor shell, and hence being lit as such.

The exterior of a house that surrounds an indoor shell is a good example of when this property would be used.

- **Position.x, Position.y, Position.z**

Position of the item along the respective axis.

- **Rotation pitch, Rotation yaw, Rotation roll**

Pitch, yaw, and roll of the item in its currently placement in the world.

- **Scale.x, Scale.y, Scale.z**

Scale in which to draw the item along the respective axis.

- **Specular**

Specifies that light should be applied to materials with a specular map specified.

*Available only for directional lights, omni lights, and spot lights.*

- **Static**

Specifies that light should be applied to static, i.e., scene objects.

*Available only for directional lights, omni lights, and spot lights.*

- **Colour adjust**

It contains the following fields:

- **Red,Green,Blue**

Sets the red, green, and blue components of the colour, respectively.

- **Multiplier**

Value to multiply colour's RGB value by.

This affects the overall luminosity of a light without affecting its hue.

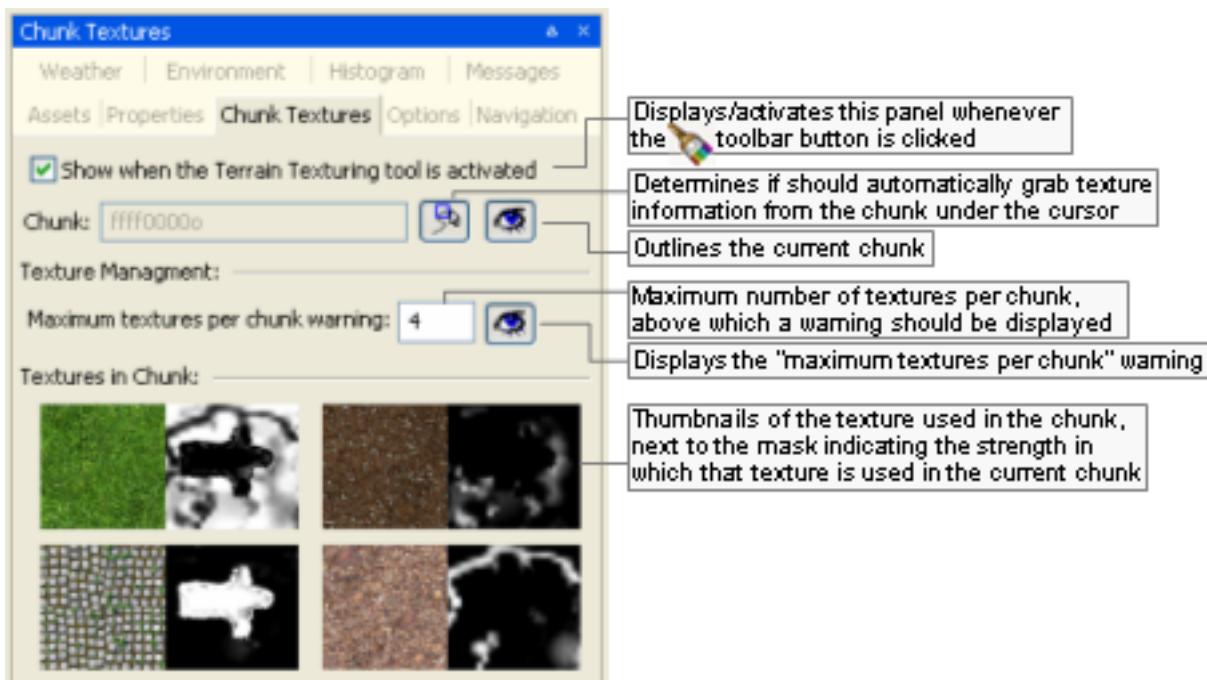
*Available only for omni lights and spot lights.*

## 2.10.12. Chunk Textures panel

---

This panel allows you to check which textures are being used on a chunk, thus allowing you to better manage the existing texture layers painted onto it.

For more details on managing chunks' terrain textures, see the document Content Creation Manual's lesson [Create and Apply Terrain Texture Maps](#).



Chunk Textures panel

The list below describes the fields on this panel:

- **Show when the Terrain Texturing tool is activated**

Determines whether this panel should be activated/displayed whenever the Terrain Texture Tool — — toolbar button is clicked.

- **Chunk**

ID of the chunk which texture information is being displayed.



Determines if WorldEditor should automatically display texture information from the chunk under the cursor.



Determines if WorldEditor should outline the chunk under the cursor.

- **Texture management**

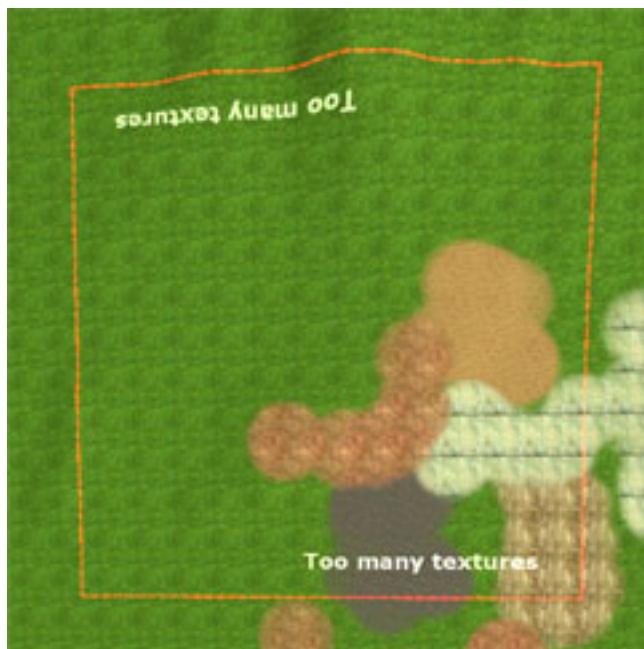
- **Maximum textures per chunk warning**

Number of textures per chunk above which a warning message should be displayed in the offending chunks.

The warning will be displayed in the chunk as illustrated in the image below.



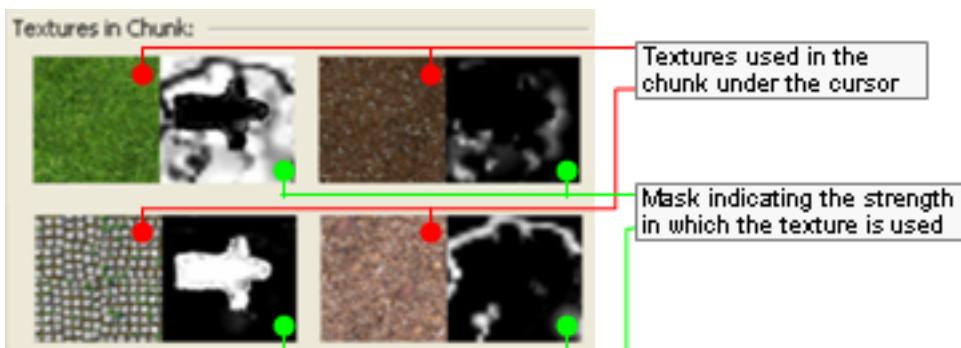
Determines whether WorldEditor should display the "maximum texture per chunk" warning.



Example of a chunk displaying the "maximum textures per chunk" warning

- **Texture thumbnail/mask**

thumbnails of the texture used in the chunk under the cursor, next to the mask indicating the strength in which it is used.



Texture thumbnail/mask information

The following keys can be used with this panel:

- **Left button click**

Adds the texture under the mouse cursor to the selection.

- **Left button click + CTRL key**

Toggles the texture under the mouse cursor into or out of the selection.

- **Space key**

Merges the selected textures into the last texture selected. The last texture selected has a slightly thicker red rectangle around it.

- **Delete key**

Deletes the selected textures. They are replaced by the texture that was not selected and contributes the most to the chunk.

- **Right button click**

Displays the **Chunk Textures** panel's context menu as below.



The Chunk Textures panel's context menu

The menu items are as follows:

- **Use Texture**

Select the texture as the **Active Texture** on the **Terrain Texturing** panel.

- **Edit Projection and Scale**

Activates the *edit projection* mode of the **Terrain Texturing** panel with the selected texture being the edited texture layer. See “.Terrain Texturing mouse controls” on page 82

- **Set as Texture Mask**

Selects the texture as the texture mask on the **Terrain Texturing** panel.

- **Remove Texture(s)**

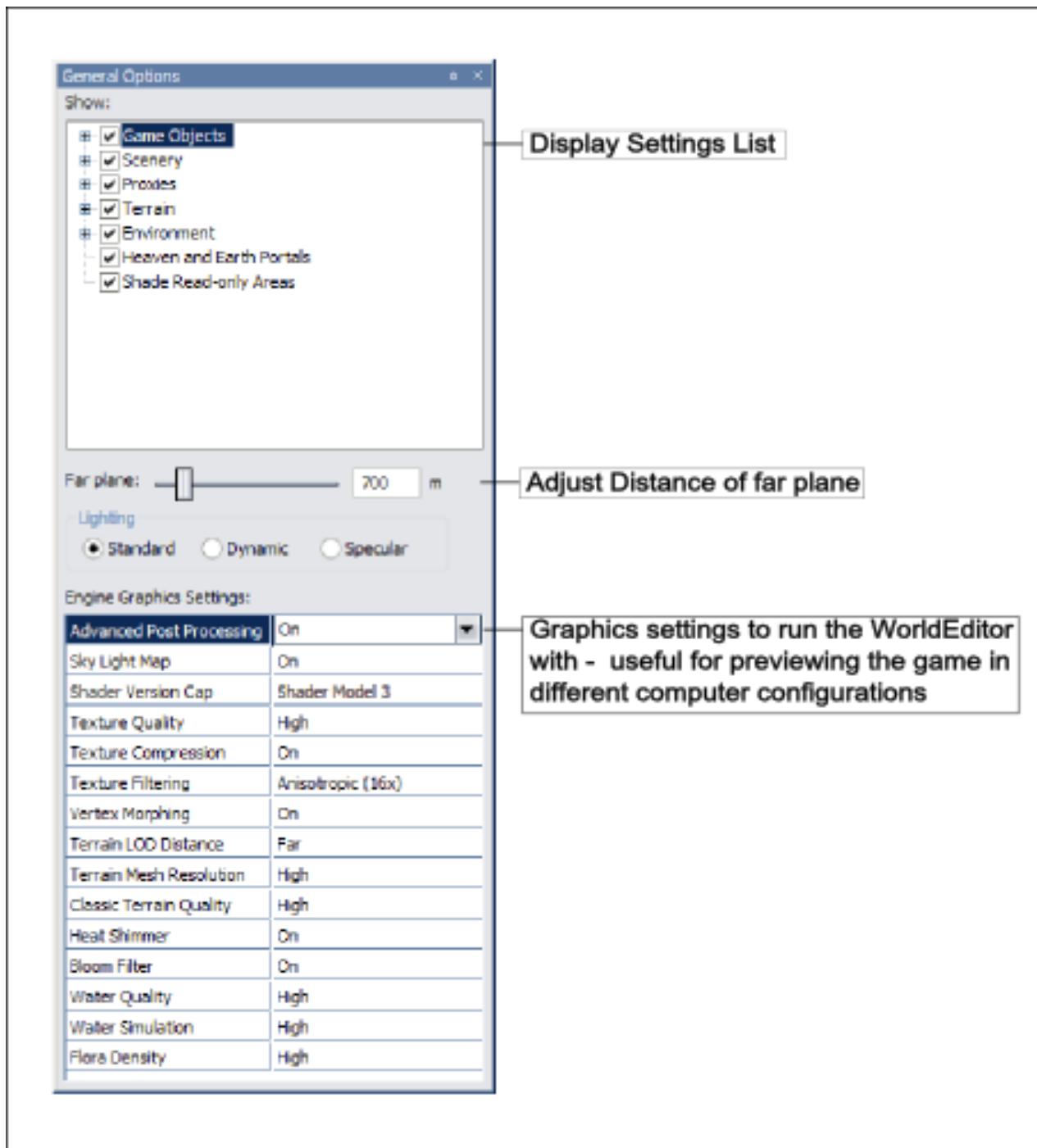
Deletes the selected textures. They are replaced by the texture that was not selected and contributes the most to the chunk. This is the same as pressing the **Delete** key.

- **Merge Textures**

Merges the selected textures into the last texture selected. The last texture selected has a slightly thicker red rectangle around it. This is the same as pressing the **Space** key.

### **2.10.13. General Options panel**

This panel allows you to specify the scene elements that should be rendered in WorldEditor, and general settings such as far plane and the kind of lighting to render.



General Options panel

The list below describes the fields on this panel:

▪ **Show**

Group of settings configuring the visibility of items in the world.

▪ **Game Objects**

Toggles the rendering of Game Objects.

▪ **Entities**

Display Settings List

Adjust Distance of far plane

Graphics settings to run the WorldEditor with - useful for previewing the game in different computer configurations

Toggles the rendering of Entities.

- **User Data Objects**

Toggles the rendering of User Data Objects and the old patrol path graphs.

- **Scenery**

Toggles the rendering of scenery items in the world.

- **Wireframe**

Toggles the rendering of scenery items as wireframe.

- **Particles**

Toggles the rendering of particle systems.

- **BSP**

Toggles the rendering of objects' BSPs.

- **Particle system bounding boxes**

Toggles the rendering of particle systems' bounding boxes.

- **Water**

Toggles the rendering of water items (for details on water properties, see the document Content Creation Manual's lesson **Add Water to the World**).

- **Reflection, Simulation**

Toggles the respective feature for all bodies of water in the world.

For an item to be reflected in a body of water and suffer refraction, its property reflection visible must be set to true in the **Properties** panel (for details, see "Properties panel" on page 105 ).

- **Shells**

Toggles the rendering of shells in the world.

- **Game visibility**

Toggles the use of the portal visibility algorithm by the shell.

When selected, shells will draw the portal system exactly as when running the game. When cleared, shells in the viewing frustum will draw without using the portal visibility algorithm.

It is recommended to clear this option when building shell systems and placing lighting and objects in them. If you require rendering performance improvements whilst building the world, then select this option when you are not working on shells. It will help WorldEditor to render the world more quickly.

- **Proxies**

Toggles the rendering of proxy models which are a physical representation of lights and particle systems.

- **Editor proxies**

Toggles the display of proxy models defined for models in ModelEditor.<sup>A</sup>

- **Particles**

Toggles the display of all particle systems proxy model. It also expands to give you the option of large or small proxy model rendering.

- **Lights**

Toggles the rendering of lights of the respective type. Each light type also expands to give you the option of large or small proxy model rendering.

- **Terrain**

Toggles the rendering of the terrain.

- **Wireframe**

Toggles the rendering of scenery items as wireframe.

- **Dynamic Level of Detail**

Toggles the rendering of terrain with constant LOD or dynamic LOD.

- **Environment**

Toggles the rendering of all selected environment items.

- **Sky**

Toggles the rendering of sky gradient dome and stars, according to settings specified in the **Environment Options** panel.<sup>A</sup>

- **Sky Boxes**

Toggles the rendering of both the space skyboxes and the weather skyboxes, according to settings specified in the **Environment Options** panel.<sup>A</sup>

- **Sun and moon**

Toggles the drawing of the sun and the moon, according to settings specified in the **Environment Options** panel's **Sun/Moon Inclination** group box.<sup>A</sup>

- **Fog**

Toggles the drawing of fog, according to settings specified in the **Environment Options** panel's **Sky Box Gradient** field.<sup>A</sup>

For details, see the document Content Creation Manual's lesson **Fog Colour**.

- **Heaven and earth portals**

Toggles the visibility of the heaven and earth portals used by chunks.

This is especially useful when building terrain, since you will be able to see the maximum and minimum heights allowed by outdoor chunks. Generally, you should not raise or lower the terrain beyond the heaven and earth portals.

- **Shade read-only areas**

Toggles the shading in red of read-only areas.

When multiple users are working on the same space, WorldEditor is connected to the Lock Server (`bwlockd`). Only the editable and selectable objects will be displayed in their natural colours. For more details, see *Lock Server (BWLckD)* on page 333 .

- **Far plane**

Adjusts the far plane. While the value defaults to 500 metres, it is often useful to adjust the far plane to something much farther away while editing the world in WorldEditor, so you can see more of it at any one time.

- **Lighting**

Lists the option of rendering of lighting in the world.

- **Standard**

Lighting should be rendered as it will appear during the game.

- **Dynamic**

Dynamic lighting should be rendered.

- **Specular**

Specular lighting should be rendered.

- **Engine graphics settings**

Graphics settings to run WorldEditor with.

These fields are useful for previewing the game in a variety of configurations that the users might run it with.

For details on graphics settings, see the document Client Programming Guide's section *3D Engine (Moo)→“Graphics settings”*.

- **Mrt Depth**

Option to enable/disable advanced post processing used for effects such as water deepening and automatic foaming.

- **Sky Light Map**

Option to enable/disable cloud shadows.

For details on cloud shadows, see the document Client Programming Guide's section *Terrain→Cloud shadows*.

- **Terrain Specular**

Option to enable/disabled terrain specular lighting.<sup>B</sup>

- **Shader Version Cap**

Option to set the shader version (Shader Model 3/Shader Model 2/Shader Model 1/Shader Model 0) available to the engine.

- **Texture Quality**

Option to set the quality (High/Medium/Low) of textures rendered by the engine.<sup>C</sup>

- **Texture Compression**

Option to enable/disable texture compression.<sup>C</sup>

- **Texture Filtering**

Option to set the texture filtering (Anisotropic 16x/Anisotropic 8x/Anisotropic 4x/Anisotropic 2x/Trilinear/Bilinear/Point).<sup>C</sup>

- **Morph Vertices**

Option to enable/disable vertex morphing in the engine.

For details on vertex morphing, see the document Client Programming Guide's section *3D Engine (Moo)*→“Features”→**Vertex morphing**.

- **Terrain LOD**

Option to set the geo-morphing factor (Far/Medium/Near) of the terrain.<sup>B</sup>

- **Terrain Mesh Resolution**

Option to set the mesh resolution (High/Medium/Low) of the terrain.<sup>B</sup>

- **Post Processing**

Option to choose the quality level of post-processing effects.

This option mirrors the client graphics setting, allowing for High,Medium,Low and None. If the 'Default Chain' is selected in the PostProcessing panel, then selecting High,Medium and Low will load the `high_graphics_setting.ppchain`, `medium_graphics_setting.ppchain` and `low_graphics_setting.ppchain` files respectively. If you modify and save these .ppchain files, you will see the results in both WorldEditor and the client.

For details on post-processing, see the document Client Programming Guide's section *Post Processing*, and the document Content Creation Manual's lesson **Post Processing**.

- **Water Quality**

Option to set the quality (High/Medium/Low/Lowest) of the water rendered by the engine.<sup>D</sup>

- **Water Simulation**

Option to set the quality (High/Low/Off) of the water's simulation.<sup>D</sup>

- **Flora Density**

Option to set the density (Very High/High/Medium/Low/Off) of flora objects rendered in the game world.

**A** – For details on defining a proxy for a model, see “Object Properties panel” on page 162 .

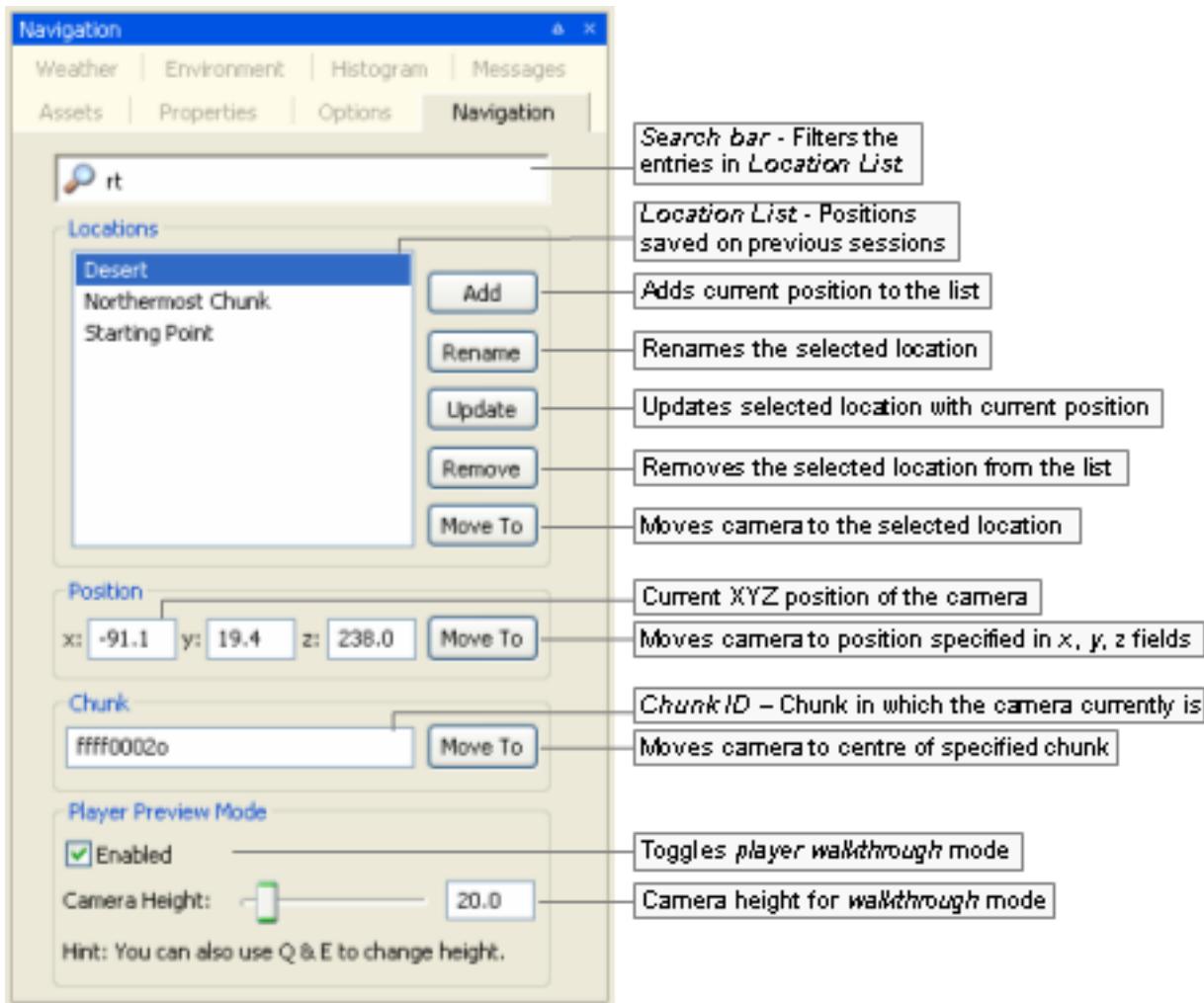
**B** – For details on terrain, see the document Client Programming Guide's section *Terrain*.

**C** — For details on textures, see the document Client Programming Guide's section 3D Engine (Moo)→“Graphics settings”.

**D** — For details on water settings, see the document Client Programming Guide's section Water→“Render settings”→“Setting the quality”.

## 2.10.14. Navigation panel

This panel allows quick navigation to locations in the world, pre-saved or not, and configures player walkthrough mode.



Navigation panel

The list below describes the fields on this panel:

- **Locations**

- **Search bar**

Restricts the locations displayed in the list to the ones containing the typed string. The list is refreshed automatically as the string is typed.

- **Location list**

List of positions saved on previous sessions.

- **Add**

Adds the current camera position to the list.

- **Rename**

Renames the selected location.

- **Update**

Updates the selected location with the current camera position.

- **Remove**

Removes the selected location from the list.

- **Move to**

Moves camera to the selected location.

- **Position**

- **x,y,z**

Current XYZ position of the camera, dynamically updated by WorldEditor.

- **Move to**

Moves camera to the XYZ position specified by the user.

- **Chunk**

- **Chunk ID**

Chunk in which the camera currently is, dynamically updated by WorldEditor.

- **Move to**

Moves camera to the centre of specified chunk.

- **Player preview mode**

- **Enabled**

Toggles the player walkthrough mode, in which the camera moves in the world as if attached to the player. This mode can be toggled via ~ (tilde) keyboard shortcut.

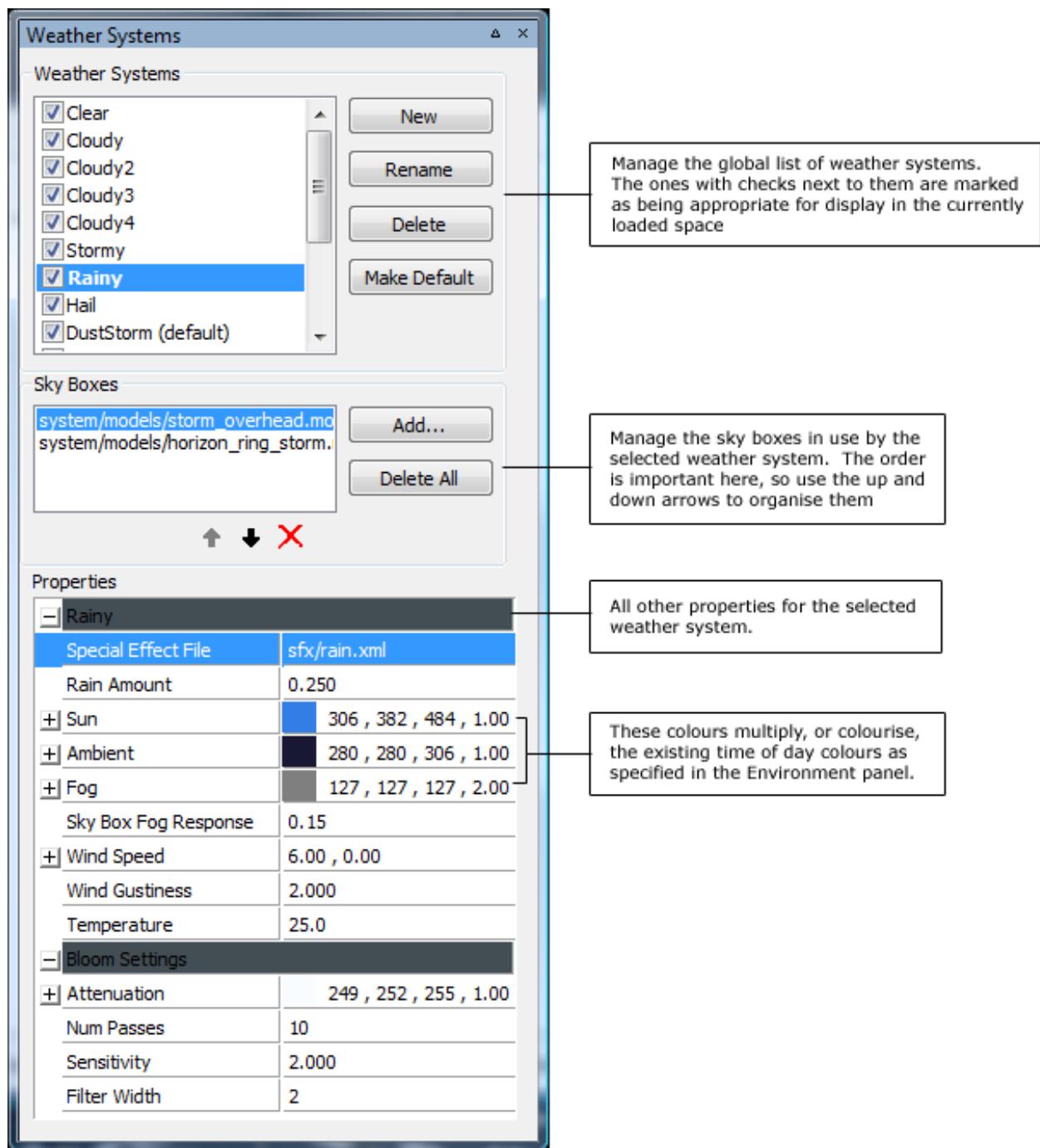
- **Camera height**

Height of the camera during player walkthrough mode.

## 2.10.15. Weather Preview panel

---

This panel allows you to create and edit weather systems, and specify which kind of weather should display in which space.



Weather Preview panel

The list below describes the fields on this panel:

- **Weather Systems list**

List of all available weather systems for your game. Systems are included / excluded from the current space by using the checkboxes next to the system name.

- **New**

Create a new weather system.

- **Rename**

Rename the currently selected system. You can achieve this also by pressing F2 or double-clicking on the system name.

- **Delete**

Delete the currently selected system.

- **Make Default**

Set the current selected weather system as the default weather system for this space.

- **Sky Boxes list**

List of the sky boxes used by the weather system. These can be any .model files, although the .model files should use one of the environment shaders in order to display correctly at the far plane.

- **Add...**

Add a new sky box to the selected weather system. Pressing this button invokes a dialog box allowing you to select a .model file. An easier way to add sky boxes to your weather system is to simply drag and drop them from the Asset Browser.

- **Delete All**

Delete all sky boxes from the list.

- **Properties**

Property editor for all other weather system properties.

- **Special Effect File**

This field accepts any Special Effect XML file. However, the effect file needs to be authored specifically for weather systems - adding an explosion effect here wouldn't make much sense. You can drag and drop files from the Special Effects virtual folder in the Asset Browser.

- **Rain Amount**

How much of the built-in rain effect to play. The built-in rain effect layers 4 sheets of rain texture over the camera, and has a built-in fog emitter.

- **Sun**

How to colourise the time-of-day sunlight (see the Environment page). Setting this value to white will mean the weather system has no effect on the normal sunlight colours. The multiplier field allows you to set a sunlight colour, and then adjust its brightness independently. Note that this allows you to overbrighten the sunlight colour, although on some low-end cards this will not work as desired.

- **Ambient**

Similar to the sun colour above, but affects the Ambient light.

- **Fog**

Colourises the time-of-day fog colour. The 4th field represents the fog density. This is interpreted as 'additional fogging.' The standard fogging value (1.0) reaches the far plane to hide clipping, and tries to not interfere with the rest of the scene too much. Dialing up the density of the fog brings the fog closer to the camera.

- **Sky Box Fog Response**

Specifies how much the skyboxes should respond to any extra fog dialed in via the fog density slider. For any fog value greater than the default of 1.0, a certain amount of that is applied to the sky boxes - this is the sky box fog response value.

- **Wind Speed**

Set the base wind speed for the weather. The wind affects the cloud layers, the flora, the trees, and the particle systems. This X/Z wind speed is in world coordinates, in metres per second.

- **Wind Gustiness**

Set the gustiness of the wind, or, how much the wind varies around the base wind speed value.

- **Temperature**

Sets the base temperature level for the weather system. Currently this value is not used by the default weather system engine.

- **Bloom Settings**

This group sets up the blooming filter to further enhance the mood set by the selected weather system.

- **Attenuation**

This is a colour multiplier that tints the colour of each stage of the bloom/blur filter, thus affecting the final colour of the bloom effect. Since it is applied per-pass to the filter, it is closely linked to the number of passes. With a higher number of passes, the blooming is very sensitive to the colour attenuation values, and so the colour attenuation will need to be fairly close to pure white.

- **Num Passes**

Sets the number of blur passes performed by the bloom filter. While increasing this number does cost in terms of fill-rate, the cost is relatively small because the bloom filter uses quarter-size render targets to perform the blurring passes.

- **Sensitivity**

This value specifies how sensitive the bloom filter is to bright colours on the screen. Setting this to a very low value makes causes the filter to respond to all intensities of colour in the frame buffer, creating more of a blur effect than a blooming one. Higher values cause the filter to react to just the brighter regions of the frame buffer, creating more of a traditional bloom effect. In the underlying bloom filter, the sensitivity is the mathematical exponent used to high-pass filter the back buffer to select the colours used in the blurring passes.

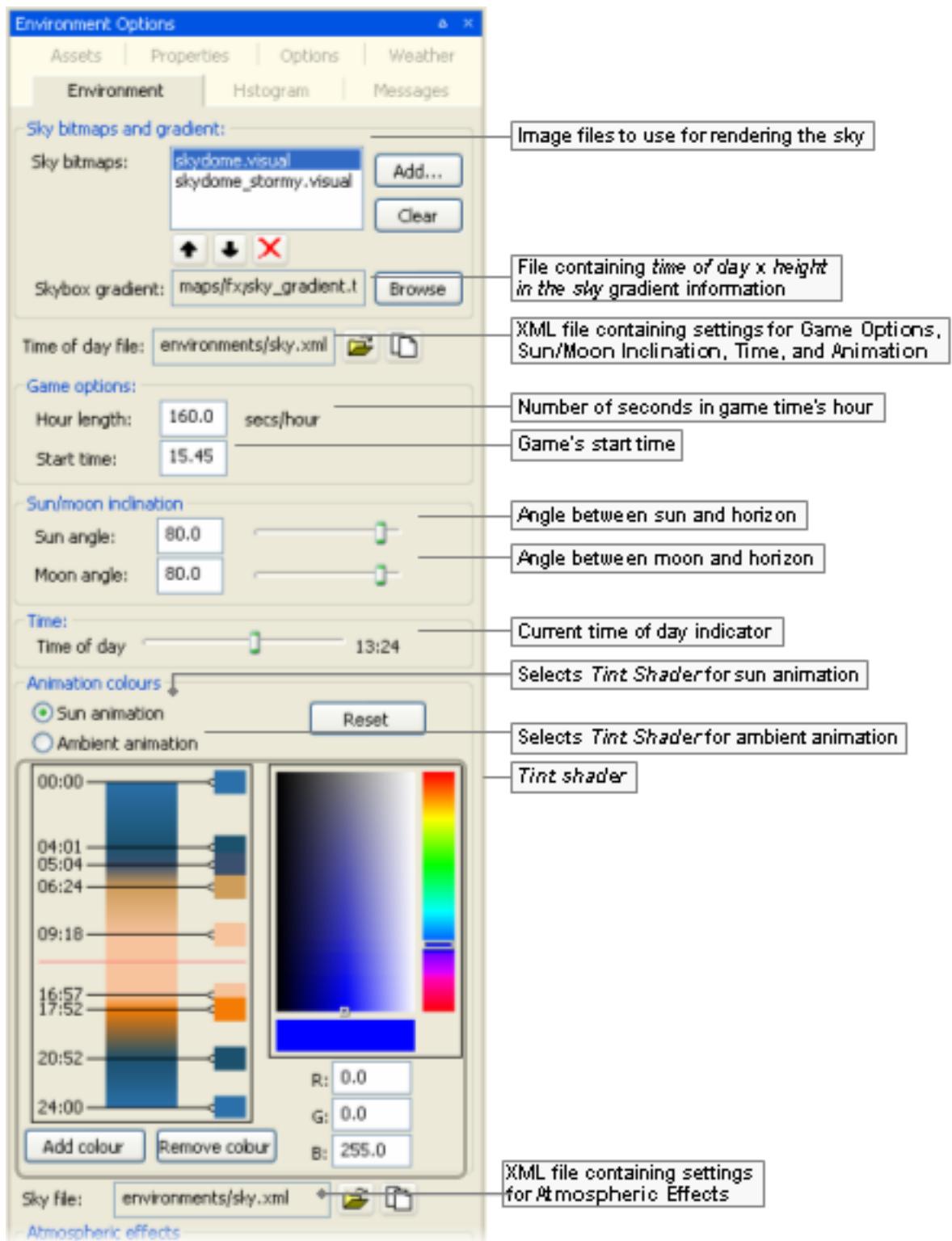
- **Filter Width**

Sets the width, in texels, of the bloom filter kernel. The default value is 1, which provides the best quality effect, but will require a higher number of passes to achieve a large bloom spread. Higher values increase the width of the bloom spread, but if the filter width is too high, you will see fragmentation in the bloom filter as it skips pixels during the blur phase. This fragmentation caused by a higher filter width can be fixed by increasing the number of blurring passes, since it is cumulative effect.

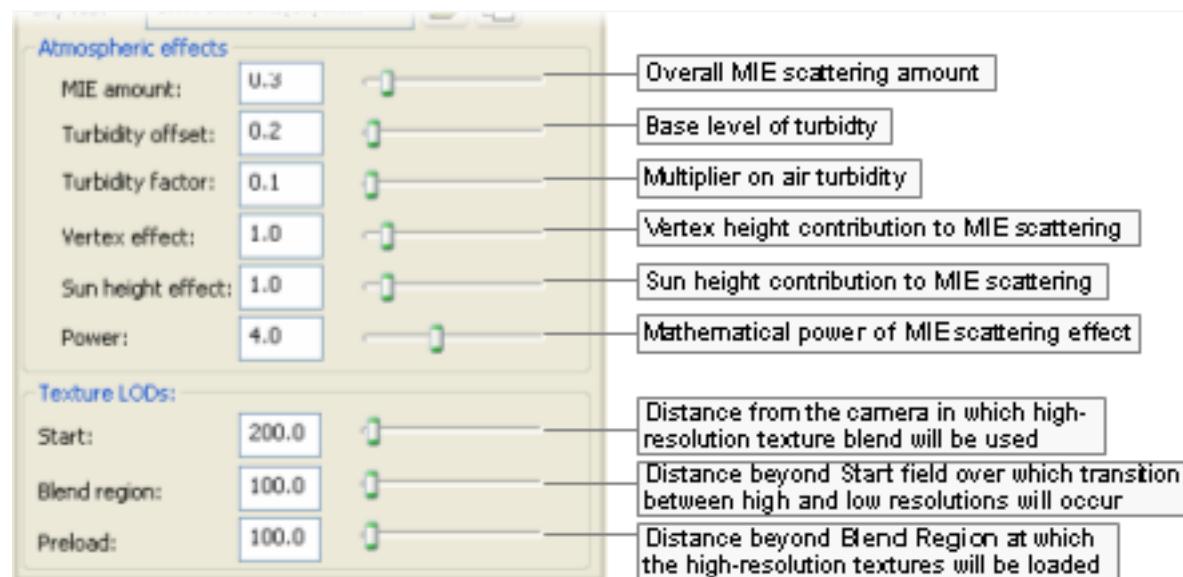
## **2.10.16. Environment Options panel**

---

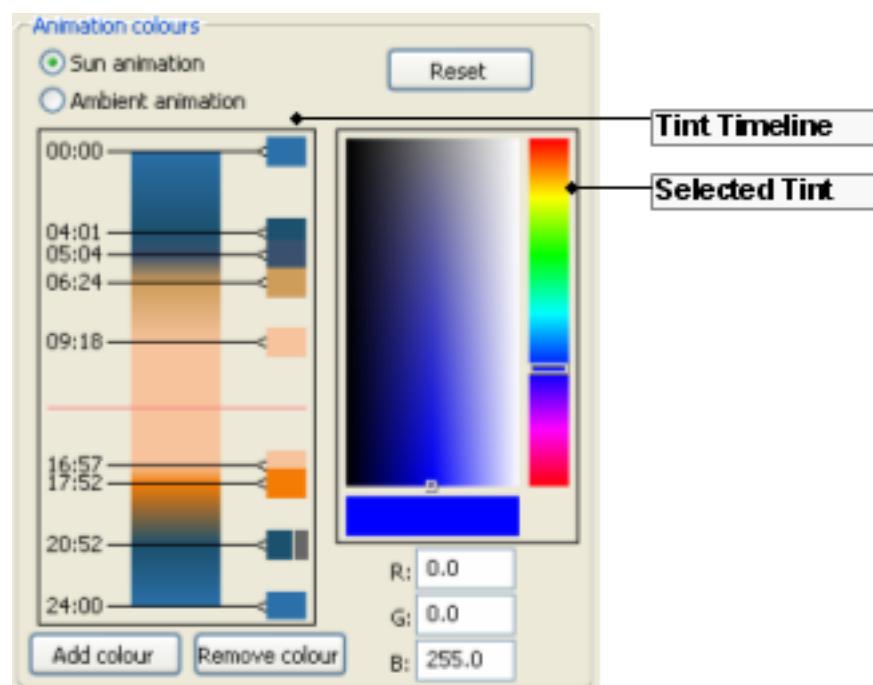
This panel allows you to specify environment settings to change world's overall rendering.



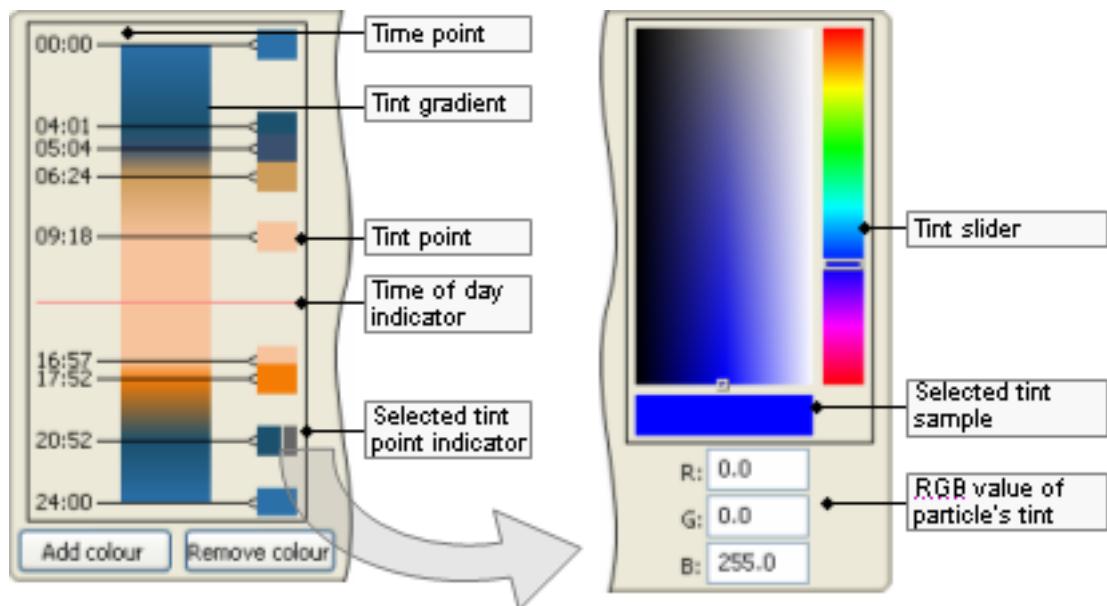
Environment Options panel (top)



Environment Options panel (bottom)



Tint Shader



Tint Timeline and Selected Tint

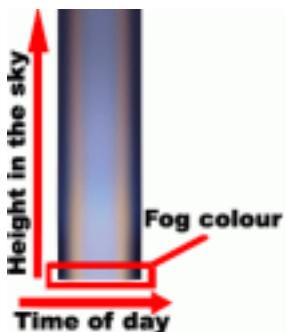
The list below describes the fields on this panel:

- **Sky bitmaps and gradient**
  - **Sky bitmaps**

List of image files to display as the sky. If more than one file is specified, then they are superimposed in the world. The Weather Systems entry in the list is always there, and cannot be deleted. It refers to the sky boxes in use by whatever Weather System is currently displayed. This item is included in the list so that you can sort the space's sky boxes with respect to the weather system ones.

- **Skybox gradient**

File containing time of day x height in the sky gradient information.



Skybox gradient mechanism

- **Time Of Day File fields**

- **Time of day file**

XML file containing the settings for the fields in the following group boxes:

- Game Options
- Sun/Moon Inclination

- Time
- Animation Colours



Opens the Open dialog box, where you can specify the Time Of Day File.



Open the Saves As dialog box, where you can save the current settings to a new XML time-of-day file.

#### ▪ Game options

##### ▪ Hour length

Number of seconds in an hour of game world's time.

##### ▪ Start time

Time of day in which the game should start.

#### ▪ Sun/moon inclination

##### ▪ Sun angle

Angle formed between sun and the horizon. Value ranges from 0° to 90°.

##### ▪ Moon angle

Angle formed between sun and the horizon. Value ranges from 0° to 90°.

#### ▪ Time

##### ▪ Time of day

Current time of day in the world.

This value changes, and can also be changed by dragging Tint Timeline's Time Of Day bar, and by clicking Tint Timeline's Tint Gradient.

#### ▪ Animation colours

##### ▪ Sun animation

Selects Tint Shader for sun animation.

##### ▪ Ambient animation

Selects Tint Shader for sun animation.

##### ▪ Reset

Resets Tint Shader values for selected animation (sun or ambient).

These values are the same ones used for FantasyDemo.

#### ▪ Tint Timeline

- **Time point**

Point of transition between two tints.

Can be dragged up and down (except the first and last one), with value being automatically updated.

- **Tint gradient**

Displays the tint on each Tint Point, and the values in between.

Clicking the Tint Gradient changes Time Of Day to respective time.

- **Tint point**

Tint selected for the time of day.

Can be dragged up and down (except the first and last one), with value in the timescale being automatically updated.

- **Time of day indicator**

Sets the current time of day in the world.

This bar changes, and can also be changed by Time Of Day slider and by clicking the Tint Gradient.

- **Selected tint point indicator**

Indicates which Tint Point is currently selected.

Selected Tint group is automatically updated to reflect the selected tint values.

- **Selected tint**

- **Tint slider/ selector**

Composed of 2 parts:

- Slider — Colour to be applied to the particle in the selected Time Point.
- Selector — Luminosity of the colour selected in the slider part of this field.

The tint might be also be specified in the RGB Value fields.

The Tint Gradient and Tint Point in the Tint Timeline, and the RGB Values are automatically updated with the values selected.

- **Selected tint sample**

Displays the tint selected in Tint Slider/Selector.

- **RGB values**

- **R, G, B**

Red, green, and blue components of the tint in the selected Time Point.

The tint might also be specified in the Tint Slider/Selector.

The Tint Gradient and Tint Point in the Tint Timeline, and the Tint Slider/Selector are automatically updated with the values specified.

- **Add colour**

Adds a new Time Point in the Tint Timeline.

The new Time Point is added on top of the final one, so it is not immediately visible to the user. You have to drag it up in the Tint Timeline before specifying its settings.

- **Remove colour**

Deletes the Time Point currently selected in the Tint Timeline. The first and last Time Points cannot be deleted.

- **Sky file fields**

- **Sky file**

XML file containing the settings for fields in the Atmospheric Effects group box.



Opens the Open dialog box, where you can specify the Sky File.



Open the Saves As dialog box, where you can save the current settings to a new XML time-of-day file.

- **Atmospheric effects**

For details on these settings, see the **Content Creation Manual**'s lesson Change Environmental Settings → Changing dynamic environment settings.

- **MIE amount**

Overall MIE scattering amount.

This is the amount of scattering effect, which simulates forward scattering of light as it travels through the atmosphere.

- **Turbidity offset**

Base level of turbidity, or amount of suspended particulate matter.

Proportionally affects MIE scattering effect.

- **Turbidity factor**

Multiplier on air turbidity.

It defines how MIE scattering effect responds to increases in the global fog amount.

- **Vertex effect**

Vertex height contribution to MIE scattering.

The vertex effect gives the scattering an elongated shape at the horizon.

- **Sun height effect**

Sun height contribution to MIE scattering.

The sun height effect decreases the overall amount of the effect when the sun is high in the sky (*i.e.*, noon).

- **Power**

Mathematical power of MIE scattering effect.

It makes the effect look less like a flat shaded circle, and more like a circular gradient with emphasis being put on white nearer the sun.

- **Texture LODs**

- **Start**

Distance in metres from the camera in which high-resolution texture blend will be used.

Higher values will result in better visual results (especially on steep terrain), but will result in higher memory use.

*Recommend value is between 200 and 1,000.*

- **Blend region**

Distance in metres beyond **Start** field over which transition between high and low resolutions will occur.

*Recommended value is between 100 and 500.*

- **Preload**

Distance in metres beyond **Blend Region** at which the high-resolution textures will be loaded.

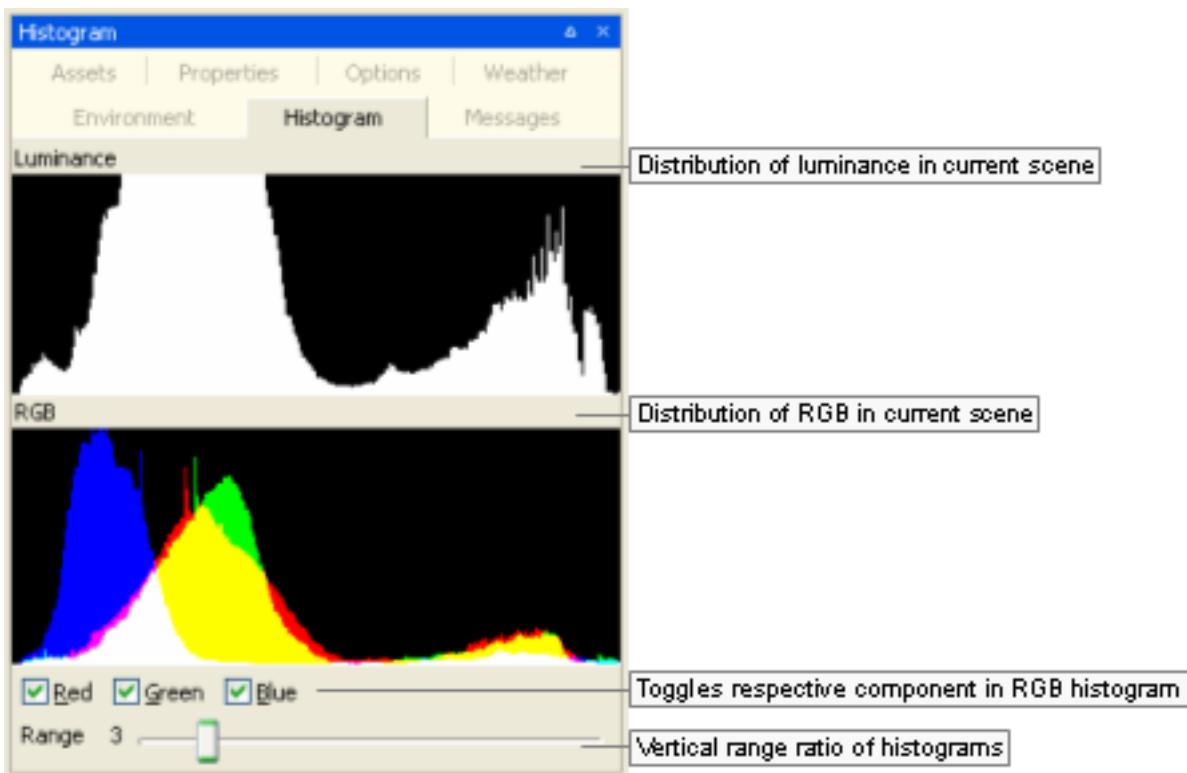
*Recommend value is between 100 and 200.*

## **2.10.17. Histogram panel**

---

This panel allows you to gauge the amount of luminance and colour in the scene, giving the world builder the ability to analyse the scene regarding the balance in the distribution of colours across the spectrum.

You can also use F11 (for details, see “Keyboard shortcuts” on page 25) to show the histograms in WorldEditor’s main window — for details, see “Histogram console” on page 266 .



Histogram panel

The list below describes the fields on this panel:

- **Luminance**

Distribution of luminance in the current scene.

- **RGB**

Distribution of red, green, and blue colours in the current scene.

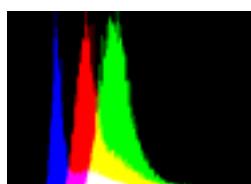
- **Red, Green, Blue**

Toggles the graphing of the respective colour component in the histograms.

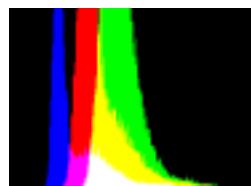
- **Range**

Sets the vertical range ratio of the **Luminance** and **RGB** histograms.

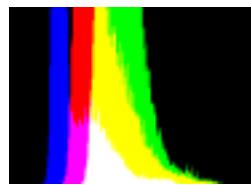
A value of 1 causes the histograms to be graphed using the whole vertical size of the panel to plot the maximum values. The value of this field will be multiplied by the value in y-axis, thus augmenting the graphing size of components that would be otherwise too small to be graphed. The series of screenshots below display the **RGB** histogram being graphed with the following values for **Range** (respectively): 1, 2, 4, and 8.



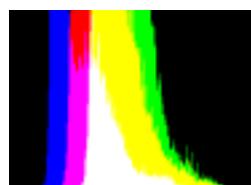
Range = 1



Range = 2



Range = 4

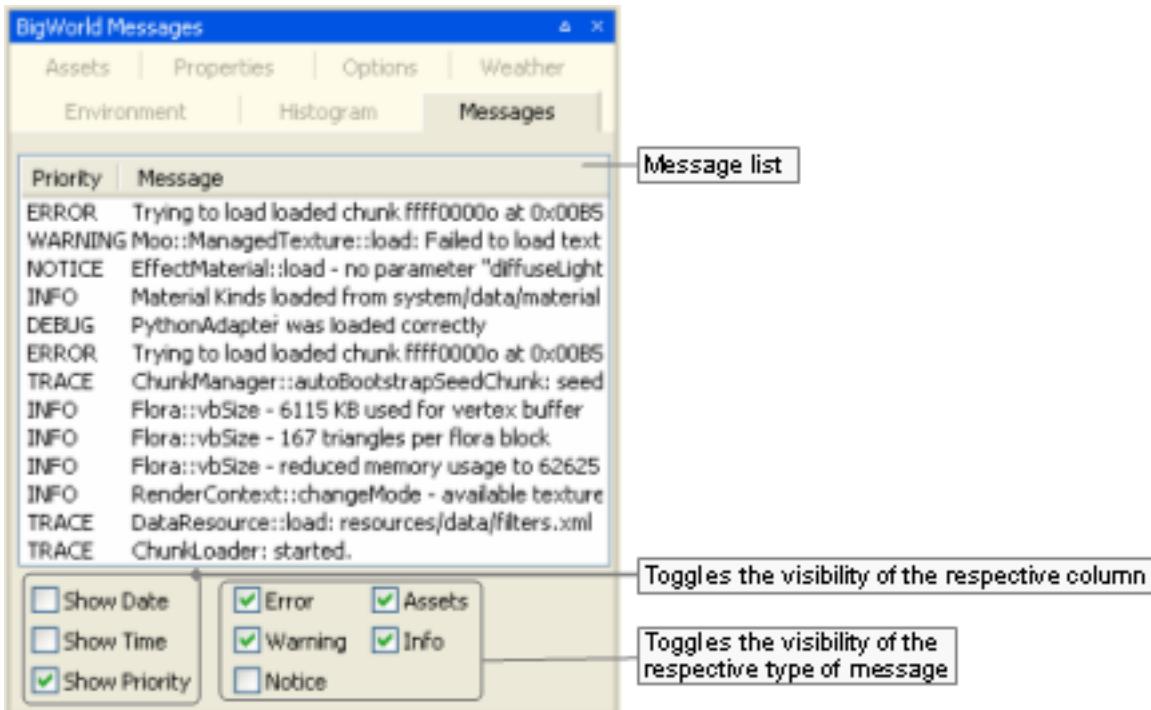


Range = 8

## 2.10.18. BigWorld Messages panel

This panel displays error, debug, and general information messages output by the tool.

To simplify debugging, these messages are also logged to `bigworld/tools/worldeditor/worldeditor.log` (for details, see “Activity logging” on page 135 ).



BigWorld Messages panel

The list below describes the fields on this panel:

- **Show data, Show time, Show priority**

Toggles the visibility of the respective column.

- **Error, Warning, Notice, Assets, Info**

Toggles the visibility of the respective type of message.

Please note that the Info check box toggles the visibility of **Info, Trace** and **Debug** messages.

### Note

Asset errors are listed in bold letters as tree entries.

Those entries can be clicked to reveal the instances of the missing asset — each sub-item acts as a link that moves the view to the bounds of the missing asset.

## 2.11. Useful notes

The following sections highlight some important details about elements in WorldEditor.

### 2.11.1. Chunks

There are two types of chunks in BigWorld:

- **Outdoor chunks**

Have a fixed size of 100x100 metres.

- **Indoor chunks**

Also called shells, have the size and shape determined by the models that represent them.

Each chunk can have any number of chunk items associated with it. For example, indoor chunks may have chunk items such as lights, tables, and chairs, while outdoor chunks may have trees, rocks, or the terrain (the terrain is not a chunk in itself, only a chunk item).

#### 2.11.1.1. Chunk templates

Restricted to indoor chunks, chunk templates are useful to reuse the lighting settings of a shell.

When a shell that for which a chunk template was saved is placed in the world, WorldEditor automatically places the lights specified by the template in that shell.

To save a chunk as a template, select the **Edit → Save Chunk As Template** menu item.

#### 2.11.1.2. Adding chunks to a space

Current versions of WorldEditor do not offer a mechanism to resize an existing space. Instead, what has to be done is to create a new space with the desired dimensions, then move the existing objects to it. There are two ways to do this, one is to copy all the old space's files except space.settings file into the new space's directory. This will mean that old space information will override the new space information for each chunk. The limitation of enlarging the space through this way is you can only enlarge the space with the old space information in the center.

Another way is to resize the space using prefabs. The list below describes each step of this process:

## 1. Load the space for which you want to add/delete chunks (if different from current one)

- Select the **File → Open Space** menu item<sup>A</sup> — the **Browse For Folder** dialog box<sup>B</sup> will be displayed. If there are unsaved changes, then the **Changed Files** dialog box<sup>B</sup> will be displayed. Choose the appropriate answer for your case.
- Select the space which size you want to change, then click the **Open Space** button — the selected space will be loaded.

## 2. Select desired world items

- Set the **Object** panel's<sup>C</sup> **Selection Filter** drop-down list box to **All**.
- Select the **Edit → Select All** menu item<sup>A</sup>, to select all objects in the space (if you want to enlarge space). Or, select desired chunks and all objects in them by drawing a rectangle around them using mouse dragging.

## 3. Save selected world items to a prefab file

- Select the **Edit → Save Selection As Prefab** menu item<sup>A</sup> — the **Save As** dialog box<sup>B</sup> will be displayed.
- Specify the name and folder in which you want to save the file, then click the **Save** button.
- Select the **File → New Space** menu item<sup>A</sup> — the **New Space** dialog box<sup>B</sup> will be displayed.
- Specify the name of the space and its dimensions, then click the **Create** button — the new space will be created and loaded.

## 4. Import world items from saved prefab file

- In the **Asset Browser**<sup>D</sup>, select the **Prefabs** virtual folder.
- In the **Asset List**, select the file saved in step 3.
- Move the mouse over the viewport, then press **Enter**<sup>E</sup>.
- The objects saved on the old space have now been added to the new space. Note: The existing terrain inside the prefab's bound will be replaced by the terrain saved in the prefab. If you put the prefab in the wrong place and want to correct it, you have to undo the placing and place the prefab again.

*A — For details, see “Menu items” on page 12 .*

*B — For details, see “Dialog boxes” on page 47 .*

*C — For details, see “Object panel” on page 70 .*

*D — For details, see “Asset Browser panel” on page 93 .*

*E — For details, see “Keyboard shortcuts” on page 25 .*

## 2.11.2. Portals

A portal links chunks, allowing traverse and visibility between them. When portals are connected, they become invisible — a complete world should not have visible portals.

For indoor chunks, portals form part of the shell, and can be modified in any 3D package — in WorldEditor they can be selected, but not changed. Indoor portals are only visible when disconnected from other indoor portals.

A portal in 3ds Max can be flagged as an exit portal, meaning that it will open up to the terrain, rather than to another indoor chunk. Exit portals are not visible in WorldEditor. When a shell with an exit portal is placed in the world, the chunk in which it is placed creates a new virtual boundary and a new portal to match the now adjacent indoor chunk. Other than this, outdoor chunks have fixed portals to adjacent outdoor chunks which should not be changed — which is why they cannot be selected in WorldEditor.

Note that the external flag in the properties of a portal is deprecated, although it still causes the portal to be shaded to yellow. But other than that, the flag has no technical effect.

### **2.11.3. Directional lights for outdoor use only**

Directional lights spread an even light over an area, unlike other kinds of light, which spread out from a specific point.

They are useful for things like the sun, whose source is very distant, and whose light needs to affect a large area. As a result, directional lights are not available for indoor chunks, which should use omni and ambient lighting instead.

For more details on the different kind of lights, see “Lighting Setup panel” on page 195 .

### **2.11.4. Potential problems placing models and shells**

When a model is placed in WorldEditor, the centre of its bounding box is used to determine the chunk in which the model will be placed.

This is suitable for most situations — placing an object in a room causes the object to be associated to that room, placing an object outdoors causes the object to be associated with an outdoor chunk.

But it might not be suitable in cases where there is a single indoor shell with an exit portal, and you want to place an enclosing outer wall around that shell. In this case, the wall and the interior shell will be approximately the same size, and will be placed in approximately the same location. In this scenario, WorldEditor would automatically place the outer walls *inside* the shell. This would mean that the external walls only get lit by the indoor lights, and would be bound by the visibility rules of that indoor shell's exit portal.

To overcome this problem, models have the *outside only* flag (accessed via the **Properties** panel (for details, see “Properties panel” on page 105 ).

After changing this value to true, WorldEditor will automatically change the model's location to an outdoor chunk. Additionally, as you move that model around the world, WorldEditor makes sure that it is never placed in an indoor chunk.

If you have a model that will need to be always designated as outside only, then you can do it by editing the .model file, as in the example below:

```
<rock.model>
...
<editorOnly> 1
...
<outsideOnly> true </outsideOnly>
...
</editorOnly>
...
</rock.model>
```

Example file rock.model

- 1 Make sure to follow the exact capitalization for the inserted text.

## 2.11.5. Corrupted space map

---

If WorldEditor starts rendering your space with random colours or adding objects by its own accord, then you can force it to regenerate the space map by deleting the cache.

In order to regenerate the space, follow the steps below:

1. Shut down WorldEditor.
2. Browse to the folder containing the space you were working in — `<res>/spaces/<space>`.
3. In that folder, delete the files `space.thumbnail.dds` and `space.thumbnail.timestamps`.
4. Restart WorldEditor.
5. The space map will be recreated.

If this problem keeps occurring, then please contact the BigWorld support engineers, providing the following information:

- Your machine's graphics card
- Version of your video drivers.

## 2.11.6. Creating spaces

---

To create a new world, the first step is to create a space using the **File → New Space** menu item.

After that, create a hand-drawn map of the whole world — as simple or as detailed as desired —, making sure that it is to scale. This hand-drawn map will act as a guide for the artists creating the world — they will be able to follow the guidelines in the map for performing task such as choosing the regions to lock for editing.

The bitmap can have any size, as long as it is proportional to your space. For example, if your space is 200x150 chunks, then your bitmap could be 640x480.

Once having drawn the world, save it as `space.map.bmp` in your newly created space folder and commit it alongside the map texture to the CVS repository.

All files relating to the new space (located in `<res>/spaces/<space>`) will have to be checked out on the machines that will be editing it with WorldEditor.

## 2.11.7. Lock Server (`bwlockd`) and new spaces

---

The Lock Server (`bwlockd`) can work with any new spaces committed to your server without having to be restarted.

For more details on the Lock Server, see *Lock Server (BWLockD)* on page 333 .

### 2.11.7.1. Troubleshooting

Errors regarding `bwlockd` are displayed in the message window. The list below describes the meaning of some of the errors you might come across, and how to correct them:

- **Unable to connect to `bwlockd`**

Generic error message displayed after any problem with the Lock Server.

Look at the error message above this one to determine the specific problem.

▪ **Connect(): Couldn't connect, last error is 10061**

The Lock Server is not running, or you have specified an incorrect host or port number in WorldEditor's configuration file `bigworld/tools/worldeitor/options.xml`, tag `<bwlockd>` (for details on this file's grammar, see the document File Grammar Guide's section `options.xml` → "WorldEditor").

Make sure that the server is running, the specified host is correct, and the specified port is 8168.

▪ **Connect(): Couldn't set lockspace**

The space you are currently editing could not be found by the Lock Server.

Make sure that you have chosen the correct space, and that it is checked out on the server, so the Lock Server can find it.

## 2.11.8. Activity logging

In order to provide a trace of the activities performed by the user, thus simplifying the debug process, all on-screen warning and errors (displayed in the **BigWorld Messages** panel (for details, see "BigWorld Messages panel" on page 130 ) are logged to file `bigworld/tools/worldeitor/worldeitor.log`.

Apart from errors and warning, actions like changing the **Object** panel's **Selection Filter** or **Locking Mode**, or saving the scene, are also logged to file.

The example below illustrates an example of the generated log file.

```
/-----\
WorldEditor 1.8 (compiled at Oct 11 2006 at 20:20:16) starting on 11/15/06

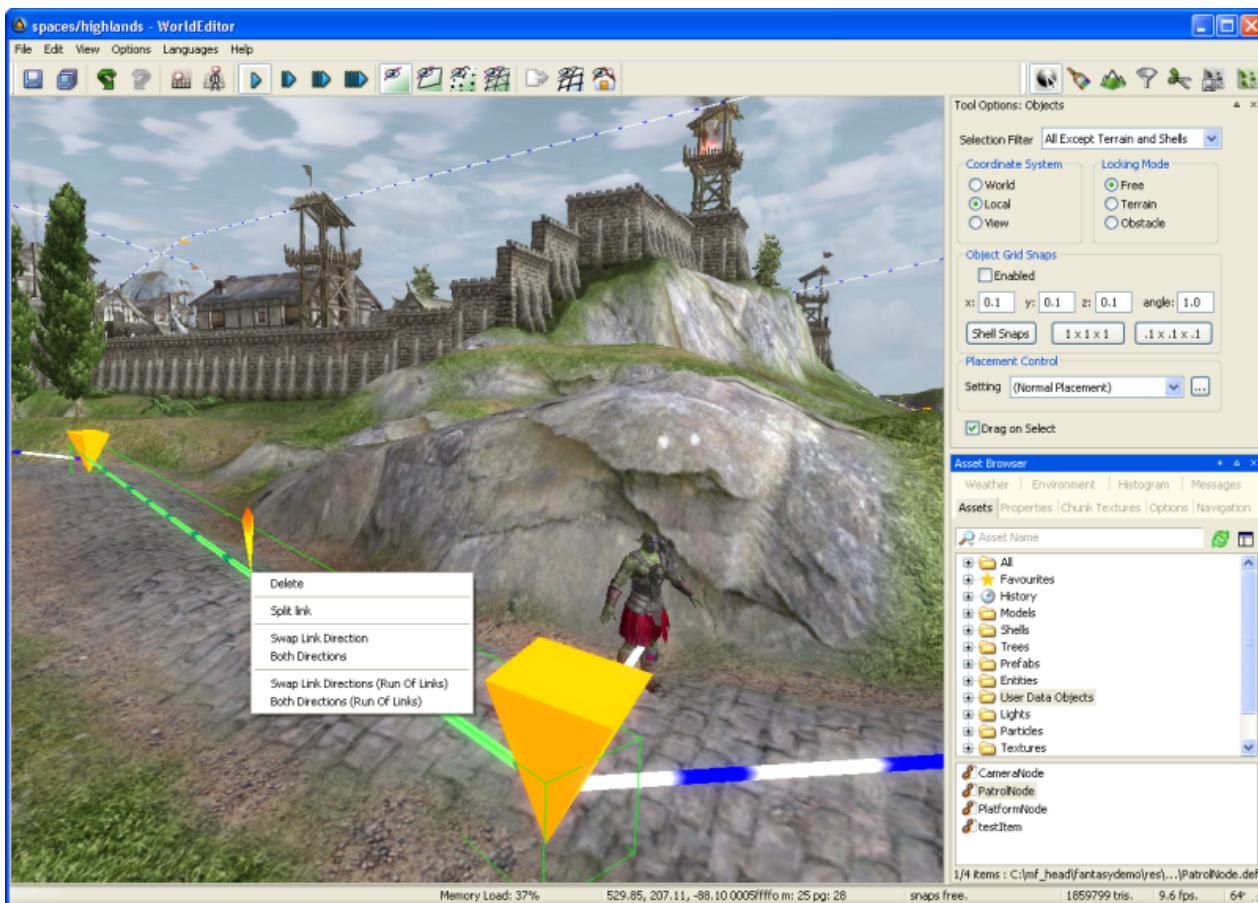
Action: entered Object mode 1
Action: Entering terrain snap mode
Action: Selection Filter: All Lights
Critical: Model not found: sets/temperate/props/maple_substitute.model 2
Critical: Model not found: sets/temperate/props/stone_a_02.model
Action: Entering obstacle snap mode 3
Action: Entering XZ snap mode
Action: characters/npc/chicken/chicken.model 4
Action: Selection Filter: All
Action: Added model
Critical: Saving...
Action: Calculating lighting for 00000026i 5
Action: Calculating thumbnails for 00000002o
Action: Calculating thumbnails for 00000026i
Action: Saving 00000002o
Action: Saving 00000026i
Critical: Save complete
```

Example BigWorld log file

- 1** During startup: Settings applied
- 2** During startup: Critical errors
- 3** During session: Settings were changed
- 4** During session: A model was added
- 5** During session: The modified scene was saved

## 2.11.9. Patrol path editing with User Data Objects

A specific type of User Data Object (UDO) has been implemented, called `PatrolNode`, that allows the creation and editing of patrol paths (or any other situation that requires a fixed directional graph).



Example patrol path using the `PatrolNode` user data object

Patrol path graphs consist of a collection of nodes and directional links between them. In addition, entities can support linking to patrol paths.

To create a patrol path graph, click the **Asset Browser** panel (for details, see “Asset Browser panel” on page 93 ), then select the **User Data Objects** virtual folder, and drag the `PatrolNode` object onto the viewport — this will create the first node in the graph.

Nodes have a special patrol node gizmo, with four selectable areas — two circles and two crosses. The crosses can be used to create more nodes, by clicking and dragging them to the location desired for the new node. A link is automatically created, from the original node to the new one.

To create a link from one node to another, select the first node, then drag the circle area onto the other node. As you drag, the colour of the link changes from red (which means that a link *cannot* be established at this location) to green (which means that a link *can* be established at this location) when the cursor is moved over the second node.

By default, links are shown to follow the ground. If either node is in the air however, the link will go in a straight line.

Standard editing operations can be done on nodes — they can be deleted, cloned, and moved.

When the mouse cursor is placed over a link, it will be highlighted with a green box. A context menu will then be available (by right-clicking the link), with the following items:

- **Delete**

Deletes the link.

- **Swap link direction**

Changes the direction of the link.

- **Both directions**

Changes the link type to bi-directional.

- **Swap link directions (run of links)**

Swaps the directions of a run of links<sup>A</sup>.

- **Both directions (run of links)**

Changes a run of links<sup>A</sup> type to bi-directional.

- **Split Link**

Splits the link at the middle.

*A — A run of links includes the current link and goes in each direction until a complete loop is done, a node with only one link going into it is found, or a node with more than one link is found.*

To support patrol paths, or to be able to link to any other user data object for that matter, an entity needs to have a UDO\_REF type property which allows linking (for details, see the document Server Programming Guide's section *Physical Entity Structure for Scripting* → "The Entity Definition File")

These entities can be linked to a PatrolNode user data object. Such an entity will have a linking gizmo, but only with the two circles (it can only be linked, it cannot create nodes). To associate an entity with a PatrolNode user data object, drag one of the circles to a node in the patrol graph — a link will be drawn from the entity to the node.

For an example of a definition file suitable for patrol paths, see `fantasydemo/res/scripts/entity_defs/Guard.def`.

The file `fantasydemo/res/scripts/cell/Guard.py` is a Python script that runs on the server to control guards. It uses PatrolNode based patrol paths to optionally set guards on a patrol path, using the `doPatrol` method. Note that it also uses the `patrolRadius` property (set in the definition file) to allow a degree of randomization on the adherence to the path.

## 2.11.10. Some useful Python scripts

---

Here we describe some useful Python scripts that are built into WorldEditor. The scripts should be used with caution - they will operate directly on the space and cannot be undone. To access these scripts bring up the Python console (Ctrl+P) and type one of the following:

- `WorldEditor.restitchAllTerrainBlocks()`

This will restitch the edges of terrain blocks in the current space so that they match. Occasionally cracks appear between chunks. Usually this can be fixed by painting with a zero-strength height brush over the cracks. This script will fix this issue for the entire space.

- `WorldEditor.regenerateThumbnails()`

This will regenerate all of the thumbnails in the current space that are used in the project view.

- `WorldEditor.convertSpaceToZip()`

This will convert the current space to use ZipSections instead of BinSections.

- `WorldEditor.regenerateLODs()`

This will force the regeneration of terrain texture LODs on the current space.

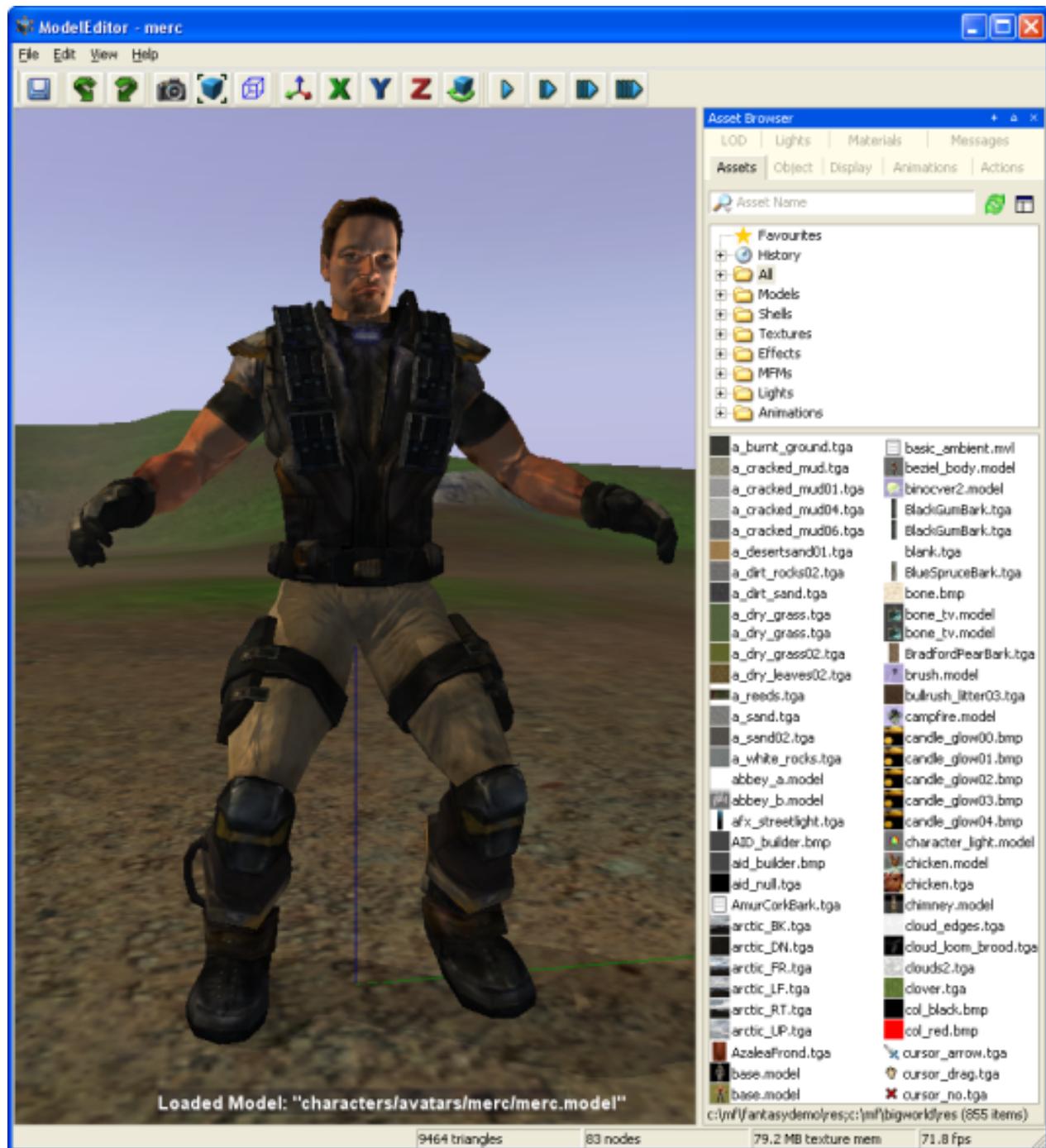
# Chapter 3. ModelEditor

ModelEditor is designed to be used in conjunction with other tools from the BigWorld Toolkit.

It is used to create new materials and view exported models and animations under various lighting conditions.

With ModelEditor you can simulate various game environments, allowing you to preview what the model will look like in the game engine, and to create effects such as shaders that are not supported by 3ds Max.

Problems in the mesh and animations of your model may also be identified. You can view the level of detail as created by the game engine to ensure that it appears as expected.



## ModelEditor window

For details on how to start this and other BigWorld tools, see *Starting the Tools* on page 273 .

## 3.1. Menu items

The list below describes the menu items available in ModelEditor:

- **File → Open model**

Opens the **Open** dialog box, where you can specify a `.model` file to load.

- **File → Add model**

Adds the selected model to the viewport, so it can be viewed alongside the current model — this is useful when editing a model that is part of a SuperModel.

Please note that added models cannot be changed, only viewed.

- **File → Remove added models**

Removes from the viewport all models that have been added to be viewed alongside the current model.

- **File → Revert to saved**

Discards all changes made to the model, and loads its saved version.

- **File → Save**

Saves the current model and any other modified files.

- **File → Reload all textures**

Reloads from disk all texture files applied to the model — this is useful to refresh modified textures.

- **File → Regenerate visibility box**

Regenerates the model's visibility box using its animations — this is the box used in the client for visibility and shadowing.

- **File → Recent models**

Opens a sub-menu with the list of recently opened models.

- **File → Recent lights**

Opens a sub-menu with the list of recently opened lights.

- **File → Exit**

Closes the application.

The user will be prompted to save changes to the model or lighting settings.

- **Edit → Undo**

Undoes the most recent model-changing action.

Multiple actions can be undone. The *undo* list extends to the state of the model when it was loaded.

Each model-changing action that is undone is added to the redo list.

Also accessible via the **Undo** toolbar button<sup>A</sup> (  ).

### Note

Only actions that effectively change the model are added to the undo list.

- **Actions added to the undo list:**
  - Changing the model's material.
  - Adding/removing animations.
  - Adding/removing LODs.
- **Not added to the undo list:**
  - Changing the **Materials Settings** panel's **Preview** check box.
  - Changing any field in the **Display Settings** panel.
  - Changing camera height and/or angle.

#### ▪ **Edit → Redo**

Redoes the most recently undone model-changing action.

Multiple actions can be redone.

The *redo* list contains one entry for each undone model-changing action.

Also accessible via the **Redo** toolbar button<sup>A</sup> (  ).

#### ▪ **Edit → Preferences**

Opens the **ModelEditor Preferences** dialog box (for details, see “Preferences dialog box” on page 154 ), which allows you to customise editor and environment options.

#### ▪ **View → Toolbar → Main toolbar**

Toggles the visibility of ModelEditor's toolbar.

#### ▪ **View → Show Asset Browser panel**

Displays/activates the panel (for details, see “Asset Browser panel” on page 160 ).<sup>A</sup>

#### ▪ **View → Show Display panel**

Displays/activates the panel (for details, see “Display Settings panel” on page 165 ).<sup>A</sup>

#### ▪ **View → Show Object panel**

Displays/activates the panel (for details, see “Object Properties panel” on page 162 ).<sup>A</sup>

#### ▪ **View → Show Animations panel**

Displays/activates the panel (for details, see “Animations panel” on page 176 ).<sup>A</sup>

- **View → Show Actions panel**

Displays/activates the panel (for details, see “Actions panel” on page 181 ).<sup>A</sup>

- **View → Show LOD Panel**

Displays/activates the panel (for details, see “Level Of Detail panel” on page 191 ).<sup>A</sup>

- **View → Show Lights Panel**

Displays/activates the panel (for details, see “Lighting Setup panel” on page 195 ).<sup>A</sup>

- **View → Show Materials Panel**

Displays/activates the panel (for details, see “Materials Settings panel” on page 199 ).<sup>A</sup>

- **View → Show Messages Panel**

Displays/activates the panel (for details, see “BigWorld Messages panel” on page 205 ).<sup>A</sup>

- **View → Show Panels**

Toggles the visibility of all panels.<sup>A</sup>

- **View → Load Default Panel Layout**

Closes all customised panels and displays ModelEditor's default panel layout.<sup>A</sup>

- **View → Load Most Recent Panel Layout**

Closes all current panels and displays the customised panel layout previously used.<sup>A</sup>

- **Languages → List of available languages**

Selects the language to use in the tool.

This list is compiled based on the `LanguageName` tags present in the XML files in the `<res>/helpers/languages` folder and in the file pointed by the `language` tag in `bigworld/tools/modeleditor/options.xml`.

- **Help → About ModelEditor**

Opens the **ModelEditor version** dialog box.

- **Help → Tools Reference Guide**

Opens this document.

- **Help → Content creation**

Opens the document Content Creation Manual.

- **Help → Shortcuts**

Opens the **ModelEditor Keyboard Shortcuts** dialog box.

For details, see “ModelEditor Shortcuts dialog box” on page 156 .

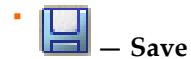
- **Help → Request feature/report bug**

Opens your e-mail program, with the **To:** field automatically set to BigWorld's support e-mail address, and the **Subject:** field set to **ModelEditor – Feature Request / Bug Report**.

*A – For details on the panel system and its terminology, see Panel System on page 287 .*

## 3.2. Toolbar

The list below describes the toolbar buttons available in ModelEditor:



Saves the current model.

Performs the same function as the **File → Save** menu item.<sup>A</sup>



Undoes the most recent action.

Performs the same function as the **Edit → Undo** menu item.<sup>A</sup>



Redoes the most recent undone action.

Performs the same function as **Edit → Redo** menu item.<sup>A</sup>



Captures a thumbnail of the current view of the loaded model.

This thumbnail is used in the **Object Properties** panel, and by the **Asset Browser**<sup>A</sup> in other tools of the BigWorld Toolkit.



Moves the camera so that the model is brought to the centre of the screen.

This is useful if you have moved the camera far from the model, and needs to quickly centre it again.



Toggles the visibility of the model's bounding box (yellow) and visibility box (blue).

Same as the **Display Settings** panel's **Show Bounding Box** check box.



Sets camera movement to a swivel action — the camera can be swivelled by dragging the right mouse button.

Keyboard movement keys will move the camera.

-  – **X-locked**

Locks camera movement to the x-axis.<sup>B</sup>

-  – **Y-locked**

Locks camera movement to the y-axis.<sup>B</sup>

-  – **Z-locked**

Locks camera movement to the z-axis.<sup>B</sup>



- – **Orbit camera**

Toggles camera pivot movement around the geometric centre of model.

You can change the orbit direction by pressing d (clockwise camera rotation) or a (counter-clockwise camera rotation).

-  – **Slow**,  – **Medium**,  – **Fast**,  – **Super fast**

Specifies how fast the camera travels in response to appropriate key events.

If Caps Lock is on<sup>A</sup>, then the camera speed will be boosted.

*A – For details, see “Menu items” on page 140 .*

*B – Swivelling the camera (by dragging the right mouse button) sets the camera mode to **Free Positioning**.*

### 3.3. Status bar

The status bar displays information about the current scene. A typical status bar is illustrated below:

Get Information about ModelEditor    7236 triangles | 172 nodes | 85 BlendBone nodes | 0.0 Bytes texture mem | 14.6 fps

ModelEditor toolbar

The list below lists the pieces of information displayed in the status bar, as they appear:

- **Menu item pointed at** (in the example, **Get Information about ModelEditor**)

Help text for the menu item currently pointed at.

- **Triangles rendered** (in the example, **7236 triangles**)

Number of triangles currently being rendered in the scene.

- **Model nodes** (in the example, **172 nodes**)

Number of nodes on the model currently rendered.

- **Model BlendBone nodes** (in the example, **85 BlendBone nodes**)

Number of BlendBone nodes for the current model.

- **Texture size in memory** (in the example, **2.61 Bytes texture memory**)

Amount of texture memory being used by the loaded model.

- **Frame rate** (in the example, **FPS: 234**)

Current frame rate being used to display the scene.

## 3.4. Keyboard shortcuts

The list of ModelEditor's keyboard shortcuts can be displayed via the **Help → Shortcuts** menu item (for details, see "Menu items" on page 140 ).

The sections below list the ModelEditor's keyboard shortcuts:

### 3.4.1. Function keys

- **F1**

Displays the **ModelEditor Shortcuts** page, which can be left by pressing **Esc**.

- **Ctrl+F5**

Activates the **Realtime Profiling** console, which can be left by pressing **Esc** — for details, see "Realtime Profiling console" on page 261 .

- **Ctrl+F7**

Activates the **Debug (Watcher)** console, which can be left by pressing **Esc** — for details, see "Debug (Watcher) console" on page 263 .

### 3.4.2. Key modifiers

- **Alt**

- **If Debug (Watcher) console<sup>A</sup> is active**

- **If [0–9] key in the alphanumeric keypad is pressed:**

Selects item 40+[0-9], or 50+[0-9] (if **Shift** is pressed).

- **If used to drag-and-drop from Asset Browser<sup>B</sup> to viewport**

Adds the dragged model (with read-only permission) to the viewport, so it can be viewed alongside the current model. This is useful for editing models that are part of a SuperModel<sup>C</sup>.

Performs the same function as the **File → Add Model** menu item. For details, see "Menu items" on page 140 .

- **Ctrl**

- **If Debug (Watcher) console<sup>A</sup> is active**

- **If [0–9] key in the alphanumeric keypad is pressed:**

Selects item 20+[0-9], or 30+[0-9] (if **Shift** is pressed).

- **If used to drag-and-drop from Asset Browser<sup>B</sup> to viewport**

Adds the dragged model (with read-only permission) to the viewport, so it can be viewed alongside the current model. This is useful for editing models that are part of a SuperModel<sup>C</sup>.

Performs the same function as the **File → Add Model** menu item. For details, see “Menu items” on page 140 .

- **Shift**

- **If Debug (Watcher) console<sup>A</sup> is active**

- **If [0–9] key in the alphanumeric keypad is pressed:**

Selects item 10+[0-9], 30+[0-9] (if Ctrl is pressed), or 50+[0-9] (if Alt is pressed).

- **Shift+Enter**

- **If Debug (Watcher) console<sup>A</sup> is active**

- **If watcher is in Edit mode**

Displays the watcher modification history.

*A — Activated by F7 (for details, see “Debug (Watcher) console” on page 263 ).*

*B — For details, see “Asset Browser panel” on page 160 .*

*C — For details, see the document Client Programming Guide’s section Models → “SuperModel”.*

### 3.4.3. Edit keys

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- **Backspace**

- **If Debug (Watcher) console<sup>A</sup> is active**

Returns the list to the previous branch of the watcher tree.

- **Caps Lock**

- **ON**

Increases the current camera speed. It will accelerate the camera movement, which speed is set by keyboard shortcuts (Ctrl+1, Ctrl+2, Ctrl+3, and Ctrl+4), or by the **Camera Speed** toolbar buttons



- **OFF**

Restores the camera speed set by keyboard shortcuts or by the **Camera Speed** toolbar buttons<sup>B</sup>.

- **Enter**

- **If Python console<sup>C</sup> is active and no command is specified**

Executes the Python command, or exits the console if no command was specified.

- **If Realtime Profiling console<sup>D</sup> is active**

Expands or collapses the profiling element currently selected — elements with children are indicated by an ellipsis (...) next to it.

- **If Debug (Watcher) console<sup>A</sup> is active**
    - **If the selected node is not a leaf**

Navigates one level down in the watcher tree.
    - **If the selected node is a leaf**

Opens the selected watcher for editing, or accepts the typed value if it is already in Edit mode.
    - **If watcher is in Edit mode and Shift is pressed**

Displays the watcher modification history.
  - **Esc**

Deselects the selected objects.

    - **If any console is active**

Exits the console.

**NOTE:** The different modes and consoles are activated in the following way:

    - **Help mode — F1**
    - **Realtime profiling console — F5** (for details, see “Realtime Profiling console” on page 261 )
    - **Debug (Watcher) console — F7** (for details, see “Debug (Watcher) console” on page 263 )
    - **Python console — Ctrl+P** (for details, see “Python console” on page 268 )
  - **If Debug (Watcher) console<sup>A</sup> is active**
    - **If the watcher is in Edit mode:**

Leaves Edit mode.
    - **If the watcher is not in Edit mode:**

Exits the console.
  - **Home**
    - **If Realtime Profiling console<sup>D</sup> is active**

Scrolls the list to display the first page.
    - **If Debug (Watcher) console<sup>A</sup> is active**

Returns the list to the root of the watcher tree.
  - **Page Down**
    - **If Realtime Profiling console<sup>D</sup> is active**

Moves the selection to the next element in the list.
- Performs the same function as the ] (square right bracket) keyboard shortcut.

- **If Debug (Watcher) console<sup>A</sup> is active**
  - **If the watcher is not in Edit mode**

Moves the selection to the next item in the list.
  - **If the watcher is in Edit mode**

Decreases the watcher's value by 1, 10 (if Shift is pressed), 100 (if Ctrl is pressed), or 1,000 (if Alt is pressed).
- **Page Up**
  - **If Realtime Profiling console<sup>D</sup> is active**

Moves the selection to the previous profiling element in the list.
  - **If Debug (Watcher) console<sup>A</sup> is active**
    - **If the watcher is not in Edit mode**

Moves the selection to the previous item in the list.
    - **If the watcher is in Edit mode**

Increases the watcher's value by 1, 10 (if Shift is pressed), 100 (if Ctrl is pressed), or 1,000 (if Alt is pressed).

*A – Activated by F7 (for details, see “Debug (Watcher) console” on page 263 ).*

*B – For details, see “Toolbar” on page 143 .*

*C – Activated by Ctrl+P (for details, see “Python console” on page 268 ).*

*D – Activated by F5 (for details, see “Realtime Profiling console” on page 261 ).*

### 3.4.4. Symbols

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- **Numpad + (Plus sign)**
  - **If Realtime Profiling console<sup>B</sup> is active**

Scrolls the screen one line down.
  - **If Debug (Watcher) console<sup>A</sup> is active**

Scrolls the watcher list down.
- **Numpad - (Minus sign)**
  - **If Realtime Profiling console<sup>B</sup> is active**

Scrolls the screen one line up.
  - **If Debug (Watcher) console<sup>A</sup> is active**

Scrolls the watcher list up.

- **[ (Left square bracket)**

- **If Realtime Profiling console<sup>B</sup> is active**

Moves the selection to the profiling element in the list.

Performs the same function as the Page Up keyboard shortcut.<sup>C</sup>

- **] (Right square bracket)**

- **If Realtime Profiling console<sup>B</sup> is active**

Moves selection to the next profiling element in the list.

Performs the same function as the Page Down keyboard shortcut<sup>C</sup>.

*A – Activated by F7 (for details, see “Debug (Watcher) console” on page 263 ).*

*B – Activated by F5 (for details, see “Realtime Profiling console” on page 261 ).*

*C – For details, see “Edit keys” on page 146 .*

### 3.4.5. Numeric keys

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- **Alphanumeric keypad**

- **If Debug (Watcher) console<sup>A</sup> is active**

Depending on the key modifier pressed (if any), selects the following item (n is the pressed key):

- **n**
- **10+n** (if Shift is pressed)
- **20+n** (if Ctrl is pressed)
- **30+n** (if Ctrl+Shift is pressed)
- **40+n** (if Alt is pressed)
- **50+n** (if Alt+Shift is pressed)

*A – Activated by F7 (for details, see “Debug (Watcher) console” on page 263 ).*

### 3.4.6. Alphabetic keys

---

- **A**

Moves the camera to the left.



**If the Orbit Camera toolbar button (  )<sup>A</sup> is selected**

- **If the camera is rotating clockwise**

Stops the camera rotation.

- **If the camera is not rotating**

Rotates the camera counter-clockwise.

- **D**

Moves the camera to the right.

- 



If the **Orbit Camera** toolbar button (  )<sup>A</sup> is selected

- **If the camera is rotating counter-clockwise**

Stops the camera rotation.

- **If the camera is not rotating**

Rotates the camera clockwise.

- **E**

Moves the camera upwards.

- **G**

- **If Realtime Profiling console<sup>B</sup> is active**

Draws a graph for the profiling element currently selected.

More than one element can be graphed at any one time. Each one will be assigned a different colour, which will be used to display the element's name, and draw the graph itself.

- **M**

- **If Ctrl is pressed**

Cycles through the available camera modes.

This value can also be set by the **Camera Mode** group of toolbar buttons



- **Q**

Moves the camera downwards.

- **W**

Moves the camera forward.

- **S**

Moves the camera backwards.

*A — For details, see "Toolbar" on page 143 .*

*B — Activated by F5 (for details, see "Debug (Watcher) console" on page 263 ).*

### 3.4.7. Key combinations

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- **Alt+F4**

Accesses the **File** → **Exit** menu item.<sup>C</sup>

- **Alt+Page Down**

- If Debug (Watcher) console<sup>A</sup> is active and watcher is in Edit mode

Decreases the watcher's value by 1,000.

- **Alt+Page Up**

- If Debug (Watcher) console<sup>A</sup> is active and watcher is in Edit mode

Increases the watcher's value by 1,000.

- **Alt+[0-9]**

- If Debug (Watcher) console<sup>A</sup> is active and alphanumeric keypad was used

Selects list item 4[0-9].

- **Alt+Shift+[0-9]**

- If Debug (Watcher) console<sup>A</sup> is active and alphanumeric keypad was used

Selects list item 5[0-9].

- **Ctrl+Page Down**

- If Debug (Watcher) console<sup>A</sup> is active and watcher is in Edit mode

Decreases the watcher's value by 100.

- **Ctrl+Page Up**

- If Debug (Watcher) console<sup>A</sup> is active and watcher is in Edit mode

Increases the watcher's value by 100.

- **Ctrl+[0-9]**

Ctrl+1 turns the **Slow Camera** toolbar button<sup>B</sup> (  ) on.

Ctrl+2 turns the **Medium Speed Camera** toolbar button<sup>B</sup> (  ) on.

Ctrl+3 turns the **Fast Camera** toolbar button<sup>B</sup> (  ) on.

Ctrl+4 turns the **Super Fast Camera** toolbar button<sup>B</sup> (  ) on.

- If Debug (Watcher) console<sup>A</sup> is active and alphanumeric keypad was used

Selects item 2[0-9].

- **Ctrl+Shift+[0-9]**

- If Debug (Watcher) console<sup>A</sup> is active and alphanumeric keypad was used

Selects item 3[0-9].

- **Ctrl+A**

Accesses the **File → Add Model** menu item.<sup>C</sup>

- **Ctrl+B**

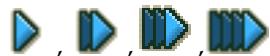
Accesses the **File → Regenerate Bounding Box** menu item.<sup>C</sup>

- **Ctrl+H**

Accesses the **View → Show Panels** menu item.<sup>C</sup>

- **Ctrl+I**

Cycles through the available camera speeds.

This value can also be set by the **Camera Speed** group of toolbar buttons — .

- **Ctrl+M**

Cycles through the available camera modes.

This value can also be set by the **Camera Mode** group of toolbar buttons —



- **Ctrl+O**

Accesses the **File → Open Model** menu item.<sup>C</sup>

- **Ctrl+P**

Activates the **Python** console, which can be left by pressing **Esc**. For details, see “**Python console**” on page 268 .

- **Ctrl+R**

Accesses the **File → Revert To Saved** menu item.<sup>C</sup>

- **Ctrl+S**

Accesses the **File → Save** menu item.<sup>C</sup>

- **Ctrl+T**

Accesses the **Edit → Reload All Textures** menu item.<sup>C</sup>

- **Ctrl+Y**

Accesses the **Edit → Redo** menu item.<sup>C</sup>

- **Ctrl+Z**

Accesses **Edit → Undo** menu item.<sup>C</sup>

**Note:** The mouse cursor must be over the viewport for this shortcut to be enabled.

- **Shift+Alt+[0-9]**

See entry Alt+Shift+[0-9] in this list.

- **Shift+Ctrl+[0-9]**

See entry Ctrl+Shift+[0-9] in this list.

- **Shift+Enter**

- **If Debug (Watcher) console<sup>A</sup> is active and watcher is in Edit mode**

Displays the watcher modification history.

- **Shift+Page Down**

- **If Debug (Watcher) console<sup>A</sup> is active and watcher is in Edit mode**

Decreases the watcher's value by 1.

- **Shift+Page Up**

- **If Debug (Watcher) console<sup>A</sup> is active and watcher is in Edit mode**

Increases the watcher's value by 1.

*A – Activated by F7 (for details, see “Debug (Watcher) console” on page 263 ).*

*B – For details, see “Toolbar” on page 143 .*

*C – For details, see “Menu items” on page 140 .*

## 3.5. Mouse controls

The list below lists the ModelEditor's mouse controls:

- **Left button drag**

- **If the mouse is dragged from an asset in the Asset Browser panel** (for details, see “Asset Browser panel” on page 160 )

For details, see “Drag-and-drop” on page 161

- **Right button drag**

Moves the camera in the scene.

Dragging the mouse to the left and to the right always moves the camera in that direction. But the effect on up and down drag is determined by the **ModelEditor Preferences** dialog box's **Invert Mouse** check box<sup>A</sup> (the dialog box is accessed via the **Edit → Preferences** menu item<sup>B</sup>).

The table below describes the camera's movement:

| Drag direction | Invert mouse | Camera movement | Model movement |
|----------------|--------------|-----------------|----------------|
| Left           | N/A          | Left            | Right          |
| Right          | N/A          | Right           | Left           |
| Forward        |              | Up              | Down           |
|                |              | Down            | Up             |
| Backwards      |              | Down            | Up             |
|                |              | Up              | Down           |

- If **Alt** or **Ctrl** is used to drag from the Asset Browser panel to the viewport (for details on Asset Browser, see “Asset Browser panel” on page 160 )

Adds the dragged model (with read-only permission) to the viewport, so it can be viewed alongside the current model. This is useful for editing models that are part of a SuperModel (for details, see the document Client Programming Guide’s section *Models* → “SuperModel”).

Performs the same function as the **File** → **Add Model** menu item. For details, see “Menu items” on page 140 .

- **Middle button click**

Moves the camera so that the model is brought to the centre of the screen.



Performs the same function as the **Zoom To Extents** toolbar button ( ).

- **Scroll wheel rotate**

Moves the camera forward and backwards.

- If **Space key** is pressed

Increases or decreases the camera speed, depending on the direction of the wheel rotation.



Performs the same functions as the , , , and toolbar buttons.<sup>C</sup>

*A* – For details, see “Preferences dialog box” on page 154 .

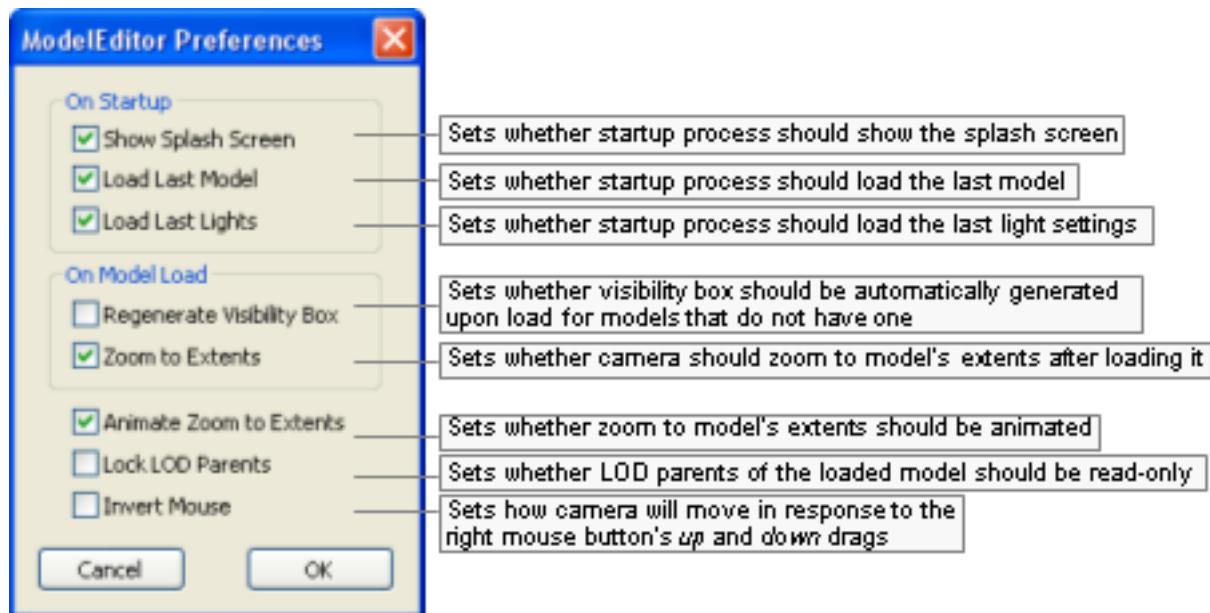
*B* – For details, see “Menu items” on page 140 .

*C* – For details, see “Toolbar” on page 143 .

## 3.6. Dialog boxes

### 3.6.1. Preferences dialog box

Accessed via the **Edit** → **Preferences** menu item, the **Preferences** dialog box allows you to customise editor, environment, and LOD (level of detail) options.



ModelEditor Preferences dialog box

The list below describes the fields on this dialog box:

▪ **On startup**

▪ **Show splash screen**

Toggles the display of the application's splash screen.

▪ **Load last model**

Toggles the automatic load on startup of the model file used on last session.

▪ **Load last lights**

Toggles the automatic load on startup of the light file used on last session.

▪ **On model load**

▪ **Regenerate visibility box**

Determines whether a visibility box should be automatically generated upon load for models that do not have one.

▪ **Zoom to extents**

Automatically zooms to show the entire model when loading.

▪ **Animate zoom to extents**

Sets whether the zoom to model's extents should be animated.

▪ **Lock LOD parents**

Sets whether LOD parents of the loaded model should be read-only.

▪ **Invert mouse**

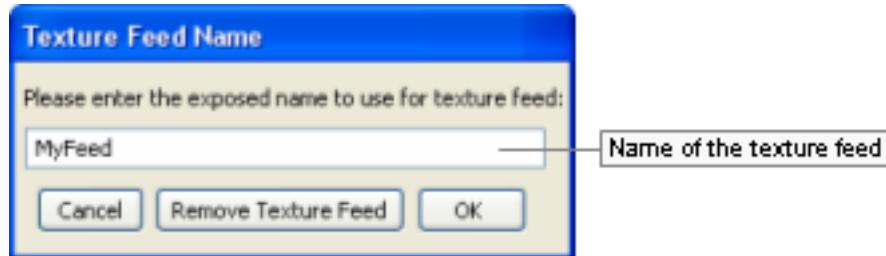
Toggles the camera orientation for the up and down mouse movements when using the mouse's right button.

Note that this setting does not affect the camera orientation for the left and right mouse movements.

| Value                               | Mouse movement | Camera movement | Model movement |
|-------------------------------------|----------------|-----------------|----------------|
| <input type="checkbox"/>            | Up             | Up              | Down           |
|                                     | Down           | Down            | Up             |
| <input checked="" type="checkbox"/> | Up             | Down            | Up             |
|                                     | Down           | Up              | Down           |

### 3.6.2. Texture Feed Name dialog box

Accessed by right-clicking any texture map in the **Materials Settings** panel's **Properties Table** (for details, see "Material Properties table" on page 203) and choosing either the **Enable Texture Feed** or the **Change Texture Feed Name** item in the context menu (for details, see "Texture map context menu" on page 204), this dialog box allows you to specify or change the name for the texture feed to be assigned to the invoking texture map.



Texture Feed Name dialog box

The list below describes the fields on this dialog box:

- **Name**

Name to assign to the texture feed.

- **Cancel**

Closes the dialog box without assigning or changing name of texture feed.

- **Remove texture feed**

Removes the texture feed currently assigned to the texture map.

This button will only be enabled if the invoking texture map already has a texture feed assigned to it.

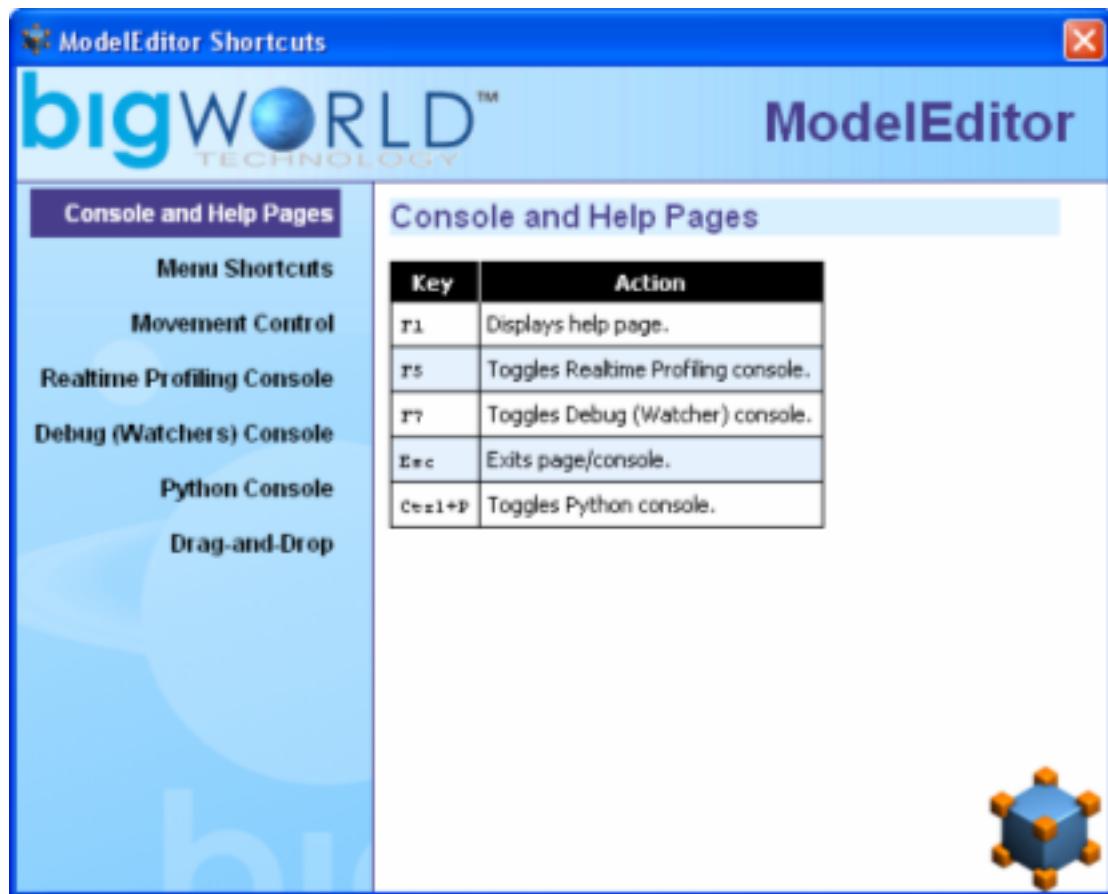
- **OK**

Assigns/changes name of the texture feed.

The name of the texture feed is displayed between parentheses next to the texture description.

### 3.6.3. ModelEditor Shortcuts dialog box

Accessed via the **Help → Shortcuts** menu item, the **ModelEditor Shortcuts** dialog box displays a list of shortcuts available on ModelEditor. For details on the complete list, see "Keyboard shortcuts" on page 145



ModelEditor Shortcuts dialog box

## 3.7. Assets

Assets used to populate the world can be accessed via the **Asset Browser** panel. For details, see “Asset Browser panel” on page 160 .

### 3.7.1. Models

This node lists all exported .model files. Models are the basic props that can be placed in world.

#### Note

For more information on models, see:

- document Client Programming Guide's chapter *Models*.
- document Content Creation Manual's lessons (document accessed by pressing F1 or by selecting the **Help → Content Creation** menu item — for details, see “Menu items” on page 140 ):
  - **Modify a Model in ModelEditor**
  - **Add Models to the World**
  - **Best Practices → Animation tree – Using LOD models to share animations**

For details on .model files' grammar, see the document File Grammar Guide's section *.model*.

### 3.7.2. Shells

Shells refer to the indoor chunks containing portals, exported to the folder shells.

#### Note

For more information on shells, see:

- “Potential problems placing models and shells” on page 133 .
- “Creating Shells” on page 325 .
- document Content Creation Manual's lessons (document accessed by pressing F1 or by selecting the **Help → Content Creation** menu item — for details, see “Menu items” on page 140 ):
  - **Create an Internal Shell**
  - **Create an Internal Area in WorldEditor Using Shells**
  - **Add Lights to the World → Lighting Environments**
  - **Outdoor-to-Indoor Transitions → Placing an interior shell**

### 3.7.3. Textures

Textures refer to two-dimensional images of a surface used to cover 3D objects, which are assigned in the **Materials Settings** panel (for details on this panel, see “Materials Settings panel” on page 199) to material's various maps (*e.g.*, normal, height, diffuse, specular, sub-surface).

#### Note

For more information on texture, see the document Content Creation Manual's lessons (document accessed by pressing F1 or by selecting the **Help → Content Creation** menu item — for details, see “Menu items” on page 140):

- **Create and Export a Static Object in 3ds Max and Maya → Referencing the object texture maps**
- **Create Low-Polygon Characters → Referencing the character texture maps**
- **Create and Apply Animated Texture Maps**
- **Build and Use Normal Maps → Create Decal Textures**

### 3.7.4. Effects

This node lists the effect files (.fx), which specify the effect to be applied to the selected material/tint (effect files are assigned in the **Materials Settings** panel (for details on this panel, see “Materials Settings panel” on page 199)).

**Note**

For more information on effects, see:

- document Client Programming Guide's section *3D Engine (Moo)* → “EffectMaterial”
- document Content Creation Manual's lessons (document accessed by pressing F1 or by selecting the **Help** → **Content Creation** menu item — for details, see “Menu items” on page 140):
  - **Manage Resources** → **Non-specific resources**
  - **BigWorld shaders and Materials**
  - **Create a New Material**

For details on the *.fx* file's grammar, see the document Client Programming Guide's section *3D Engine (Moo)* → “EffectMaterial” → “Format”.

### 3.7.5. MFMs

This node lists the material files (*.mfm*), which contain material information that includes bitmap references and effect files (*.fx*), which in turn gives ModelEditor access to artist-editable features in that file (MFM files are assigned in the **Materials Settings** panel (for details on this panel, see “Materials Settings panel” on page 199 ).

Material files are a handy way of storing complex material property settings.

When a *.mfm* file is referenced in ModelEditor, the content of that material file is copied to the model's visual file (*.visual*) — it does not dynamically reference the *.mfm* file. For details on visual files' grammar, see the document File Grammar Guide's section *.visual*.

**Note**

For more information on MFM, see the document Content Creation Manual's lessons (document accessed by pressing F1 or by selecting the **Help** → **Content Creation** menu item — for details, see “Menu items” on page 140 ):

- **Manage Resources** → **Organising art resources – Sets**
- **BigWorld shaders and Materials**
- **Create a New Material**
- **Create and Apply Animated Texture Maps**

For details on *.mfm* files' grammar, see the document File Grammar Guide's section *.mfm*.

### 3.7.6. Lights

This node lists pre-defined ModelEditor Light (*.mv1*) files, which specify lighting settings that can be applied to the model, thus previewing how it will look when placed in the world.

Lighting settings can be applied to the model using the **Lighting Setup** panel (for details on this panel, see “Lighting Setup panel” on page 195 ).

**Note**

For details on `.mv1` files' grammar, see the document File Grammar Guide's section `.mv1`.

### 3.7.7. Animations

This node lists the animation files (`.animation`) created and exported by your 3D application.

**Note**

For more information on animations, see:

- “3ds Max animation exporter” on page 314 .
- “Maya visual and animation exporter” on page 320 .
- document Client Programming Guide's chapter *Animation System*.
- document Content Creation Manual's lessons (document accessed by pressing F1 or by selecting the **Help → Content Creation** menu item — for details, see “Menu items” on page 140 ):
  - **Create Character Movement Animations**
  - **Add Animations to Characters**
  - **Modify Animations with Actions**
  - **Create Animated or Interactive Entities**
  - **Best Practices → Animation tree — Using LOD models to share animations**

## 3.8. Panel summary

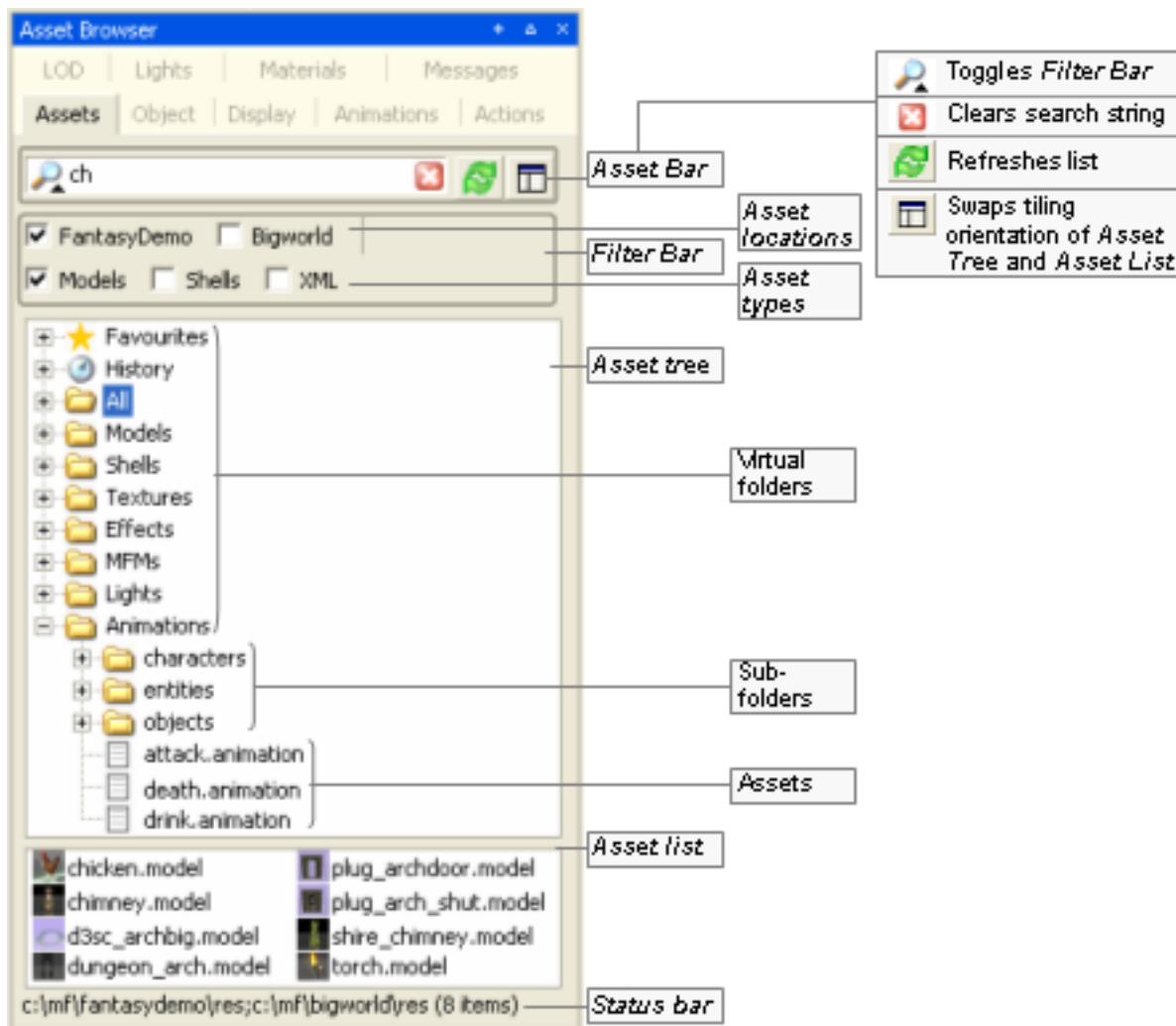
Most of the GUI for interacting with models is contained in panels selectable via tabs.



The following sub-sections describe each panel and the settings available on them.

### 3.8.1. Asset Browser panel

This panel gives access to assets through the Asset Browser, an interface that is available in WorldEditor, ModelEditor, and ParticleEditor. For details, see *Asset Browser* on page 275 .



Asset Browser panel

### 3.8.1.1. Drag-and-drop

Drag-and-drop operation is specific to the tool that implements it, and the type of asset being dragged , as described in the table below (asset types are listed in the order in which they appear in the Asset Tree):

| Asset type | Drop location <sup>A</sup>   | Effect  |
|------------|--|---|
| Animation  | Animations panel's <b>Animation</b> list (for details on this field, see "Animations panel" on page 176 )  | Adds the dragged animation to the list of animations played for the current model.  |
| Effect     | <b>Materials Settings</b> panel's <b>Properties</b> table or <b>Effect</b> field (for details on this field, see "Materials Settings panel" on page 199 )  | Assigns the dragged effect/MFM file to the current material.  |
| Light      | Viewport   | Applies the lighting setup described in the dragged file to the current model. This automatically selects the <b>Custom Lighting</b> option button in the <b>Lighting Setup</b> panel, and sets the <b>Lighting Model</b> drop-down list box with the selected file (for details, see "Lighting Setup panel" on page 195 ).   |
| MFM        | Same as <b>Effect</b> .  |   |
| Model      | Viewport   | <p>Opens the dragged model/shell for editing.</p> <p># If <b>ctrl</b> or <b>Alt</b> is pressed:</p> <p>Adds the dragged model (with read-only permission) to the viewport, so it can be viewed alongside the current model — this is useful for editing models that are part of a SuperModel (for details, see the document Client Programming Guide's section <i>Models</i> → "SuperModel").</p> <p>Performs the same function as the <b>File</b> → <b>Add Model</b> menu item (for details, see "Menu items" on page 140 ).</p> |
|            | <b>Object Properties</b> panel's <b>Editor Proxy Model</b> field (for details on this field, see "Object Properties panel" on page 162 )   | Adds the dragged model as a new LOD level for the current model.  |
|            | <b>Level Of Detail</b> panel's <b>LOD</b> table (for details on this field, see "Level Of Detail panel" on page 191 )  | Sets the dragged model as the editor proxy model.   |
| Shell      | Viewport   | Opens the dragged shell for editing.  |
| Texture    | <p><b>Display Settings</b> panel's <b>Choose Floor Texture</b> button (for details on this field, see "Display Settings panel" on page 165 )</p> <p><b>Materials Settings</b> panel's <b>Properties</b> table's any map field — e.g., normal, height, diffuse, specular, subsurface (for details on these fields, see "Materials Settings panel" on page 199 )</p> | <p>Applies the dragged texture to the floor texture.</p> <p>Assigns the dragged texture to the map field.</p>   |

A — If asset file is dropped in Favourites special virtual folder, then it is added to that folder. For details, see "Asset file" on page 282 .

Drag-and-drop operation in ModelEditor's Asset Browser panel

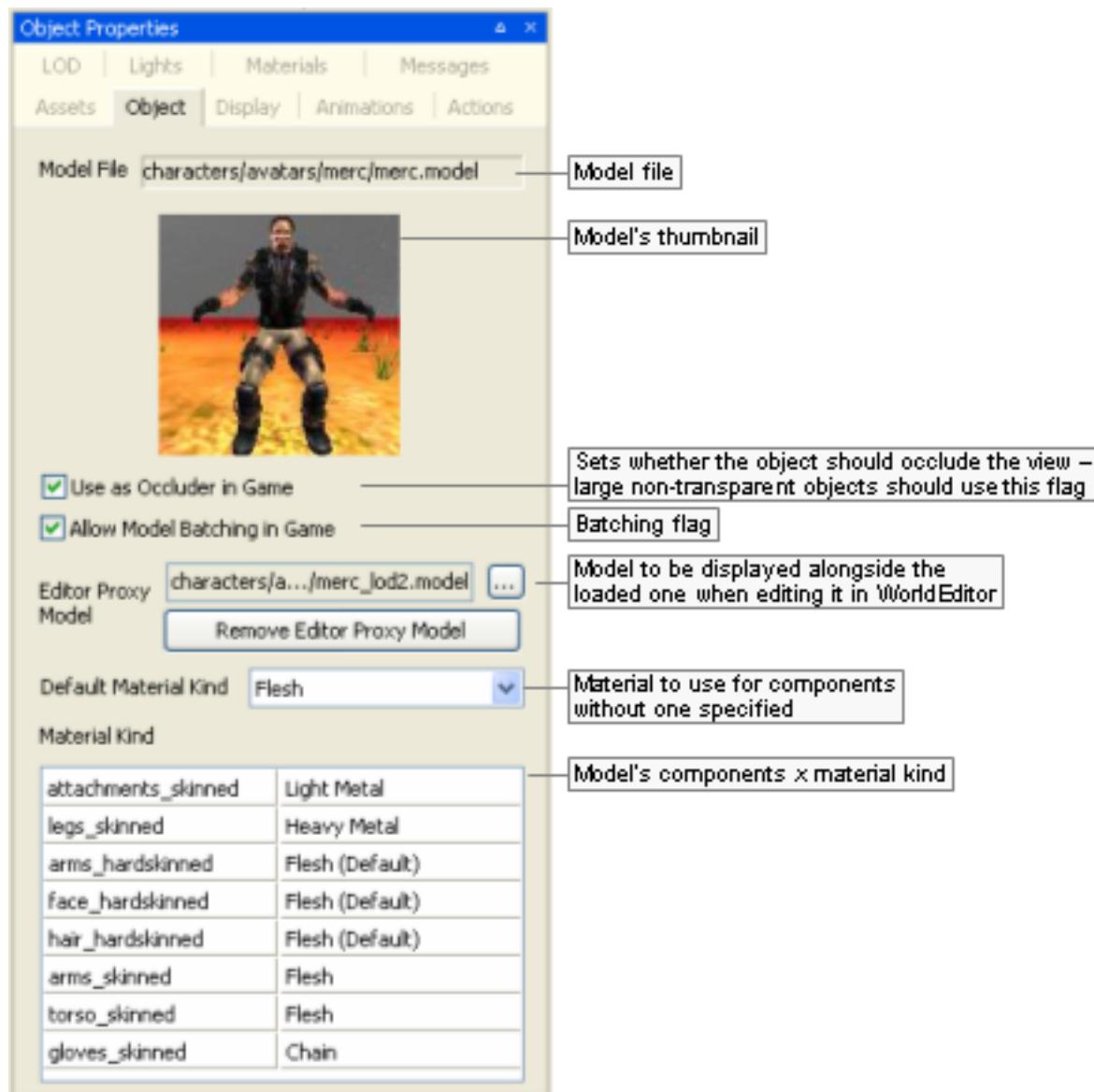
### 3.8.1.2. Virtual folders

Defined in Asset Browser's configuration file (for details, see "Customisation" on page 282), virtual folder list files of a specific asset type.

For details on the listed asset types, see "Assets" on page 157 .

### 3.8.2. Object Properties panel

This panel allows you to specify the properties of the material of each component of the model. For details on material properties, see "Materials Settings panel" on page 199 .



Object Properties panel

The list below describes the fields on this panel:

- **Model file**

Model's file name, with full path.

- **Use as occluder in game**

Indicates that the object should occlude the view (large non-transparent objects should use this flag). This information is used by UMBRA in the client to determine the visibility of objects behind the model.

- **Allow model batching in game**

Indicates that the model allows batching. This can improve performance due to rendering optimisation, if there are several instances of a model appearing in the game. It is important to note that batched models cannot use tints.

- **Editor proxy model**

Model to be displayed alongside the loaded one when editing it in WorldEditor. A very small models are difficult to select, manipulate, and visualise in WorldEditor — by defining a proxy model, the builder has a better way to work with them. Please note that ModelEditor also renders the proxy model alongside the current model.

- **Remove editor proxy model**

Removes the proxy model specified for the current model.

- **Default material kind**

Default material kind for the model (such as wood, glass, etc...), used to define the behaviour of the model, such as sounds to play and the particle systems to use for it.

For example, for a wooden barrel, a wood sound should be played, and wood particles emitted when it is shot at.

The default value—None (Default)—specifies that the value set for Default Material Kind should be used.

The file `bigworld/res/system/data/material_kinds.xml` (for details on this file's grammar, see the document File Grammar Guide's section `material_kinds.xml`) contains the current set of pre-defined kinds, and can be edited to customise the available material kinds, which are listed below:

- **None (Default)**

Material will use the visual's kind.

- **Wood**

Dull surfaces, not very reactive.

- **Stone**

Non-metallic hard surfaces.

- **Chain**

Lightweight meshes, often loose, such as link fences, or wire crates.

- **Light metal**

Lightweight or thin metal surfaces, often hollow.

- **Heavy metal**

Solid or thick metal surfaces.

- **Glass**

Any kind of glass.

- **Dirt**

Hard outside surfaces, often crunchy.

- **Grass**

Soft outside surfaces, may not be grassy.

- **Snow**

Hard crunchy snow.

- **Water**

Wet surfaces, including mud, wet ground and water pools.

- **Flesh**

People, body parts, etc...

- **Plastic**

Thick plastic (used often in research area for walls).

- **Material kind**

Table containing each model's components and its material kind.

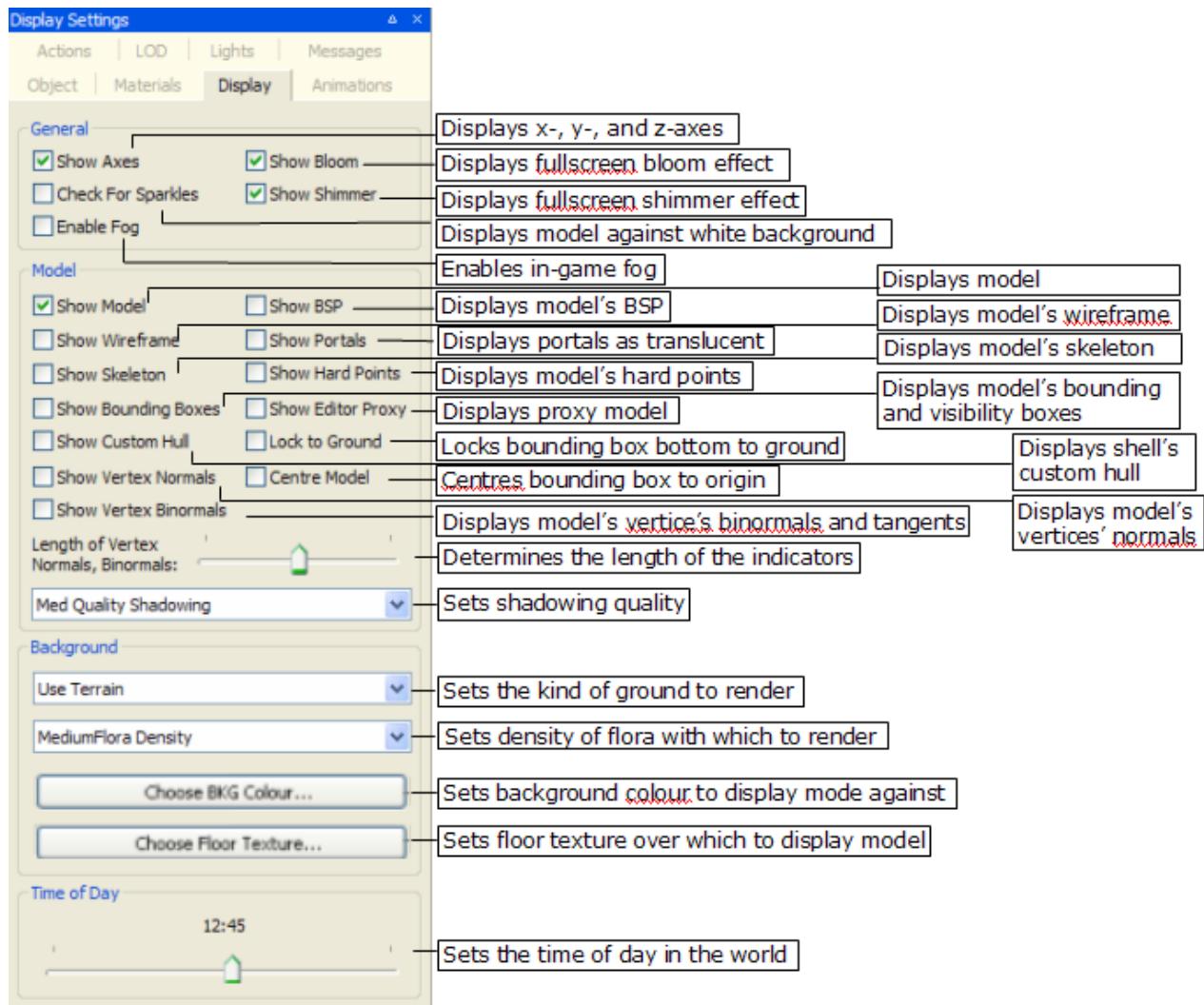
This value can be changed in Materials Settings panel, alongside other settings for each component. For details, see “Materials Settings panel” on page 199 .

*A — To display proxy models in WorldEditor, the General Options panel’s Show list box’s Editor Proxies check box must be selected. For details, see “General Options panel” on page 111 .*

### **3.8.3. Display Settings panel**

---

This panel gives you access to options on how to display models in the current session of ModelEditor.



Display Settings panel

The list below describes the fields on this panel:

- **General**

- **Show axes**

Toggles rendering of the X-, Y-, and Z-axes.

- **Show bloom**

Toggles the bloom full-screen effect.

Blooming is a way to simulate the high dynamic range of lighting, by producing an automatic glow around very bright objects.

- **Check for sparkles**

Overrides all other display settings, and displays the model against a white background with white ambient lighting — this is used to highlight any seams in the model.

Sparkles along seams can occur when two separate models (*e.g.*, a detachable arm a torso) are not properly joined. By rotating the model against a white background, any gaps along seams will sparkle.

- **Show shimmer**

Toggles the shimmer full-screen effect.

Shimmer is a special effect that is suited to simulating the diffraction from a moving water surface or bubbles, and localised heat-haze effects.

This will have an effect in ModelEditor only if the model has a shimmer material.

- **Enable Fog**

Toggles in-game fog.

Fog is particularly useful when dealing with sky domes.

- **Model**

- **Show model**

Toggles rendering of the model. In general, this option will be cleared only when the Show Skeleton check box is selected, to give the user a view only of the model's skeleton.

- **Show BSP**

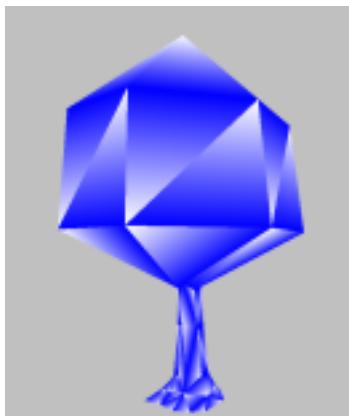
Toggles the display of model's BSP, which is used to calculate the collision scene.

**Note**

Skinned objects do not have an associated BSP tree, unless a custom one has been exported with it.



Show BSP—OFF



Show BSP—ON

- **Show wireframe**

Toggles the display of the model as a mesh.



Show Wireframe—OFF



Show Wireframe—ON

- **Show portals**

Toggles the display of portals as a translucent blue region.

**This option is applicable only to shells.**



Show Portals—OFF



Show Portals—ON

- **Show skeleton**

Toggles the display of model's skeleton, which will be rendered over the model itself.

It is possible to show only the skeleton by clearing the **Show Model** check box.



Show Skeleton—OFF



Show Skeleton—ON

- **Show hard points**

Toggles the display of model's hard points — each will be rendered alongside its name and XYZ axes.

For details on hard points, see the document Client Programming Guide's section *Models* → "Hard Points".



Show Hard Points—OFF



Show Hard Points—ON

- **Show bounding boxes**

Toggles the visibility of model's bounding box (yellow) and visibility box (blue).



Performs the same function as the **Display Bounding Box** (blue icon) toolbar button — for details, see “Toolbar” on page 143 .

- **Show editor proxy**

Toggles the display of the proxy model (specified in the **Object Properties** panel's **Editor Proxy Model** field) alongside the current model.

For details on proxy models, see “Object Properties panel” on page 162 .

- **Show custom hull**

Toggles the display of shell's custom hull defined in the `.visual` file (for details on this file's grammar, see the document File Grammar Guide's section `.visual`).

This option has no effect on shells that do not define a custom hull.

**This option is applicable only to shells.**



Show Custom Hull—OFF



Show Custom Hull—ON

- **Show vertex normals**

Toggles the display of normals for each of the model's vertices, which will be rendered in yellow.



Show Vertex Normals—OFF



Show Vertex Normals—ON

- **Centre model**

Centres the model's bounding box at the origin.

- **Show vertex binormals**

Toggles the display of binormals for each of the model's vertices — tangents will be rendered in red, and bi-normals in blue.



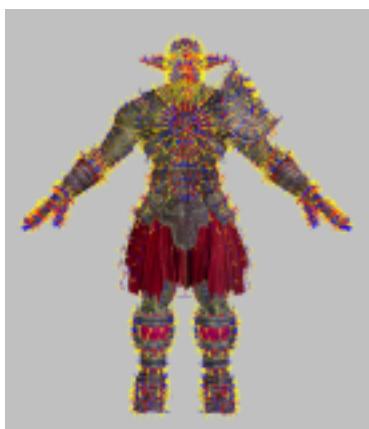
Show Vertex Binormals—OFF



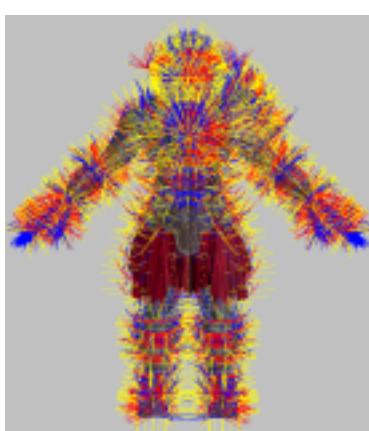
Show Vertex Binormals—ON

- **Length of vertex normals, binormals**

Specifies the length of the in which the vertices' normal, bi-normals, and tangents will be displayed.



Low value for length



High value for length

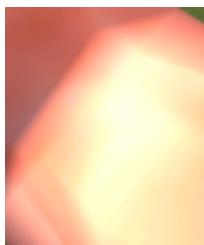
- **Shadowing settings**

Specifies the quality in which to render the model shadow.

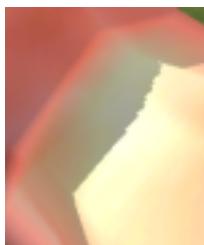
The higher the quality of the shadowing, the more CPU resources are used, thus decreasing the number of frames per second in which the model is rendered.

### Note

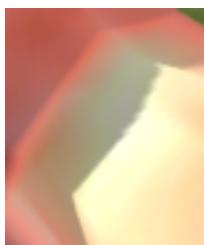
If the Show Wireframe check box is selected, then **Shadowing Settings** will have no effect on the model.



Disabled



Low quality



Medium quality



High quality

#### ▪ Background

##### ▪ Background option

Specifies what kind of ground should be rendered with the model:

- **No background**

Only the model will be rendered, with no floor or terrain.

- **Use floor**

The model will be rendered on top of the floor texture specified via the **Choose Floor Texture** button.

- **Use terrain**

The model will be rendered against the terrain specified for the space used in ModelEditor (this is set in `bigworld/tools/modeleditor/options.xml` file's `space` tag (for details on this file's grammar, see the document File Grammar Guide's section `options.xml` → "WorldEditor").

- **Flora density option**

Specifies the density of the flora to be rendered alongside terrain — this option is only available if the **Background Option** drop-down list box is set to **Use Terrain**.

| Note   |
|--|
| <p>Settings for the flora — including its density — are specified in the <code>flora.xml</code> file (for details on this file's grammar, see the document File Grammar Guide's section "<code>&lt;flora&gt;.xml</code>") specified in the space's <code>space.settings</code> configuration file's <code>flora</code> tag (for details on this file's grammar, see the document File Grammar Guide's section <code>space.settings</code>).</p> <p>If the tag is not present, then ModelEditor will use the settings specified in the <code>flora.xml</code> file specified in the <code>resources.xml</code> file's <code>floraxML</code> tag (for details, see the document Client Programming Guide's section <i>Overview</i> → "Configuration files" → "File <code>resources.xml</code>").</p> |

- **Choose BKG colour**

Opens the **Color** dialog box, where you can specify the colour against which the models will be rendered.

The selected colour will be applied to the background only if the **Background Option** drop-down list box is set to **No Background or Use Floor**.

- **Choose floor texture**

Opens the **Open** dialog box, where you can specify the image to be used as the floor texture.

Bitmaps, TGA, and JPG images can be used as a floor texture.

| Note  |
|---|
| <p>Items can be dragged into this button from <b>Asset Browser</b> panel's <b>Textures</b> virtual folder — the dragged texture will be applied to the floor.</p> |

**Note**

The texture tiling size (which defaults to 1 metre) is configurable via the `bigworld/tools/modeleditor/options.xml` file's `settings/floorGrid` tag

- **Time of day**

Sets the current time of the day in the world.

Changing the time of day affects the angle of the sun, and hence it also affects:

- **Ground** – depending on **Background Option**.
- **Shadow cast:**
  - **Upon the model** – depending on **Shadowing Setting**.
  - **On ground** – depending on **Shadowing Setting** and **Background Option**.

As mentioned in the **Shadowing Settings** entry, if the **Show Wireframe** check box is selected, then shadows are not rendered.

If **Background Option** is set to **Use Terrain**, then the sky changes according to the time.

The table below describes how the ground is affected by this field:

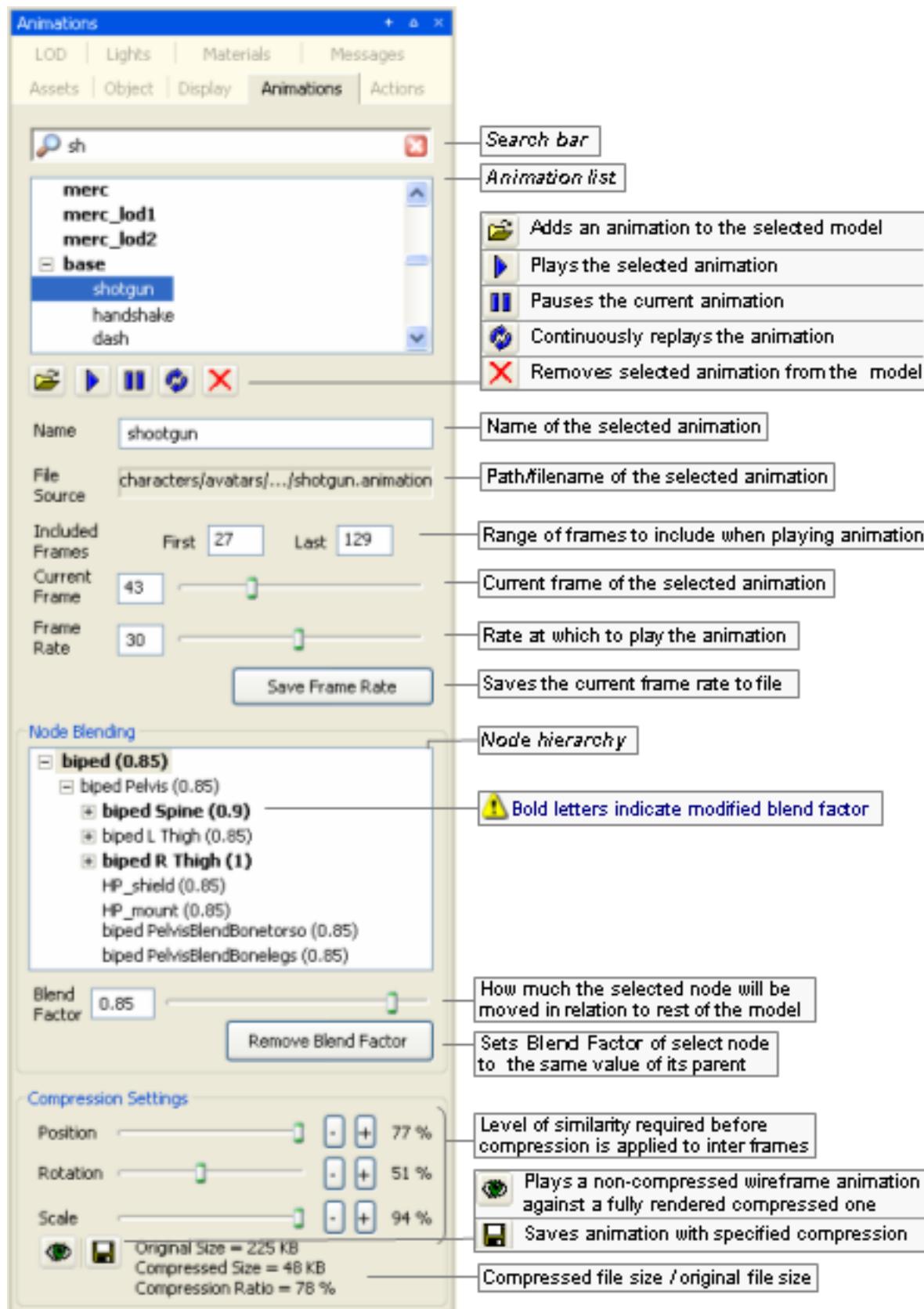
| Shadowing settings | Background option         |   |   |
|--------------------|---------------------------|---|---|
|                    | No Background             | Use Floor   | Use Terrain   |
| Disable shadowing  | None. No ground rendered. | Floor is rendered more darkly or brightly, according to colour of the light.  | Terrain and sky are rendered according to colour of the light.  |
| Low quality        |                           |   |   |
| Medium quality     |                           |   |   |
| High quality       |                           | Floor is rendered more darkly or brightly, according to angle of the sun. The model's shadow is cast on the ground according to angle of the sun. | Terrain and sky are rendered according to angle of the sun. The model's shadow is cast on the ground according to angle of the sun. |

**Note**

The **Lighting Setup** panel also has a **Time of Day** slider (under the **Game Lighting** option button), which is automatically changed to the value set on this field. For details, see “**Lighting Setup panel**” on page 195.

### 3.8.4. Animations panel

This panel allows you to manipulate the animations exported from your 3D application



Animations panel

The list below describes the fields on this panel:



Search bar — Restricts the animations displayed in **Animation List** to the ones containing the typed string.

The list is refreshed automatically as the string is typed.

The **Clear** button — — deletes the typed string, which causes the **Animation List** to display all animations associated to the model.

#### ▪ Animation list

List of all animations defined for each LOD of the model, which is set in the **Level Of Detail** panel (for details, see “Level Of Detail panel” on page 191 ).

Animations are listed in the order in which they were added to the model — which also will be reflected in the model file (for details on this file's grammar, see the document File Grammar Guide's section `.model`).

#### ▪ Animation buttons



Opens the Open dialog box, where you can specify an animation file (`.animation`) to associate to the selected model.



Plays the selected animation.



Pauses the current animation.



Continuously replays the current animation.



Dissociates the selected animation from the model. No confirmation is requested for this operation.

#### ▪ Name

Name of the selected animation.

Changes made to this field are automatically reflected in the **Animation List** list box.

#### ▪ File source

Path/filename of the selected animation.

The path is relative to one of the entries in the resources folders list (or `<res>`). For details on how BigWorld compiles this list, see *Starting the Tools* on page 273 .

- **Included frames**

Range of frames to include when playing the animation

- **Current frame**

Number of the frame currently displayed.

As you move the slider, the frame in the viewport is automatically updated, according to the current settings for node blending.

- **Frame rate**

Rate at which to play the animation.

Value ranges from 1 to 60.

- **Save frame rate**

Writes the current value of **Frame Rate** to the model.

When viewing different animations, the modified value of **Frame Rate** is lost, unless it is written to the model.

- **Node blending**

This panel allows the user to modify the settings that refer to animation node blending. **Blend Factor** determines the percentage of current node animation that will be retained when this animation is blended with another one.

Changes to node blending are saved in the model file, not in the original animation.

- **Node hierarchy**

Displays the model's nodes that must be manipulated in order to achieve the overall animation, as set in your 3D application.

For each node, the following is displayed:

- **Node name.**

- **Amount of node blending.**

- **Blend factor**

Sets the percentage of current node animation to retain when blending this animation with another one.

This value is specified in relation to the animation's original value set in your 3D application.

Value ranges from 0.0 to 1.0, with the effects described below:

- **0.0**

None of the animation for the current node will be used in the final blended animation — *i.e.*, the node will be moved as specified in the other animation.

- **Between 0.0 and 1.0**

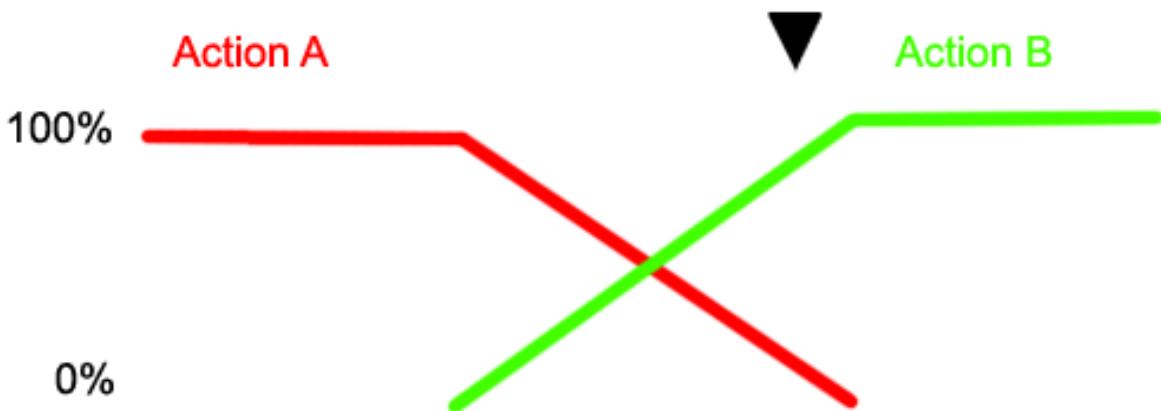
The specified percentage of the animation for the current node will be used in the final blended animation.

- **1.0**

The animation for the current node will be used in the final blended animation as it is — *i.e.*, none of the other animation will be used for current node.

Blend values greater than 1.0 can be assigned to a node to give it more weight when blending, but it is important to recognise that strong node blend values will effect the blend in and blend out times between actions. In the diagram below a node with a strong blend weight in Action A will still be the

strongest influence at the time marker , if blending with a significantly less weighty node.



- **Remove blend factor**

Sets Blend Factor of the selected node to same value of its parent node.

- **Compression settings**

Group of settings that specify how much the animation should be compressed.

The key frames of an animation contain rotation, scale and position information. If this information does not change much over several frames, the intermediate frames (or inter frames) can have that information stripped out to save memory.

The sliders can be used to specify the threshold of similarity that determines whether to strip out the values for the inter frames. When changing the value of one of the sliders, it will only update when you release the left mouse button. Holding down shift while changing the slider will cause it to update every frame.

- **Position, Rotation, Scale**

Required level of similarity in position/rotation/scale information before compression is applied to inter frames.



Produces a non-compressed wireframe animation of the model, played along a fully-rendered compressed one.

This way, the user can tweak the animation to achieve the best relation between animation quality and file size.



Preview



Saves the animation with the specified compression.

- **Compressed vs. Original file size**

Displays the animation file size reflecting the current compression settings, against the current animation file size.

### **3.8.5. Actions panel**

---

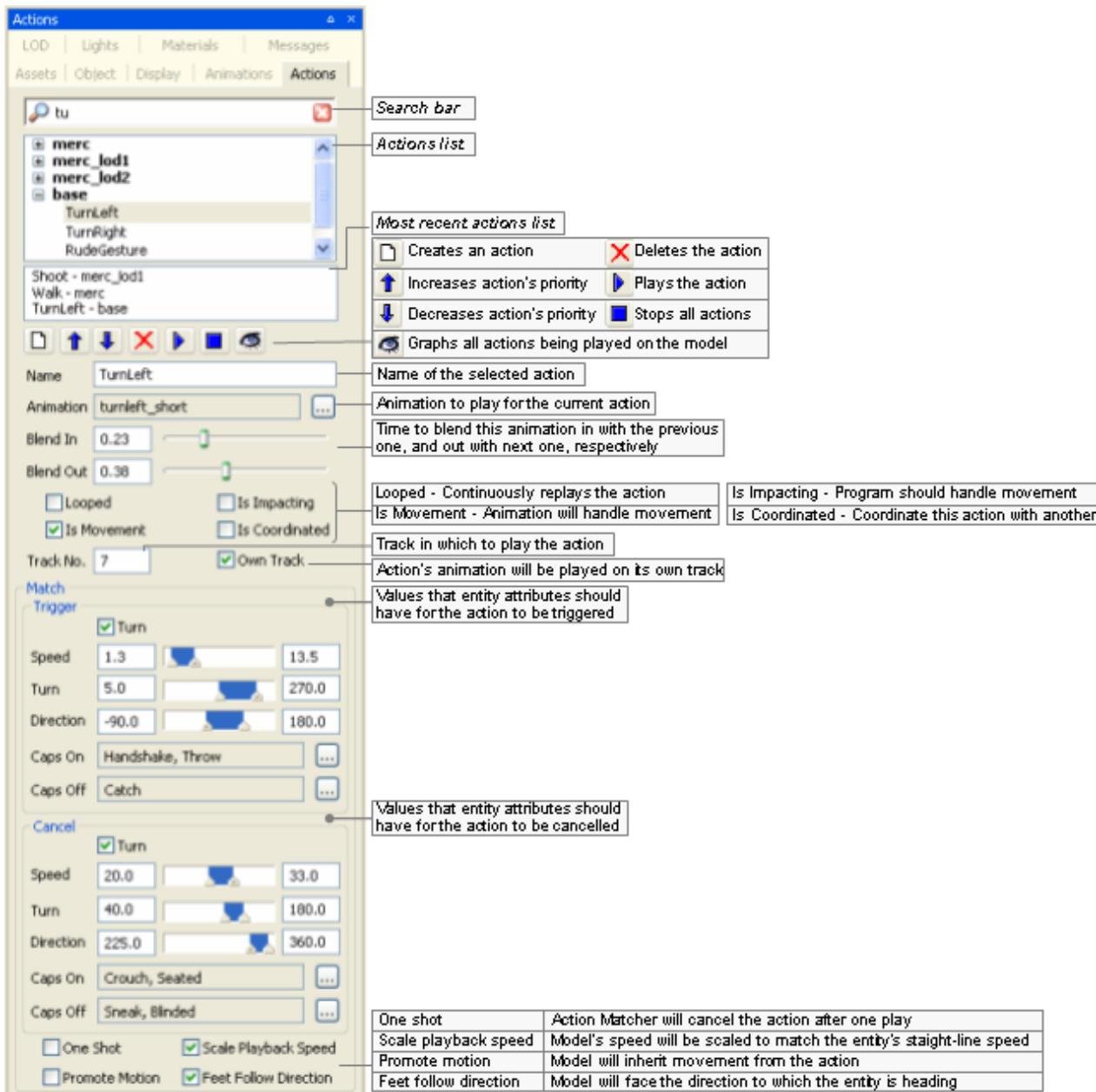
This panel allows you to create actions for the model, which can be used in scripts, and which are used by Action Matcher to determine the model's animations.

It also allows you to preview blending between actions that are on the same track and those that are on separate tracks. ModelEditor has a set of rules in order to mimic the way the Action Matcher chooses how actions behave with each other in the game, these rules are:

- If the action has no action match settings then it will be played once unless the **Looped** option is set.
- If the action has trigger conditions then it will loop unless it has cancel conditions.
- If the **One Shot** option is set then it will play once.

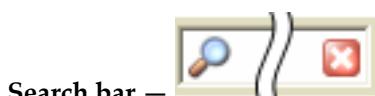
For details on match triggers and capability flags, see:

- “Action Triggers dialog box” on page 190 .
- document Client Programming Guide’s section *Scripting* → “Functional components” → “Action Matcher”.
- document File Grammar Guide’s section *.model*.



Actions panel

The list below describes the fields on this panel:



Restricts the actions displayed in **Action List** to the ones containing the typed string.

The list is refreshed automatically as the string is typed.

The **Clear** button — — deletes the typed string, which causes the **Action List** to display all actions associated to the model.

#### ▪ Action list

List of all actions defined for each LOD of the model, which is set in the **Level Of Detail** panel (for details, see “Level Of Detail panel” on page 191 ).

Actions are listed in the order in which they were added to the model — which also will be reflected in the model file (for details on this file's grammar, see the document File Grammar Guide's section `.model`).

- **Most recent actions list**

List of the three most recent used actions.

- **Action buttons**



Opens the **Create Action** dialog box (for details, see “Create Action dialog box” on page 187), where you can specify an animation file (`.animation`) to associate to the new action.

The action is added directly after the selected action.



Increases the priority of the selected action



Decreases the priority of the selected action



Deletes the select action. No confirmation is requested for this operation.



Triggers the selected action.



Stops all actions currently playing.



Graphs on the viewport all actions being played on the model, with their respective blend weights.



Graph with the actions being played on model, with their respective blend weights

Please note that this graph can also be displayed in-game using the Python console (for details, see the document Content Creation Manual's lesson **Modify Animations With Actions** → **Debugging Animations**, and the document Client Programming Guide's section *Scripting* → "Functional components" → "Action Matcher" → "Debugging animations").

- **Name**

Name of the action as used by a script.

These are available as named 'constants' of the model object returned by the Model Manager.

Changes to this field are automatically reflected in **Action List** list box.

**Note**

This has to be a Python-safe name, *i.e.*, with only alphanumerics and the underscore character. Hence, it cannot support non-ASCII character sets, such as Chinese.

- **Animation**

Animation to be played for the current action.



The **Browse** button — — opens the **Choose Animation** dialog box (for details, see "Choose Animation dialog box" on page 189 ), where you can select an animation file (.animation) for the action.

- **Blend in**

Time (in seconds) to blend this animation in with the previous one.

- **Blend out**

Time (in seconds) to blend this animation out with the next one.

- **Looped**

Toggles the continuous replay of the selected action.

- **Is impacting**

Sets whether the movement in the root node of the animation should be promoted to impact on the controlling entity's position (assuming it is being controlled by an entity).

When this check box is selected, the offset of the root node in each frame of the animation from the position of the root node in the first frame is recorded, then subtracted from that frame.

This should be used for an irregular movement like 'jump over a log', where the model position change due to the animation should actually change the entity's position (and where the functionality provided by Is Movement is not appropriate).

The offset of the final frame is available to scripts.

Note that changes to the entity's position caused by impacting actions do not consider the collision scene. Care should be taken to ensure that applying an impacting action does not result in the entity being stuck in the collision scene.

- **Is movement**

Sets whether the animation contains built-in movement, such as a walk cycle or a run cycle.

The change in transform of the root node from the beginning to end is recorded, then proportionally subtracted from each frame (*i.e.*, if this check box is selected, then a run animation that does not run on the spot will appear to).

Since the subtraction is proportional to the frame number, if you move the model's transform at a constant speed, then the animation will play back exactly as it was exported, since the amount added by the movement of the transform will exactly match that subtracted from the movement of the root.

This check box should be selected for linear animations with regular movement. For irregular movements, select the Is Impacting check box instead.

IsMovement actions can also use the scale playback speed option.

The recorded offset of the last frame is available to scripts.

- **Is coordinated**

Sets whether the animation is part of a sequence that is to be coordinated with a corresponding action on another model, and this animation does not start at the origin.

In this case, the offset of the root node in the first frame of the animation from the same node in its cognate animation's first frame is recorded, and subtracted completely from the root node for every frame of the animation (*i.e.*, if this check box is selected, then the action for an animation that does not occur at the origin will play as if it did).

The offset from the cognate is available to scripts, so that models can be perfectly positioned and have their animations played back exactly as they were exported.

**Note:** The cognate animation is recorded in the animation definition, not in the action definition. The cognate is an animation whose root node in the first frame is in exactly the same pose as the root node in the first frame of the animation being described, except that the animation being described is offset from

the origin — *i.e.*, it is the normal (non-offset) animation that was being played immediately prior to the animation being defined. The 'idle' animation is almost always a suitable cognate for animations whose actions will be coordinated.

- **Track no.**

Track on which the selected animation should be played.

A model may have different animations played on it at the same time, if each one is running on a different track.

- **Own track**

Sets whether the action's animation should be played on its own track. An action with this field selected will have its animation always always blending with other animations playing at the same time.

- **Match**

Group of conditions that must be met before Action Matcher triggers or cancels the selected action. For details on match triggers and capability flags, see the document Client Programming Guide's section *Scripting* → "Functional components" → "Action Matcher", and the document File Grammar Guide's section `.model`.

- **Trigger**

Group of conditions that must be met for the Action Matcher to trigger the action.

- **Falling (check box)**

Determines whether the model must be falling in order for the action to match.

If this option is selected, then **Speed** is interpreted as the falling velocity. To further clarify, if the minimum and maximum velocities are set to 1 and 20 m/s then without falling being selected the action will be matched by a horizontal or vertical speed between 1 and 20 m/s. If falling is selected, then the action will be matched by a negative vertical velocity between 1 and 20 m/s.

- **Speed**

Minimum and maximum entity speeds.

If the **Falling** check box is selected, then this is the vertical falling velocity.

- **Turn**

Minimum and maximum difference between entity's head and body angle.

- **Direction**

Minimum and maximum yaw of the model in relation to the entity.

- **Caps on<sup>A</sup>**

List of user-defined capability flags that should be on.

- **Caps off<sup>A</sup>**

List of user-defined capability flags that should be off.

- **Cancel**

Group of conditions that must be met for the Action Matcher to cancel the action.

- **Turn (check box), Speed, Turn, Direction, Caps on<sup>A</sup>, Caps off<sup>A</sup>**

Same as **Trigger**.

- **One shot**

Indicates to Action Matcher that the action should cancel the triggered action after playing it once.

- **Scale playback speed**

Indicates that the speed at which the action is played should be scaled, in order to match the straight-line speed of the entity.

It is used to keep the feet from sliding along the ground, while allowing the entity to move at any pace.

- **Promote motion**

Indicates that a model should inherit the movement from an action, instead of blending out its movement back to the origin once it has finished playing.

Also indicates, for any client-controlled entity (such as the Player), that the entity will inherit the Action's translation. Note that any rotation in such actions will not be promoted to the Entity, only to the Model.

Note that this option should always be turned on for **IsImpacting** and **IsMovement** actions, or else those options will not work correctly.

- **Feet follow direction**

Indicates that the model should face the direction to which the entity is heading.

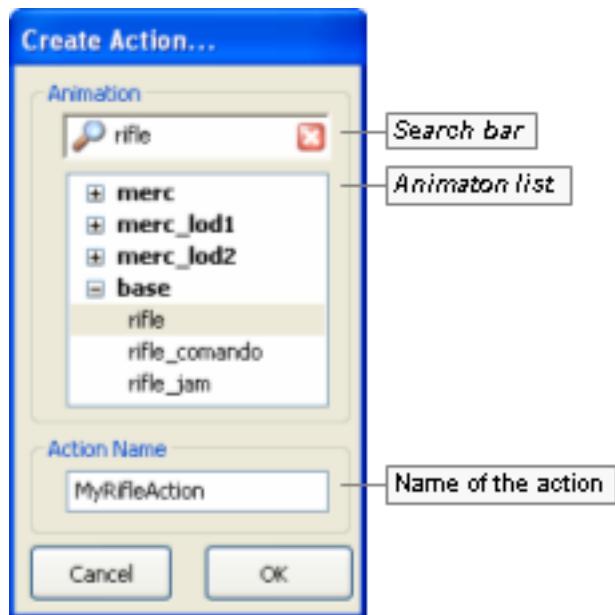
This will be a temporary change, and the model will blend back to pointing 'straight ahead' after the action has finished playing.

 A – The Browse button –  – opens the **Action Triggers** dialog box, where you can specify the list of capabilities that will affect triggering the action. For details, see “Action Triggers dialog box” on page 190 .

### 3.8.5.1. Create Action dialog box



This dialog box is invoked by **Actions** panel's **New Action** button –  –, and allows you to create an action for the selected model.



Create Action dialog box

The list below describes the fields on this dialog box:

- **Search bar** —

Restricts the animations displayed in the Animation List to the ones containing the typed string.

The list is refreshed automatically as the string is typed.

The Clear button — — deletes the typed string, which causes the Animation List to display all animations associated to the model.

#### ▪ **Animation list**

List of all animations defined for each LOD of the model (set in the Level of Detail panel).

Animations are listed in the order in which they were added to the model — which also will be reflected in the model file (for details on this file's grammar, see the document File Grammar Guide's section `.model`).

#### Note

The specified animation might belong to a model different from the one selected in the Actions panel.

#### ▪ **Action name**

Name of the new action.

**Note**

This has to be a Python-safe name, *i.e.*, with only alphanumerics and the underscore character. As a consequence, it cannot support non-ASCII character sets, such as Chinese.

▪ **Cancel**

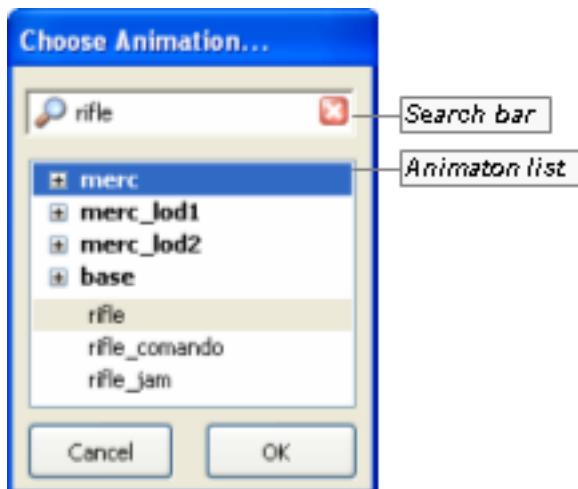
Closes the dialog box without creating an action.

▪ **OK**

Closes the dialog box, updating Actions panel's Name and Animation fields with the specified values.

### 3.8.5.2. Choose Animation dialog box

This dialog box is invoked by the Animation field's Browse button — —, and allows the user to choose the animation to be associated with the selected action.



Choose Animation dialog box

The list below describes the fields on this dialog box:

- 

**Search bar** —

Restricts the animations displayed in the **Animation List** to the ones containing the typed string.

The list is refreshed automatically as the string is typed.

The **Clear** button — — deletes the typed string, which causes the **Animation List** to display all animations associated to the model.

▪ **Animation list**

List of all animations defined for each LOD of the model (set in the **Level Of Detail** panel).

Animations are listed in the order in which they were added to the model — which also will be reflected in the model file (for details on this file's grammar, see the document File Grammar Guide's section `.model`).

**Note**

The specified animation might belong to a model different from the one selected in the **Actions** panel.

- **Cancel**

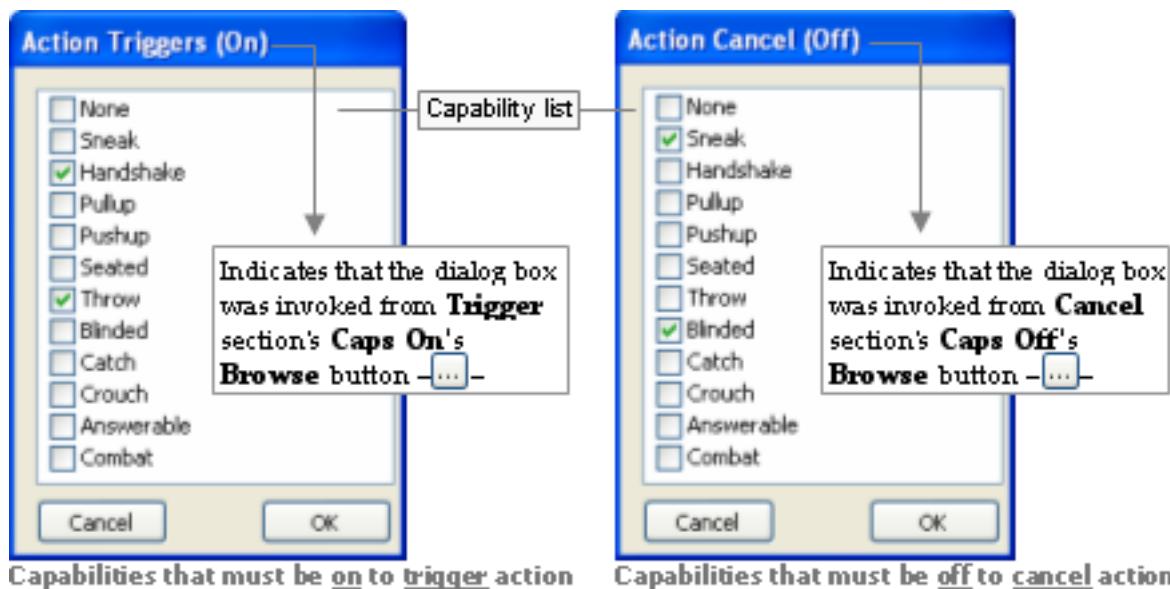
Closes the dialog box without assigning an animation to the selected action.

- **OK**

Closes the dialog box, updating **Actions** panel's **Animation** field with the selected animation.

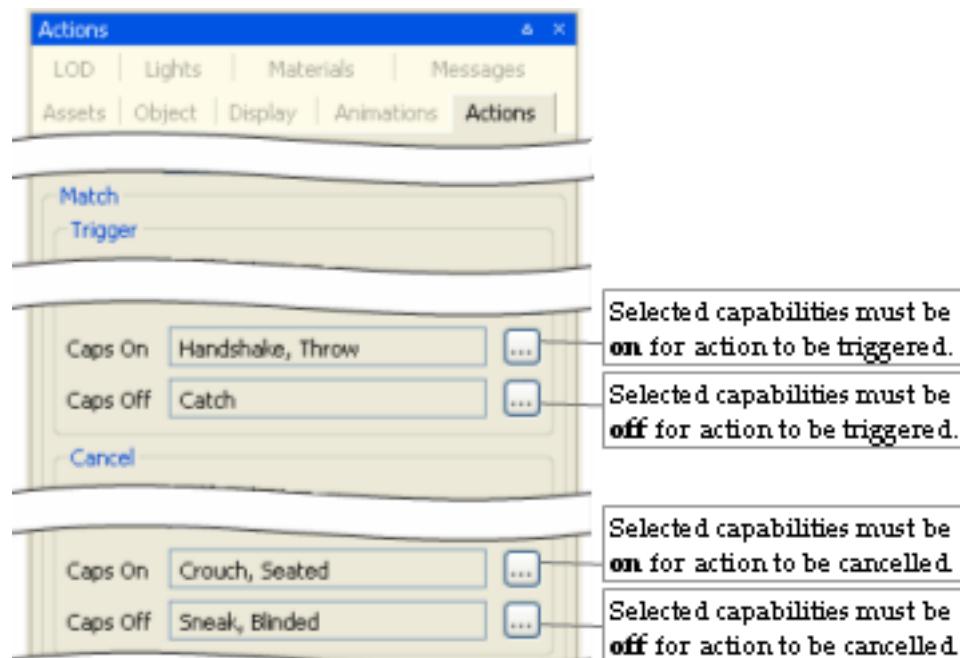
### 3.8.5.3. Action Triggers dialog box

This dialog box is invoked by the **Actions** panel's various **Browse** buttons —  — on the **Capabilities** fields, and allows the user to specify the capabilities that must be on (if the dialog box was invoked from **Caps On**) or off (if invoked from **Caps Off**) for the action to be triggered (if invoked from the **Trigger** section) or cancelled (if invoked from the **Cancel** section).



Action Triggers dialog box

The illustration below shows the effect of the selected capabilities in the current action, according to the button that invoked the dialog box:



#### Example

The list below describes the fields on this dialog box:

- **Capability list**

List is retrieved from `fantasydemo/res/scripts/common/capabilities.xml`.

For details on this file, see the document File Grammar Guide's section `capabilities.xml`.

- **Cancel**

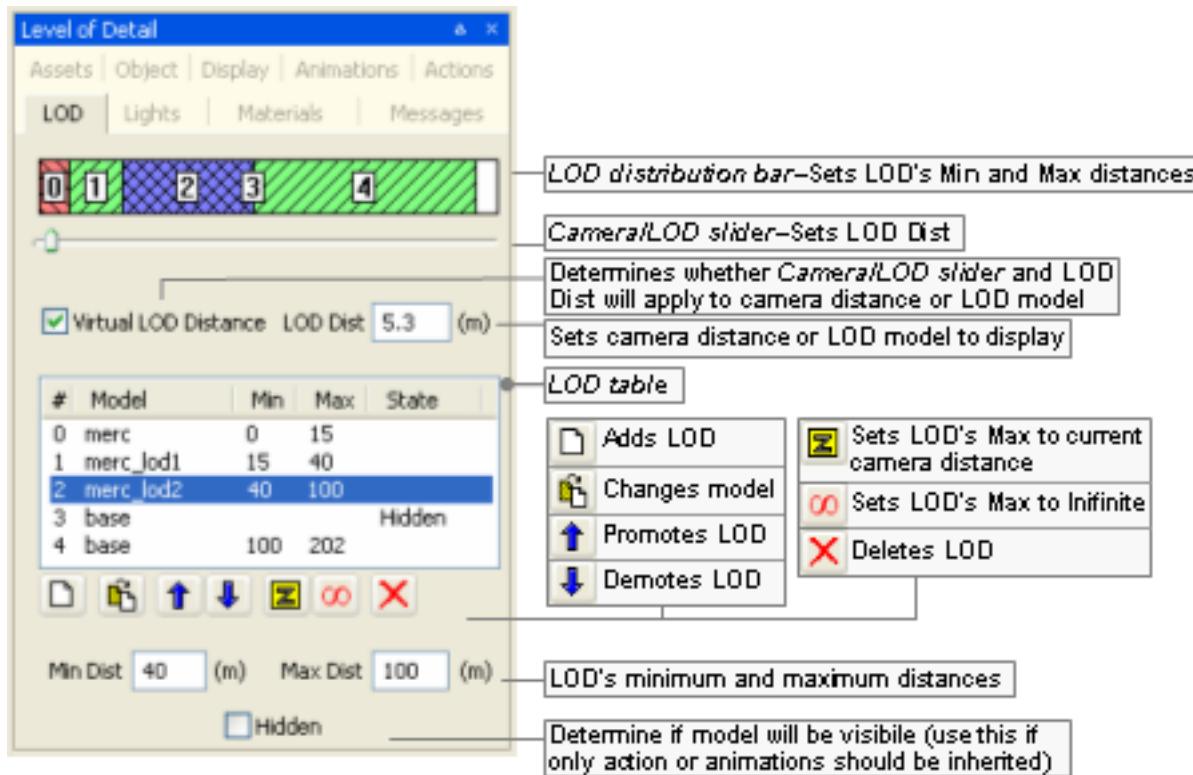
Closes the dialog box without assigning any capabilities to the invoking field.

- **OK**

Closes the dialog box, updating the invoking field with list of selected capabilities.

### **3.8.6. Level Of Detail panel**

This panel allows the user to set discrete levels of detail for the model, and to specify the distances at which to use them.



Level Of Detail panel

The list below describes the fields on this panel:

- **LOD distance bar**

Graphic representation of LOD levels.

The bar is divided into ranges, one for each entry in the **LOD table**. The ranges are displayed in proportion to the distances they cover.

**Min** and **Max** columns in the LOD Table are automatically updated according to changes made to the bar.

- **Camera/LOD slider**

Sets LOD Dist.

- **Virtual LOD distance**

Determines whether **Camera/LOD slider** and LOD Dist will affect the LOD model displayed (if the check box is selected), or camera distance (if the check box is cleared).

- **LOD Dist**

Depending on the value of **Virtual LOD Distance** check box, it has the following behaviour:

- **If selected:**

Displays the LOD model associated to that distance.

- **If cleared:**

Sets the camera distance to the model.

- **LOD table**

Contains one row for each LOD level.

It contains the following fields:

- **#**

Sequential number of the LOD.

- **Model**

Model to be drawn for the LOD.

- **Min**

Minimum distance from the camera for which the model will be drawn.

If the model moves closer to the camera, then the model specified for the previous LOD will be drawn.



This field can be set by the **LOD Distance Bar**, the **Promote LOD** button – –, the **Demote LOD**



button – –, and the **Min Dist** field.

**Min** column of the first non-hidden LOD can only be 0.

- **Max**

Maximum distance from camera in which model will still be drawn.

If the model moves closer to the camera, then the model specified for the next LOD (if any) will be drawn.

If an ellipsis is displayed in this column, it means that the LOD has no maximum range – this is done



via **Set To Infinite** – – button.



This field can be set by the **LOD Distance Bar**, the **Promote LOD** button – –, the **Demote LOD**



button – –, the **Apply Camera Distance** button – –, the **Set to Infinite** button – –, and the **Max Dist** field.

- **State**

Determines whether the model should be actually rendered at any point.

An LOD might be set as hidden (via the check box with the same name), in case we want other LODs to inherit its animations and/or actions, but do not want it to be rendered at any distance.

If an LOD model cannot be located, then its **State** will be set to **Missing** – in this case, the model can



be changed to a valid one by using the **Change Model** button – –.

- **LOD table buttons**



Opens the **Open** dialog box, where the user can specify a model file (.model) to be associated to the new LOD added at the end of **LOD Table**.

New LOD's **Min** column will be set to the value of previous LOD's **Max** column, or to previous LOD's **Min** column plus 10 metres, in case its **Max** is set to ... (infinite).

New LOD's **Max** column will be set to ... (infinite).



Opens the **Open** file dialog box, where the user can specify a new model file (.model) to replace the remainder of the LOD trunk from the selected LOD down the tree. Note: This may change multiple models in the tree.



Moves the selected LOD to the row above.

This causes the selected model to swap values of **Min** and **Max** columns with the LOD that previously occupied the row above.

This button will be disabled if the first or the second LOD is selected (in the latter case, that is because it would make the current model to change).



Moves the selected LOD to the row below.

This causes the selected model to swap values of **Min** and **Max** columns with the LOD that previously occupied the row below.

This button will be disabled if the first or the last LOD is selected.



Sets **Max** column of the selected LOD to current camera distance.



Sets **Max** column of selected LOD to ... (infinite).

The value of **State** column of LODs below the selected one are automatically changed to **Hidden**.



Removes the selected LOD.

The value of **Max** column of the first non-hidden LOD above the selected one will be automatically changed to the value of **Min** column of the selected LOD.

If only one LOD is left after pressing this button (which means that now the model has no effective LOD, and only the current model is listed in the **LOD table**), then the value of its **Max** column is set to ... (infinite).

This button will be disabled if the first LOD is selected.

- **Min Dist**

Sets **Min** column of **LOD table**'s selected LOD.

- **Max Dist**

Sets **Max** column of **LOD table**'s selected LOD.

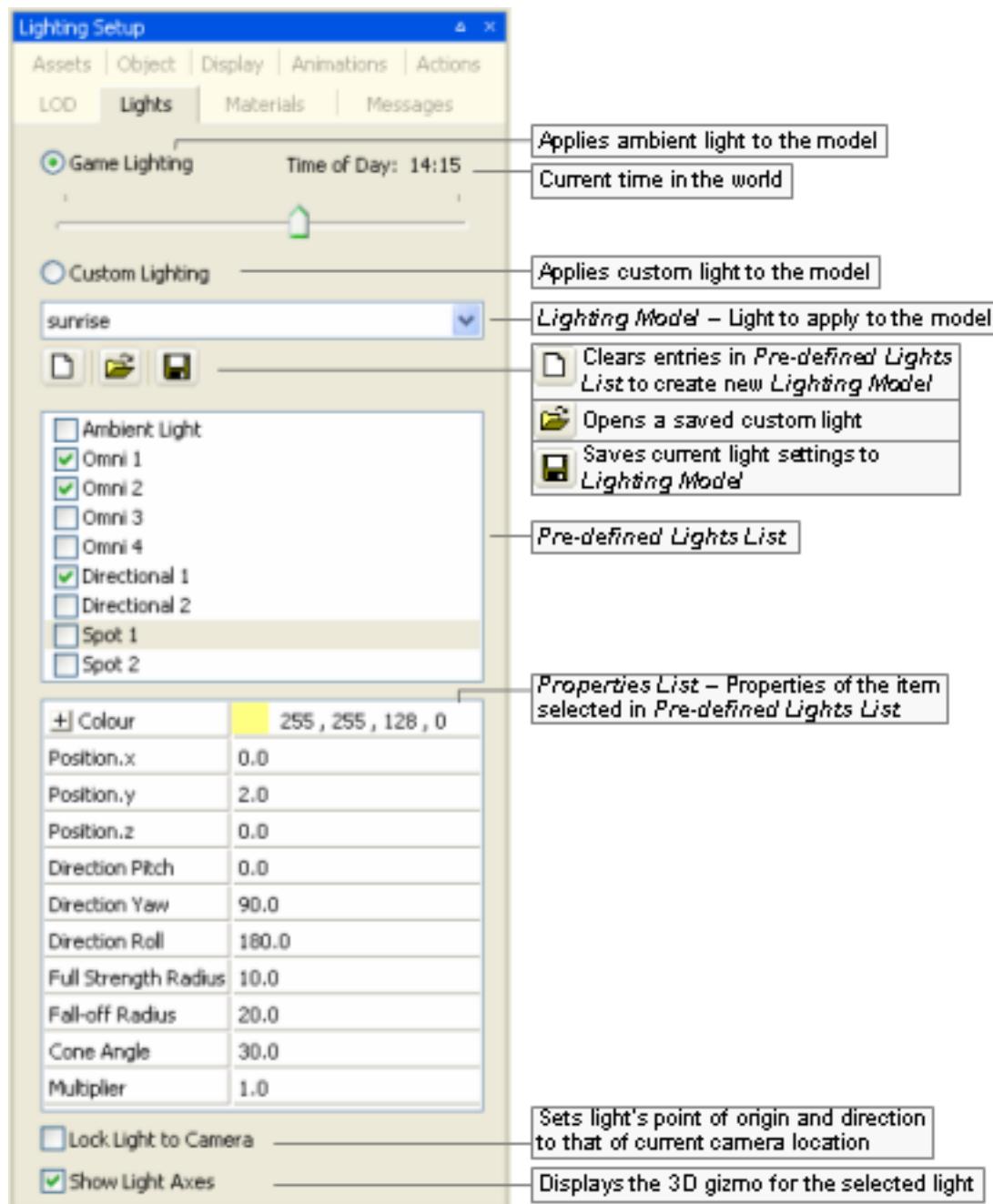
- **Hidden**

Sets **State** column of **LOD table**'s selected LOD.

### **3.8.7. Lighting Setup panel**

---

This panel lets the user change the current lighting settings in ModelEditor.



Lighting Setup panel

The list below describes the fields on this panel:

- **Type of light**
  - **Game lighting**

Applies ambient light to the model.

**\* Time of day<sup>A</sup>**

Sets the current time of day in the world.

**Note**

The **Display Settings** panel also has a **Time of Day** slider, which is automatically changed to the value set on this field — for details, see “Display Settings panel” on page 165 .

- **Custom lighting**

Applies custom light to the model.

- **Lighting model<sup>B</sup>**

Saved custom ModelEditor Lighting Model (.mv1)<sup>C</sup> applied to the model.

- **Lighting model buttons<sup>B</sup>**



Clears values specified in the **Pre-defined Lights List**, in order to create a new Lighting Model.



Opens the **Open** dialog box, where you can specify a ModelEditor Lighting Model (.mv1)<sup>C</sup> file to apply to the model.



Opens the **Save As** dialog box, where you can specify a ModelEditor Lighting Model (.mv1)<sup>C</sup> file to save the current light settings to.

- **Pre-defined lights list<sup>B</sup>**

List of instances of light types that might be applied to the model.

The selected light instances will be applied to the model, and each can be configured in the **Properties List** list box.

Each Lighting Model might have the following light types (described in the order they appear in the list box):

- **Ambient** (1 instance)

Covers the entire scene with omnidirectional light.

- **Omni** (4 instances)

Radiates from a three-dimensional point, giving more control over the concentration of light in certain areas.

It is done by specifying an area of full light intensity, and a bigger area in which light gradually fades away.

- **Directional** (2instances)

Directs a wide area of radiance at a particular area or object — ideal for simulating infinite-point light sources, such as sunlight, moonlight, and firelight. The first directional light is used for determining the shadow angle, if it is enabled.

Shadows are enabled in the **Display Settings** panel's **Model** group box's **Shadowing Settings** drop-down list box (for details, see "Display Settings panel" on page 165 ).

- **Spot** (2 instances)

Produces a small, concentrated, and directed source of light — ideal for illuminating small details in the scene, or for simulating street lights and torches.

- **Properties list<sup>B</sup>**

List of properties relative to the light instance selected in **Pre-defined Lights List**.

The list varies according to the type of light, as described in the list below:

- **Colour** (available for Ambient, Directional, Omni, and Spot)

Light's colour and alpha value, in RGB values. The **Browse** button –  – opens the **Color** dialog box.

- **Cone angle<sup>D</sup>** (available for Spot)

Angle of the cone of light generated by spot light.

The angle at which the light is placed in relation to the ground or to the model affects its intensity.

- **Direction pitch<sup>D</sup>, Direction roll<sup>D</sup>, Direction yaw<sup>D</sup>** (available for Directional)

Direction in which the light will be projected.

It can be automatically set if the **Lock Light To Camera** check box is selected.

- **Full strength radius** (available for Omni and Spot)

Area over which the light will be at full intensity.

- **Fall-off radius** (available for Omni and Spot)

Total area influenced by the light.

The area starting at **Full Strength Radius** will have light at full intensity, which will be faded away until it is completely off when it reaches **Fall-off Radius**.

- **Position X<sup>D</sup>, Position Y<sup>D</sup>, Position Z<sup>D</sup>** (available for Omni and Spot)

Light's point of origin.

It can be automatically set if the **Lock Light To Camera** check box is selected.

These fields may be changed by the axis gizmo displayed by the **Show Light Models** check box.

- **Multiplier** (available for Directional, Omni, and Spot)

Multiplier for the colour's RGB value, which affects the overall luminosity of the light without affecting its hue.

The RGB values will be multiplied by this value, effectively making the light brighter.

- **Lock light to camera**

Attaches the current camera position to the following fields:

- **For directional and spot lights:**

**Direction Pitch**, **Direction Roll**, and **Direction Yaw**.

- **For omni and spot lights:**

**Position X**, **Position Y**, and **Position Z**.

Once the light is in the position you want, clear this option to detach the camera.

- **Show light axes<sup>D</sup>**

Displays a gizmo representing the light source. Meaningful only for omni and spot lights.

*A* — Only enabled if the Game Lighting option button is selected.

*B* — Only enabled if the Custom Lighting option button is selected.

*C* — For details on this file's grammar, see the document File Grammar Guide's section .mv1)

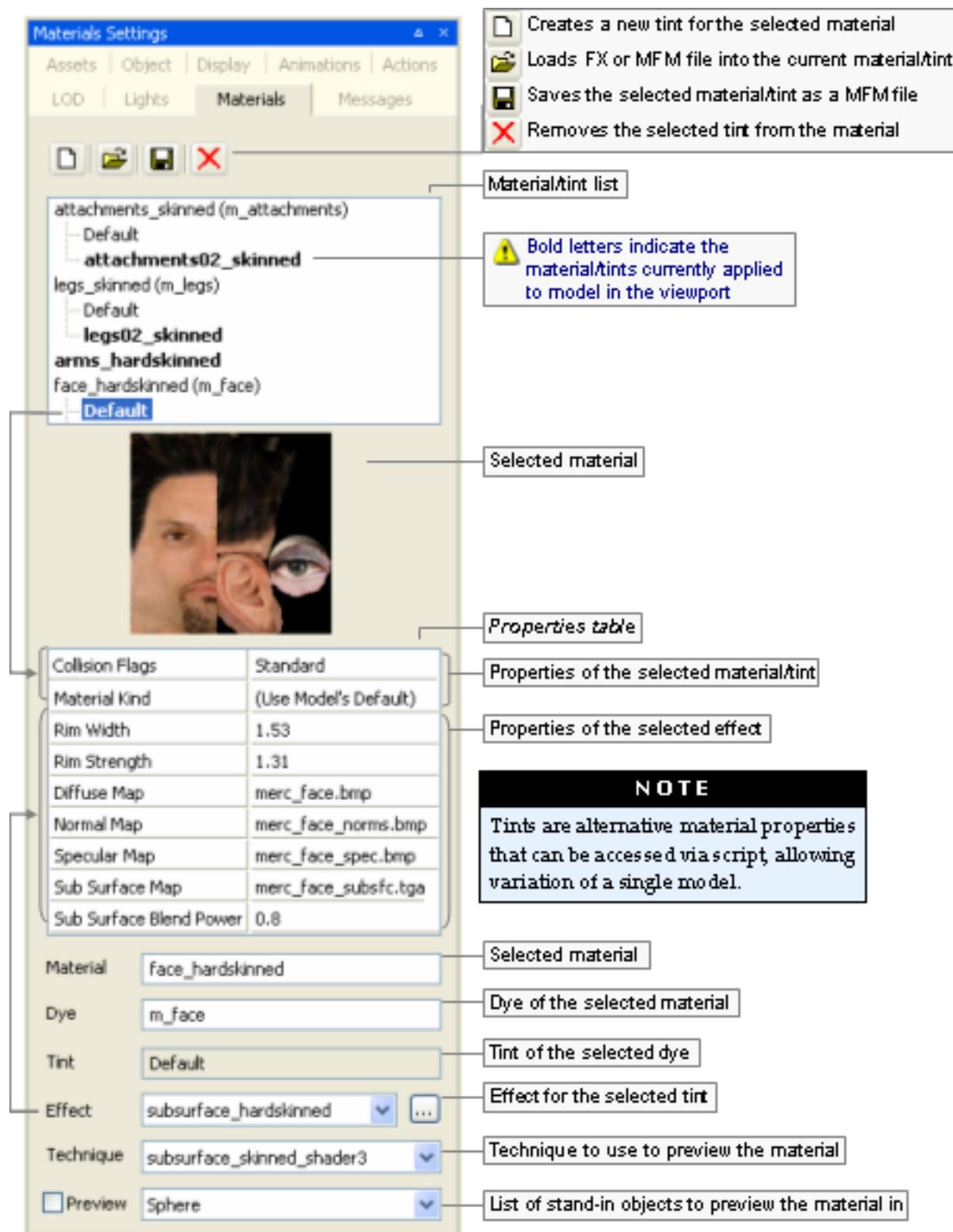
*D* — If the Show Light Axes check box is selected, then the gizmo (in conjunction with key modifiers) can be used to change some of the light's fields. For details, see "Key modifiers" on page 145 .

### 3.8.8. Materials Settings panel

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Some properties can be changed in ModelEditor, as defined in the FX file. For more details, see the document Client Programming Guide's section 3D Engine (Moo) → "EffectMaterial" → "Automatic variables/Globals".

Each material file has its own list of properties. For a broader discussion of these settings, please refer to the document Content Creation Manual (document accessed by pressing F1 or by selecting the **Help** → **Content Creation** menu item — for details, see "Menu items" on page 140 ).



Materials Settings panel

The list below describes the fields on this panel:

- **Material/ tint list buttons**



Opens the **New Tint** dialog box, where you can specify a name and a material (.mfm) or effect (.fx) file for the tint to be applied to the material.



New Tint dialog box



Opens the **Open** dialog box, where you can select a new material (.mfm) or effect (.fx) file for the selected tint.

The **Effect** drop-down list box is updated with the value selected in the dialog box.



Opens the **Save As** dialog box, where you can save the settings of selected material/tint as new material (.mfm) file.



Removes the selected tint — no confirmation is asked.

This button is disabled to Default tints.

#### ▪ Material/ tint list

List of materials/tints associated with the model.

Altering the material on the model and saving it creates a new instance of this material to be saved within the model's .visual file (for details on this files' grammar, see the document File Grammar Guide's section .visual). Therefore, the model will no longer reference the MFM file.

#### Note

Skinned objects in which each point can be affected by up to three bones will have the suffix \_skinned appended to its material name.

#### ▪ Properties table

Due to its extents, this table is discussed on a section of its own.

Please refer to “Material Properties table” on page 203 .

### Note

Items can be dragged into this table from the **Effects** and **Texture** folders in the **Asset Browser** panel. This will result in changing the **Effect** drop-down list box.

- **Material**

Name of the material.

For details, see **Default Material Kind** and **Material Kind** in “Textures” on page 158 .

- **Dye**

Name of the dye.

It defaults to the material name, prefixed by `m_`.

### Note

This needs to be a Python-safe name, *i.e.*, with only alphanumerics and the underscore character. As a consequence, it cannot support non-ASCII character sets, such as Chinese.

- **Tint**

Name of the tint.

Every material with a tint will have one named Default, which name cannot be changed.

- **Effect**

Effect to be applied to selected material/tint.

The Browse button —  — opens the Open dialog box, where you can select an effect (.fx) file for the selected material/tint.

### Note

Items can be dragged into this field from the Effects virtual folder in the Asset Browser panel.

- **Technique**

Technique to use to preview the material.

This allows the preview of different fallback rendering techniques offered by the material's shader. It would mainly be used for the debugging of shaders, allowing their fallback techniques to be tested.

- **Preview**

List of stand-in objects to preview the material in. The check box next to the field toggles the preview function.

The available options are:

- **Sphere**
- **Cube**
- **Room**
- **Torus**
- **Teapot**

### 3.8.8.1. Material Properties table

The first 2 rows of the table (**Collision Flags** and **Material Kind**) are fixed, and list properties specific to the material/tint selected in the **Material/tint List** list box. Subsequent rows are variable, and list the properties of the **Effect** drop-down list box.

The list below lists the rows relative to the selected material/tint:

- **Collision flag**

Used to specifies whether the camera and/or player collide with surfaces of this material.

- **Camera Off Player Off** — Neither the camera nor the player collide with the material.
- **Camera Off Player On** — The player will collide with the material, while the camera will not.
- **Camera On Player Off** — The camera will collide with the material, while the player will not.
- **Camera On Player On** — Both the camera and the player will collide with the material.

#### Note

If either the camera or the player collide with the material, the material will cast terrain shadows.

#### Note

Models with custom BSP trees will not be affected by changes in the collision flag — you will have to re-export the model with either a different custom BSP, or none (depending on your purpose) from your 3D package.

For details on how to create custom BSP trees, see the document Content Creation Manual's lesson **Create Custom BSPs** (document accessed by pressing F1 or by selecting the **Help → Content Creation** menu item — for details, see "Menu items" on page 140 ).

- **Material kind**

Material kind for the model (such as wood, glass, etc...), used to define sounds and particle systems to objects.

For details on **Default Material Kind** and **Material Kind**, see "Textures" on page 158 .

The list below describes the most common properties for the effect:

- **Alpha reference**

The cut-off value at which the texture's alpha channel will determine the transparency.

Range of values is from 0 through 255. Setting this field to 200 would cause areas of the image with an alpha value smaller than 200 to be transparent, and all others as solid.

- **Alpha text**

Determines whether the alpha map of the material should be used.

- **Diffuse light extra modulation**

Value to multiply the diffuse map by.

- **Diffuse map<sup>A</sup>**

Base texture map.

- **Double sided**

Indicates whether the material can be seen from both sides.

- **Light enable**

Indicates whether the material will receive lighting.

If set to false, then the texture's original colour will be displayed.

- **Other map<sup>A</sup>**

Texture map to roll across the surface.

- **Self illumination**

Intensity with which the material should be illuminated as if it was a light source.

- **Specular map<sup>A</sup>**

Texture map specifying specularity for the material.

- **Normal map<sup>A</sup>**

Normal map to use for the material.

For details on normal maps, see the document Content Creation Manual's lesson **Build and Use Normal Maps** (document accessed by pressing F1 or by selecting the **Help → Content Creation** menu item — for details, see "Menu items" on page 140 ).

*A — Texture maps can be assigned a texture feed — for details, see "Texture map context menu" on page 204. The name of the texture feed is displayed between parentheses, next to the texture description.*

### 3.8.8.1.1. Texture map context menu

Accessed by right-clicking any texture map in the **Materials Settings** panel's **Properties Table**, the context menu contains the following items:

- **Enable texture feed<sup>A</sup>**

Allows you to specify a name for the texture feed to be assigned to the texture map.

- **Change texture feed name<sup>A</sup>**

Allows you to change the name of the texture feed assigned to the texture map.

- **Remove texture feed<sup>A</sup>**

Allows you to remove the texture feed assigned to the texture map.

*A — Opens the Texture Feed Name dialog box — for details, see “Texture Feed Name dialog box” on page 156 .*

### 3.8.8.2. Exposing material properties to Python

Any non-default tint material can have its Vector4 properties (such as Colour) exposed, so that they can be accessed through Python scripts during runtime.

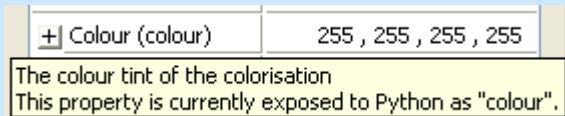
In order to do this, access the context menu of the Vector property of a non-default tint by right-clicking it, then select the Expose To Python menu item:



Exposing a property to Python — Step 1

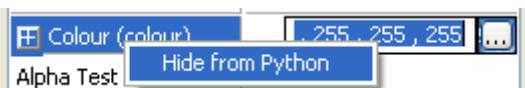
#### Note

When a property is exposed to Python, its exposed name is displayed in the material properties description. It will be the UIName given in the shader — this is the name exposed to Python.



Exposing a property to Python — Step 2

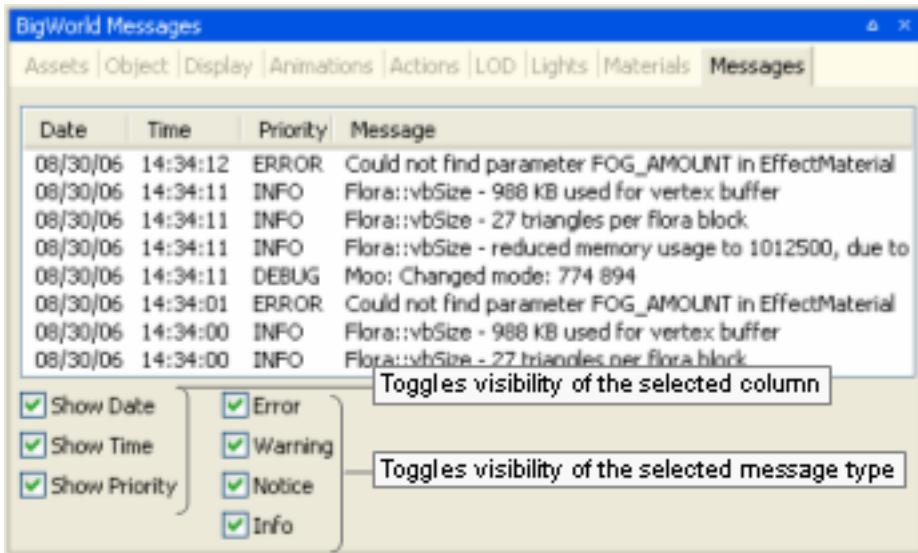
In order to unexpose the material property, access the context menu of the Vector property by right-clicking it, then select Hide From Python menu item:



Exposing a property to Python — Step 3

### 3.8.9. BigWorld Messages panel

This panel displays different levels of information related to loading, viewing, and manipulating models.



BigWorld Messages panel

### 3.9. Models and split lens effect from sun

The split lens effect from the sun will be used automatically for any material with the following settings:

```
( 'Sorted' Render Channel OR 'Alpha Test Enabled') AND SrcBlend == src alpha
AND DestBlend == inv src alpha
```

The old .bsp file has to be deleted before your changes can be displayed in the BigWorld project. The .bsp file is generated by BigWorld to speed startup in subsequent sessions.

# Chapter 4. ParticleEditor

The ParticleEditor is a component of the BigWorld toolset that provides a graphical interface for the creation of a BW particle system XML file.

BigWorld particle systems can be defined in three ways:

- C coding.
- Python scripting.
- XML file.

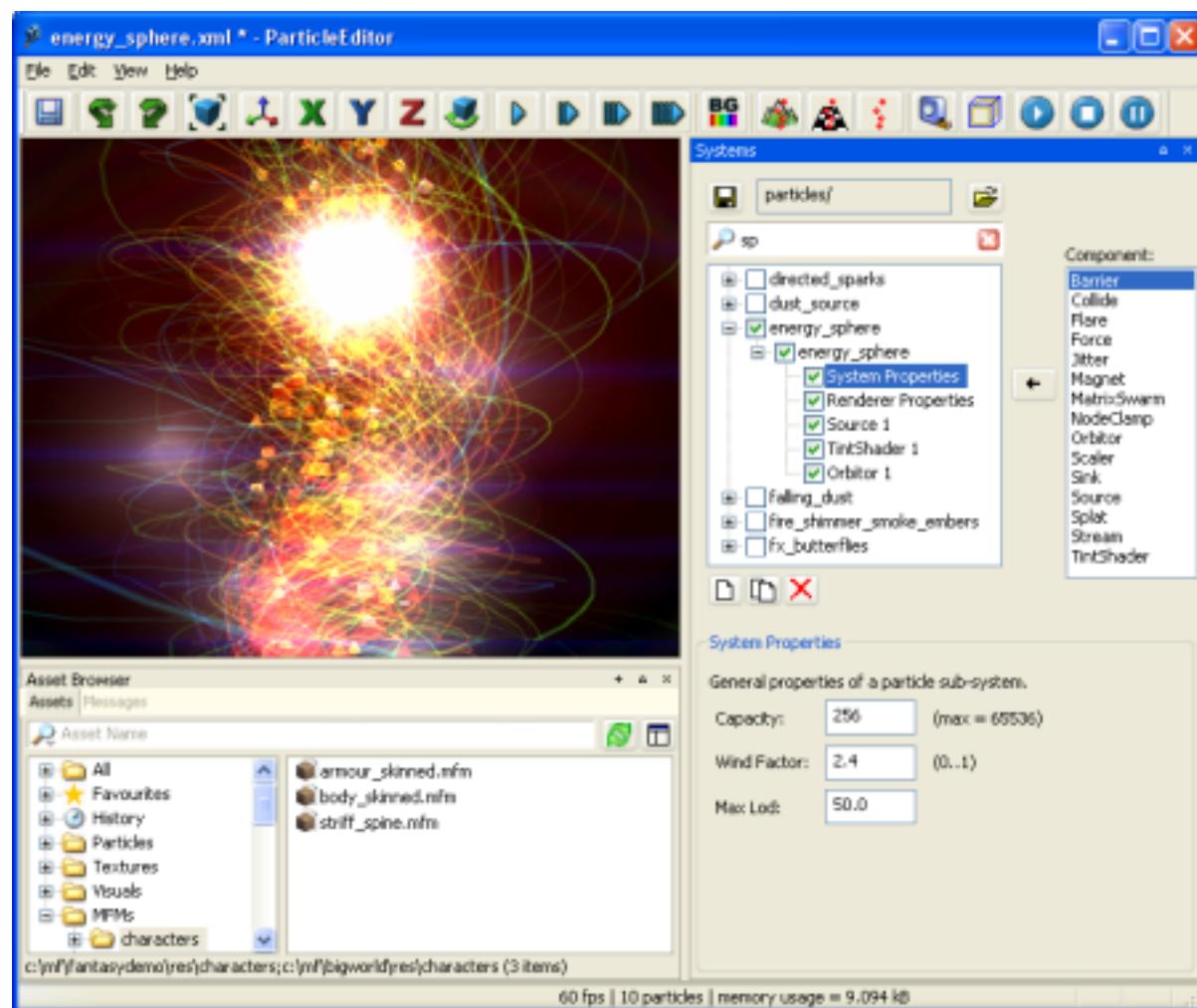
Once the particle system is created, the game script can load the XML file and place an instance of a particle system in the game world. This can be done in two ways:

- **As part of the scenery**

By placing a particle object in WorldEditor (a ChunkParticles chunk item).

- **As a dynamic entity**

Through Python scripting or C coding. For details, see “Loading a particle system via code” on page 257



## ParticleEditor window

For details on how to start this and other BigWorld tools, see *Starting the Tools* on page 273 .

## 4.1. Menu items

The list below describes the menu items available in ParticleEditor:

- **File → Open particle directory**



Performs the same function as the **General** sub-panel's **Open Particle Folder** button<sup>A</sup> —  —.

- **File → Save particle system**



Performs the same function as **Systems** panel's **Save** button<sup>A</sup> —  — and **Save** toolbar button<sup>B</sup> —  —.

- **File → Reload all textures**

Reloads textures used by the particle system.

Changes made to textures in third-party applications will not be visible until the particle system is reloaded or this option is selected.

- **File → Exit**

Closes the application.

The user will be prompted to save any changes made to the scene.

- **Edit → Undo**

Undoes the most recent action.

Multiple actions can be undone. The *undo* list extends to the state of the world when ParticleEditor was last started.

Each action undone is added to the redo list.



Also accessible via the **Undo** toolbar button<sup>B</sup> —  —.

- **Edit → Redo**

Redoes the most recent undone action.

Multiple actions can be redone. The *redo* list contains one entry for each undone action.



Also accessible via the **Redo** toolbar button<sup>B</sup> —  —.

- **View → Toolbars → Main Toolbar<sup>B</sup>**

Toggles the toolbar's visibility.

- **View → Status bar**

Toggles the status bar's visibility.

For details on the status bar, see “Status bar” on page 212 .

- **View → Show Action Selection**

Toggles the visibility of all panels.<sup>C</sup>

- **View → Show Asset Browser**

Toggles the visibility of the **Asset Browser** panel (for details on this panel, see “Asset Browser panel” on page 225 ).

- **View → Show Messages**

Toggles the visibility of the **Messages** panel (for details on this panel, see “BigWorld Messages panel” on page 257 ).

- **View → Load default panel layout<sup>A</sup>**

Closes all customised panels and displays ParticleEditor's default panel.<sup>A</sup>

- **View → Load most recent panel layout<sup>A</sup>**

Closes all current panels and displays the custom panel layout previously used.<sup>A</sup>

- **Languages → List of available languages**

Selects the language to use in the tool.

This list is compiled based on the `LanguageName` tags present in the XML files in the `<res>/helpers/languages` folder and in the file pointed by the `language` tag in `bigworld/tools/particleeditor/options.xml`.

- **Help → About ParticleEditor**

Opens the ParticleEditor version dialog box.

- **Help → Tools Reference Guide**

Opens this document.

- **Help → Content creation**

Opens the document Content Creation Manual.

- **Help → Shortcuts**

Opens the **ParticleEditor Shortcuts** dialog box.

For details, see “ParticleEditor Shortcuts dialog box” on page 222 .

- **Help → Request feature/report bug**

Opens your e-mail program, with the **To:** field automatically set to BigWorld's support e-mail address, and **Subject:** set to **ParticleEditor – Feature Request / Bug Report**.

*A – For details, see “General sub-panel” on page 227 .*

*B – For details, see “Toolbar” on page 210 .*

*C – For details on the panel system and its terminology, see Panel System on page 287 .*

## 4.2. Toolbar

The list below describes the toolbar buttons available in ParticleEditor:

-  – **Save**

Saves the current particle system.

Performs the same function as the **File → Save Particle System** menu item.<sup>A</sup>

-  – **Undo**

Undoes the most recent action.

Performs the same function as the **Edit → Undo** menu item.<sup>A</sup>

-  – **Redo**

Redoes the most recent undone action.

Performs the same function as the **Edit → Redo** menu item.<sup>A</sup>

-  – **Zoom to extents**

Moves the camera so that the model is brought to the centre of the screen.

This is useful if you have moved the camera far away from the model.

-  – **Free positioning**

Sets camera movement to a swivel action.

-  – **X-locked**

Locks camera movement to the x-axis.

-  – **Y-locked**

Locks camera movement to the y-axis.

-  – **Z-locked**

Locks camera movement to the z-axis.

-  – **Orbit camera**

Toggles the rotation of the camera around the geometric centre of the model.

You can change the orbit direction by pressing d (clockwise camera rotation) and a (counter-clockwise camera rotation).

- **ON**

Camera rotates around the model in a circle.

- **OFF**

Camera ceases rotation, keeping its last position.



Specifies how fast the camera travels in response to the appropriate key events (keys Q, W, E, A, S, and D).<sup>A</sup>

If Caps Lock is on, then camera speed will be boosted.

Camera speed can also be set to Slow, Medium, Fast and Super Fast by the keyboard shortcuts Ctrl+1, Ctrl+2, Ctrl+3, and Ctrl+4, respectively.

- **BG**  
 — **Background colour**

Opens the Colour Picker dialog box, where you can change the background colour on the viewport.

- — **Use terrain as background**

Displays the particle system against the terrain specified in the tool's configuration file<sup>B</sup>.

- — **Use floor as background**

Displays the particle system against the generic floor image.

The floor image file is specified in the tool's configuration file<sup>B</sup>.

- — **Use no background**

Displays the particle system against the background colour specified via the Background Colour toolbar button.

- — **Toggle grid**

Toggles the visibility of a 1mx1m grid, displayed against the particle system.

- — **Toggle bounding box**

Toggles the visibility of the particle system's bounding box (yellow) and visibility box (blue).

- — **Play**

Plays the current particle system.

- — **Stop**

Stops the current particle system.



– **Pause**

Cycles between pausing and resuming the current particle system.

**A** – For details, see “*Keyboard shortcuts*” on page 214 .

**B** – The ParticleEditor’s configuration file is `bigworld/tools/particleeditor/options.xml`. For details on this file’s grammar, see the document File Grammar Guide’s section `options.xml` → “ParticleEditor”.

## 4.3. Status bar

The status bar displays information about the current particle system. A typical status bar is illustrated below:



Status bar

The list below lists the pieces of information displayed in the status bar, as they appear:

- **Frame rate** (in the example, **64 fps**)
  - Frame rate being used to display the particle system.
- **Particles displayed** (in the example, **66 particles**)
  - Number of particles being currently rendered.
  - This number varies along the lifetime of the system.
- **Memory used** (in the example, **memory usage = 3.5552 kB**)
  - Memory used by the current particle system.

## 4.4. Gizmos

The movement and scale gizmos availability depends on the sub-system’s component selected in the Particle’s sub-systems list box, as described in the sections below.

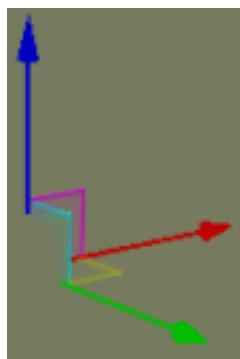
### 4.4.1. Movement gizmo

Displayed if one of the sub-system’s components below is selected in the **Particle’s sub-systems** list box:

- **Barrier**
  - Depending on the **Barrier Shape** drop-down list box.
- **Force**
- **Orbitor**
- **Source**

One movement gizmo is displayed for the **Initial Position Generator** field, and another for the **Initial Velocity Generator** field. Each of these fields will have two movement gizmos if the **Generator Type** drop-down list box is set to either **Cylinder** or **Line**.

- Stream



Movement gizmo

#### **4.4.2. Scale gizmo**

---

Activated by the Alt keyboard shortcut (for details, see “Keyboard shortcuts” on page 214) and represented by red and/or green circles, this gizmo allows a particle’s component to be scaled. Dragging the circle inwards or outwards uniformly shrinks or enlarges the component, respectively.

This gizmo is displayed if one of the sub-system’s components below is selected in the **Particle’s sub-systems** list box:

- **Barrier**

- **If Barrier Shape is set to Cylinder:**

Red circle controlling **Radius**.

- **If Barrier Shape is set to Sphere:**

Green circle controlling **Radius**.

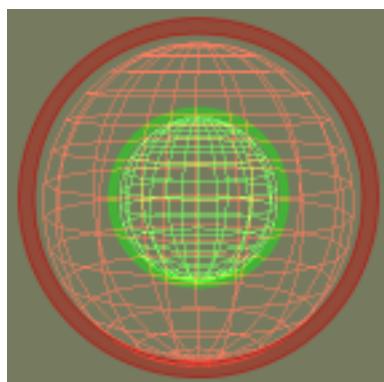
- **Source**

- **If Initial Position Generator or Initial Velocity Generator is set to Cylinder:**

Red circle controlling **Radius**.

- **If Initial Position Generator or Initial Velocity Generator is set to Sphere:**

Green circle controlling **Minimum Radius** and red circle controlling **Maximum Radius**.



Scale gizmo

## 4.5. Keyboard shortcuts

The list of ParticleEditor's keyboard shortcuts can be displayed via the **Help → Keyboard Shortcuts** menu item (for details, see "Menu items" on page 208 ).

The sections below list the ParticleEditor's keyboard shortcuts.

### 4.5.1. Function keys

- **F1**

Displays the help page, which can be left by pressing **Esc**.

- **F2**

Allows renaming of the currently selected item in the Particle List.

- **F3**

Performs the same function as the **Play** toolbar button<sup>A</sup> —  —.

- **F4**

Performs the same function as the **Stop** toolbar button<sup>A</sup> —  —.

- **F5**

Performs the same function as the **Pause/Resume** toolbar button<sup>A</sup> —  —.

- **Ctrl+F5**

Activates the **Realtime Profiling** console, which can be left by pressing **Esc** — for details, see "Realtime Profiling console" on page 261 .

- **Ctrl+F7**

Activates the **Debug (Watcher)** console, which can be left by pressing **Esc** — for details, see "Debug (Watcher) console" on page 263 .

*A — For details, see "Toolbar" on page 210 .*

### 4.5.2. Key modifiers

- **Alt**

- **If Debug (Watcher) console<sup>A</sup> is active**

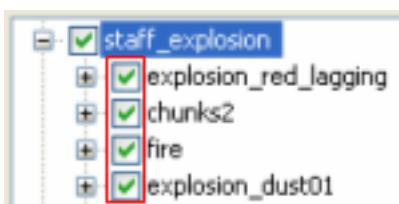
- **If key [0-9] in the alphanumeric keypad is pressed:**

Selects item 40+[0-9], or 50+[0-9] (if **Shift** is pressed).

- **Ctrl**

- **If clicking on a particle's sub-system check box**

Causes all other sub-systems to acquire the opposite value of the current sub-system.



Particle's sub-system check boxes

- **If Debug (Watcher) console<sup>A</sup> is active**
  - If key [0-9] in the alphanumeric keypad is pressed:  
Selects item 20+[0-9], or 30+[0-9] (if Shift is pressed).
- **Shift**
  - If Debug (Watcher) console<sup>A</sup> is active If key [0-9] in the alphanumeric keypad is pressed:  
Selects item 10+[0-9], 30+[0-9] (if Ctrl is pressed), or 50+[0-9] (if Alt is pressed).

*A – Activated by F7 (for details, see “Debug (Watcher) console” on page 263 ).*

#### 4.5.3. Edit keys

---

- **Backspace**
  - If Debug (Watcher) console<sup>A</sup> is active:  
Returns the list to the previous branch of the watcher tree.
- **Caps Lock**
  - **ON**  
Increases the current camera speed. It will accelerate the camera movement, which speed is set by keyboard shortcuts (Ctrl+1, Ctrl+2, Ctrl+3, and Ctrl+4), or by Camera Speed toolbar buttons<sup>D</sup> ( , , , and ).
  - **OFF**  
Restores the camera speed set by keyboard shortcuts or by Camera Speed buttons<sup>D</sup>.
- **Delete**  
Deletes the selected objects.
- **Enter**
  - If Python console<sup>C</sup> is active and no command is specified:  
Exits the console:
  - If Realtime Profiling console<sup>D</sup> is active  
Expands or collapses the profiling element currently selected. Elements with children are indicated by an ellipsis (...) next to it.

- **If Debug (Watcher) console<sup>A</sup> is active**
  - **If the selected node is not leaf:**

Navigates one level down in the watcher tree.
  - **If the selected node is leaf:**

Opens selected watcher for editing, or accepts typed value if it is already in Edit mode.
- **Esc**
  - **If any console is active**

Exits the console.

**NOTE:** The different modes and consoles are activated in the following way:

- **Help mode — F1**
- **Realtime profiling console — F5** (for details, see “Realtime Profiling console” on page 261 )
- **Debug (Watchers) console — F7** (for details, see “Debug (Watcher) console” on page 263 )
- **Python console — Ctrl+P** (for details, see “Python console” on page 268 )
- **If Debug (Watcher) console<sup>A</sup> is active**
  - **If the watcher is in Edit mode:**

Leaves Edit mode.
  - **If the watcher is not in Edit mode:**

Exits the console.
- **Home**
  - **If Realtime Profiling console<sup>D</sup> is active**

Scrolls the list to display the first page.
  - **If Debug (Watcher) console<sup>A</sup> is active**

Returns the list to root of the watcher tree.
- **Page Down**
  - **If Realtime Profiling console<sup>D</sup> is active:**

Moves the selection to the next profiling element in the list. Same as ].
  - **If Debug (Watcher) console<sup>A</sup> is active:**
    - **If the watcher is not in Edit mode:**

Moves the selection to the next item in the list.
    - **If the watcher is in Edit mode:**

Decreases the watcher's value by 1, 10 (if Shift is pressed), 100 (if Ctrl is pressed), or 1,000 (if Alt is pressed).

*A – Activated by F7 (for details, see “Debug (Watcher) console” on page 263 ).*

*B – For details, see “Toolbar” on page 210 .*

*C – Activated by Ctrl+P (for details, see “Python console” on page 268 ).*

*D – Activated by F5 (for details, see “Realtime Profiling console” on page 261 ).*

#### 4.5.4. Symbols

---

- **Numpad + (Plus sign)**

- **If Realtime Profiling console<sup>B</sup> is active:**

Scrolls the screen one line down.

- **If Debug (Watcher) console<sup>A</sup> is active:**

Scrolls the watcher list down.

- **Numpad - (Minus sign)**

- **If Realtime Profiling console<sup>B</sup> is active**

Scrolls the screen one line up.

- **If Debug (Watcher) console<sup>B</sup> is active**

Scrolls the watcher list up.

- **[ (Left square bracket)**

- **If Realtime Profiling console<sup>B</sup> is active**

Moves the selection to the previous profiling element in the list. Same as Page Up<sup>C</sup>.

- **] (Right square bracket)**

- **If Realtime Profiling console<sup>B</sup> is active**

Moves the selection to the next profiling element in the list. Same as Page Down<sup>C</sup>.

*A – Activated by F7 (for details, see “Debug (Watcher) console” on page 263 ).*

*B – Activated by F5 (for details, see “Realtime Profiling console” on page 261 ).*

*C – For details, see “Edit keys” on page 215 .*

#### 4.5.5. Numeric keys

---

- **[0-9]**

- **If Debug (Watcher) console<sup>A</sup> is active and the alphanumeric keypad was used:**

Depending on the key modifier pressed (if any), selects the following item:

- **n**
- **10+n** (if Shift is pressed)
- **20+n** (if Ctrl is pressed)
- **30+n** (if Ctrl+Shift is pressed)
- **40+n** (if Alt is pressed)
- **50+n** (if Alt+Shift is pressed)

*A – Activated by F7 (for details, see “Debug (Watcher) console” on page 263 ).*

#### 4.5.6. Alphabetic keys

---

##### ▪ A

Moves the camera to the left.

- 



If Orbit Camera toolbar button<sup>A</sup> – – is selected:

- If the camera is rotating clockwise:

Stops the camera rotation.

- If the camera is not rotating:

Rotate the camera counter-clockwise.

##### ▪ D

Moves the camera to the right.

- 



If Orbit Camera toolbar button<sup>A</sup> – – is selected:

- If the camera is rotating counter-clockwise:

Stops the camera rotation.

- If the camera is not rotating:

Rotate the camera clockwise.

##### ▪ E

Moves the camera up.

##### ▪ G

- If Realtime Profiling console<sup>B</sup> is active:

Draws a graph for the profiling element currently selected.

More than one element can be graphed at any one time. Each one will be assigned a different colour, which will be used to display the element's name, and draw the graph itself.

- **Q**

Moves the camera down.

- **S**

Moves the camera backwards.

- **W**

Moves the camera forward.

*A* — For details, see “Toolbar” on page 210 .

*B* — Activated by F5 (for details, see “Realtime Profiling console” on page 261 ).

#### 4.5.7. Key combinations

---

- **Alt+Page Down**

- If Debug (Watcher) console<sup>A</sup> is active and the watcher is in Edit mode

Decreases the watcher's value by 1,000.

- **Alt+Page Up**

- If Debug (Watcher) console<sup>A</sup> is active and the watcher is in Edit mode

Increases the watcher's value by 1,000.

- **Alt+[0-9]**

- If Debug (Watcher) console<sup>A</sup> is active and used alphanumeric keypad

Selects list item 4[0-9].

- **Alt+Shift+[0-9]**

- If Debug (Watcher) console<sup>A</sup> is active and the alphanumeric keypad was used

Selects list item 5[0-9].

- **Ctrl+Page Down**

- If Debug (Watcher) console<sup>A</sup> is active and watcher is in Edit mode

Decreases the watcher's value by 100.

- **Ctrl+Page Up**

- If Debug (Watcher) console<sup>A</sup> is active and watcher is in Edit mode

Increases the watcher's value by 100.

- **Ctrl+[0-9]**

Ctrl+1 turns the **Slow Camera** toolbar button<sup>B</sup> (  ) on.

**Ctrl+2** turns the **Medium Speed Camera** toolbar button<sup>B</sup> (  ) on.

**Ctrl+3** turns the **Fast Camera** toolbar button<sup>B</sup> (  ) on.

**Ctrl+4** turns the **Super Fast Camera** toolbar button<sup>B</sup> (  ) on.

- **If Debug (Watcher) console<sup>A</sup> is active and used alphanumeric keypad**

Selects item 2[0-9].

- **Ctrl+Shift+[0-9]**

- **If Debug (Watcher) console<sup>A</sup> is active and used alphanumeric keypad**

Selects item 3[0-9].

- **Ctrl+H**

Accesses the **View → Show Action Selection** menu item.<sup>C</sup>

- **Ctrl+I**

Cycles through the available camera speeds.

This value can also be set by the **Camera Speed** group of toolbar buttons – .

- **Ctrl+M**

Cycles through the available camera modes.

This value can also be set by the **Camera Mode** group of toolbar buttons – .

- **Ctrl+O**

Accesses the **File → Open Particle Directory** menu item.<sup>C</sup>

- **Ctrl+P**

Activates the **Python** console, which can be left by pressing **Esc**. For details, see *Tools Consoles* on page 261 .

- **Ctrl+S**

Accesses the **File → Save** menu item.<sup>C</sup>

- **Ctrl+T**

Accesses the **Edit → Reload All Textures** menu item.<sup>C</sup>

- **Ctrl+Y**

Accesses the **Edit → Redo** menu item.<sup>C</sup>

- **Ctrl+Z**

Accesses **Edit → Undo** menu item.<sup>C</sup>

**Note:** The mouse cursor must be over the viewport for this shortcut to be enabled.

- **Shift+Alt+[0-9]**

See entry Alt+Shift+[0-9] in this table.

- **Shift+Ctrl+[0-9]**

See entry Ctrl+Shift+[0-9] in this table.

- **Shift+Enter**

- **If Debug (Watcher) console<sup>A</sup> is active and watcher is in Edit mode**

Displays the watcher modification history.

- **Shift+Page Down**

- **If Debug (Watcher) console<sup>A</sup> is active and watcher is in Edit mode**

Decreases the watcher's value by 1.

- **Shift+Page Up**

- **If Debug (Watcher) console<sup>A</sup> is active and watcher is in Edit mode**

Increases the watcher's value by 1.

*A — Activated by F7 (for details, see “Debug (Watcher) console” on page 263 ).*

*B — For details, see “Toolbar” on page 210 .*

*C — For details, see “Menu items” on page 208 .*

## 4.6. Mouse controls

The list below describes the ParticleEditor's mouse controls:

- **Right button drag**

Moves the camera in the scene.

The table below describes the camera's movement:

| Drag direction | Camera movement | Particle system movement |
|----------------|-----------------|--------------------------|
| Left           | Left            | Right                    |
| Right          | Right           | Left                     |
| Forward        | Up              | Down                     |
| Backwards      | Down            | Up                       |

- **Scroll wheel rotate**

Moves the camera forward and backwards.

- **If Space key is pressed:**

Increases or decreases the camera speed, depending on the direction of the wheel rotation.

Performs the same functions as the  toolbar buttons.<sup>C</sup>

- **Middle button click**

Moves the camera so that the model is brought to the centre of the screen.



Performs the same function as the **Zoom To Extents** toolbar button<sup>A</sup> ().

## 4.7. Considerations

Particle systems need to be used with care, since they can easily have an adverse effect on the game's performance when targeting lower-end systems.

When designing the particle system, consider the points below:

- Large particles may hinder performance (due to fill rate issues).
- Each particle consumes memory, even if not being used (memory usage is shown in the status bar). Be sure to use a sink to remove unnecessary particles.
- Set the the **System Properties** sub-panel's **Capacity** field to be just enough to contain the number of particles being used — this information is displayed in the status bar.

For details on the **System Properties** sub-panel, see “System Properties sub-panel” on page 231 .

- The **Amp** and **Trail** renderers on the **Renderer Properties** sub-panel need to cache each particle's history, and therefore consumes considerably more memory.

For details on the **Renderer Properties** sub-panel, see “Renderer Properties sub-panel” on page 232 .

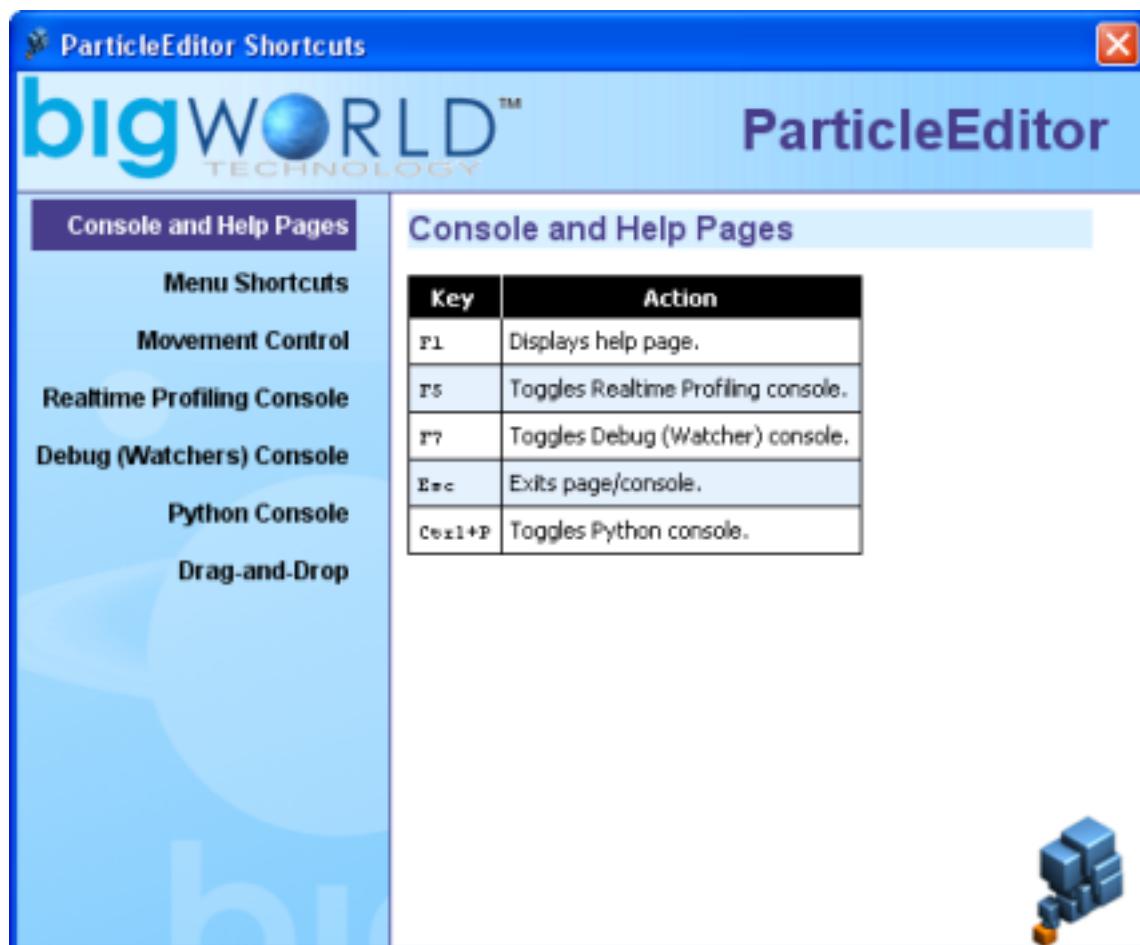
- Use the **System Properties** sub-panel's **Max LOD** field to remove the particle from render once it reaches a certain distance from the player.

For details on the **System Properties** sub-panel, see “System Properties sub-panel” on page 231 .

## 4.8. Dialog boxes

### 4.8.1. ParticleEditor Shortcuts dialog box

Accessed via the **Help → Keyboard Shortcuts** menu item, the **Keyboard Shortcuts** dialog box displays a list of shortcuts available on ParticleEditor. For details on the complete list, see “Keyboard shortcuts” on page 214 .



Keyboard Shortcuts dialog box

## 4.9. Assets

Assets used to populate the world can be accessed via the **Asset Browser** panel. For details, see “Asset Browser panel” on page 225 .

### 4.9.1. Particles

This node gives you access to ambient particle systems created in ParticleEditor, so you can place them in your world.

**Note**

For more information on particles, see:

- document Client Programming Guide's section *Particles*.
- document Content Creation Manual's lessons (document accessed by pressing F1 or by selecting the **Help → Content Creation** menu item — for details, see “Menu items” on page 208 ) lessons:
  - Manage Resources → Particles
  - Generate Particles for Special Effects

For details on the grammar of particle files, see the document File Grammar Guide's section “*<particle>.xml*”.

## 4.9.2. Textures

This node gives access to bitmap images (.bmp), TrueVision Targa Graphic (.tga), and Microsoft Direct Surface (.dds) files, which can be assigned as the source for sprite-, amp-, trail-, and blur-based particles in the **Renderer Properties** sub-panel (for details on this panel, see “Renderer Properties sub-panel” on page 232 ).

## 4.9.3. Visuals

This node gives access to visual files (.visual), which contain node hierarchy, vertices, indices, materials used for rendering objects, and the BSP tree used for collision detection.

Visual files can be assigned as the source for mesh-based particles in the **Renderer Properties** sub-panel (for details on this panel, see “Renderer Properties sub-panel” on page 232 ).

**Note**

For more information on visuals, see the document Content Creation Manual's lessons (document accessed by pressing F1 or by selecting the **Help → Content Creation** menu item — for details, see “Menu items” on page 208 )

- Create Low-Polygon Characters → Exporting the character
- Add Animations to Characters → Importing a new character

For details on the grammar of.visual files, see the document File Grammar Guide's section .visual.

## 4.9.4. MFM

This node lists the material files (.mfm), which contain material information that includes bitmap references and effect files (.fx), which in turn gives access in ModelEditor to artist-editable features in that file.

Material files are a handy way of storing complex material property settings.

### Note

For more information on MFM's, see the document Content Creation Manual's lessons (document accessed by pressing F1 or by selecting the **Help → Content Creation** menu item — for details, see “Menu items” on page 208):

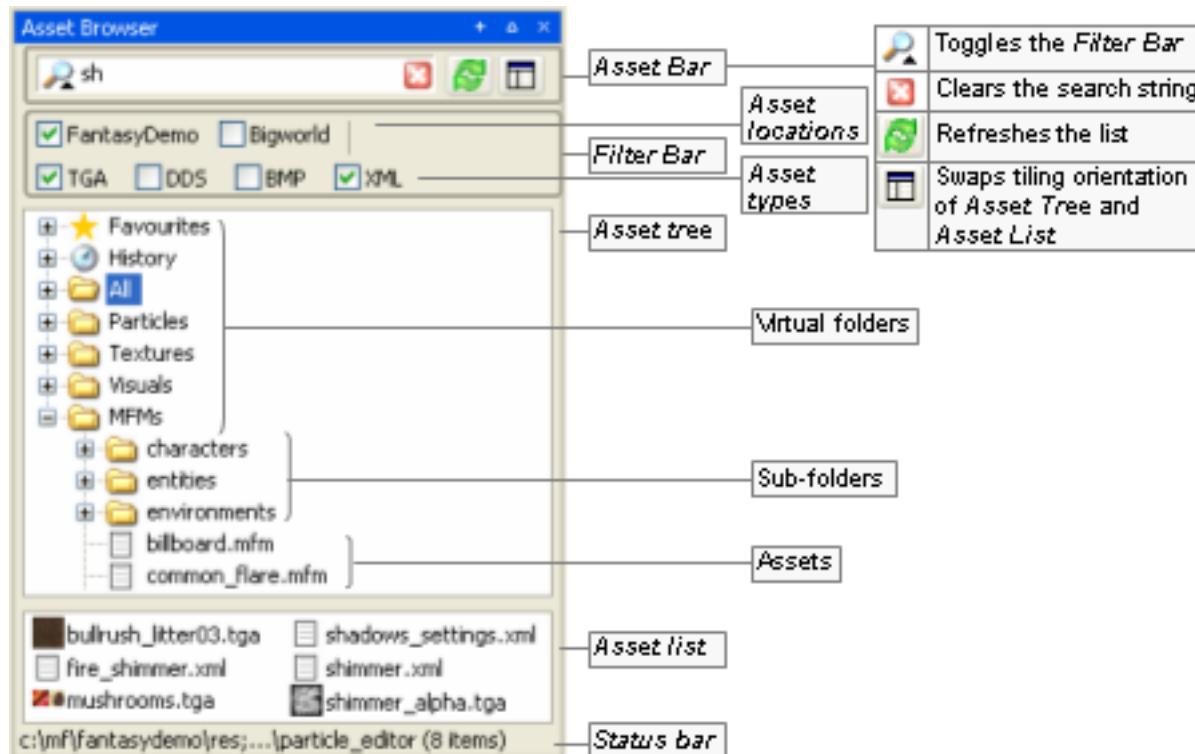
- Manage Resources → Organising art resources — Sets
- BigWorld shaders and Materials
- Create a New Material
- Create and Apply Animated Texture Maps

For details on the grammar of .mfm files, see the document File Grammar Guide's section *.mfm*.

## 4.10. Panel summary

### 4.10.1. Asset Browser panel

This panel gives access to assets through the Asset Browser, an interface that is available in WorldEditor, ModelEditor, and ParticleEditor. For details, see *Asset Browser* on page 275.



Asset Browser panel

#### 4.10.1.1. Drag-and-drop

Drag-and-drop operation is specific to the tool that implements it, and the type of asset being dragged, as described in the table below (asset types are listed in the order in which they appear in the **Asset Tree**):

| Asset type | Drop location <sup>A</sup>  | Effect  |
|------------|---|---|
| Particle   | Viewport  | Opens the dragged particle system for editing.  |
| Texture    | Renderer Properties sub-panel's <b>Texture File</b> drop-down list <sup>B</sup> . (only if Renderer is set to <b>Sprite, Amp, Trail or Blur</b> ) | Sets the texture file to be used for current particle's sub-system.                                 |
| Visual     | Renderer Properties sub-panel's <b>Visual File</b> drop-down list <sup>B</sup> . (only if Renderer is set to <b>Visual</b> )                      | Sets the visual file to be used for current particle's sub-system.                                  |
| MFM        | Renderer Properties sub-panel's <b>MFM File</b> drop-down list <sup>B</sup> . (available for mesh-based particles)                                | Sets the MFM file to be used to override the mesh's material settings specified in its visual file. |

**A** — If the asset file is dropped in the Favourites special virtual folder, then it is added to that folder. For details, see “Asset file” on page 282 .

**B** — For details on these fields, see “Renderer Properties sub-panel” on page 232 .

Drag-and-drop operation in ParticleEditor's Asset Browser panel

#### 4.10.1.2. Virtual folders

Defined in Asset Browser's configuration file (for details, see “Customisation” on page 282), virtual folders list files of a specific asset type.

For details on the listed asset types, see “Assets” on page 223 .

#### 4.10.2. System panel

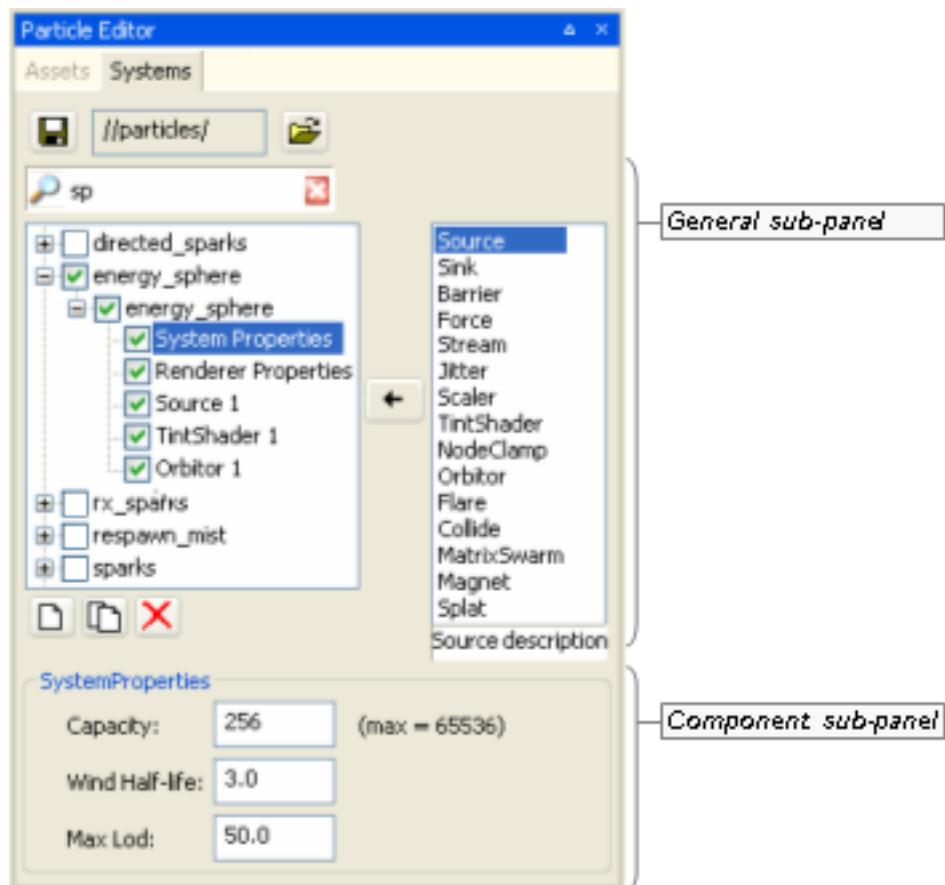
The panel is divided in two parts:

- **General sub-panel**

The upper sub-panel, which lists all particle systems in the current folder, with their sub-systems and their components.

- **Component sub-panel**

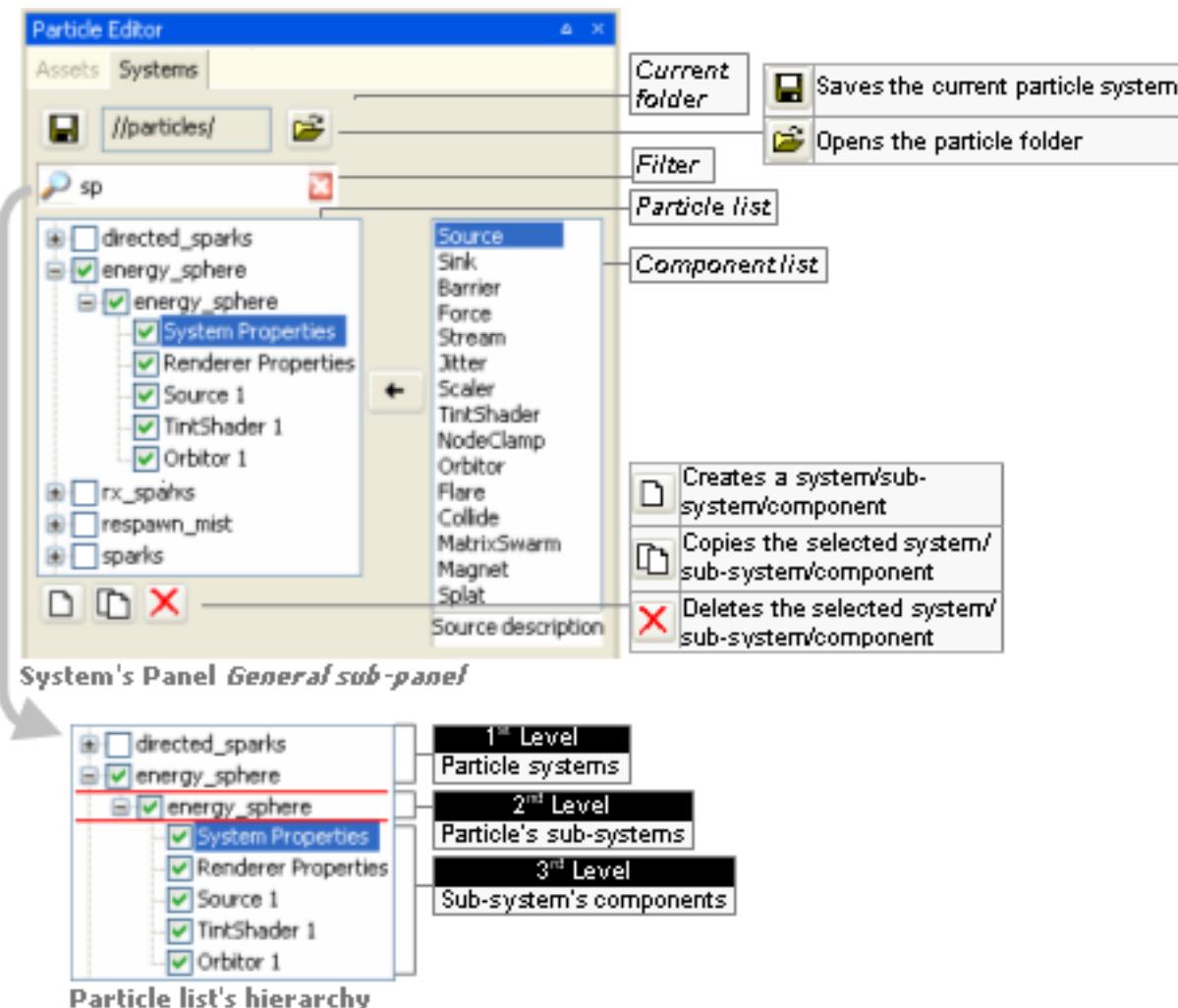
The lower sub-panel, containing the configuration options of the sub-system's component selected in the Particle List of the General sub-panel.



System panel

#### 4.10.2.1. General sub-panel

The panel contains the settings to be applied to the selected particle system.



General sub-panel

The list below describes the fields on this sub-panel:



Saves changes to the current particle system.

Performs the same function as the **File → Save Particle System** menu item.<sup>A</sup>

#### ▪ Current folder

Folder which particle systems are displayed in **Particle list**.



The path is relative to the resource folder selected by the **Open Folder** – – button.



Opens the **Open** dialog box, where you can specify a new current folder.

The dialog box displays only the folders in the resources folders list (or <res>). For details on how BigWorld compiles this list, see *Starting the Tools* on page 273 .

If this list is not set, then it will display the folders specified in the `Path` tag in `bigworld/tools/particle_editor/paths.xml` (for details on this file's grammar, see the document File Grammar Guide's section `paths.xml`).

Performs the same function as the **File → Open Particle Directory** menu item.<sup>A</sup>

- **Filter**

Filter settings for particle system's name.

Please note that the filter applies only to particle-system's level.

For details, see "Asset Browser panel" on page 225 .

- **Particle list**

Hierarchical list with particle systems' information.

- **Particle systems**

List of particles system files under the current folder (corresponds to the `MetaParticleSystem` object).

The selection/clearing of the check box propagates to all sub-systems.

- **Particle's sub-systems**

List of particle sub-systems of the particle system (corresponds to the `ParticleSystem` object).

Individual sub-systems can be turned off by clearing its check box.

Pressing `Ctrl` while clicking the check box causes all other sub-systems to acquire the opposite value of the current sub-system.

- **Sub-system's components**

List of components of the particle's sub-system.

As a minimum, every particle sub-system has the components **System Properties** and **Renderer Properties**.

Individual sub-systems can be turned off by clearing its check box, with the exception of **System Properties** and **Renderer Properties**.

Selecting a component causes its settings to be displayed in the **Component** sub-panel.

For more details, see the following sections:

- "System Properties sub-panel" on page 231 .
- "Renderer Properties sub-panel" on page 232 .
- "Barrier sub-panel" on page 245 .
- "Collide sub-panel" on page 254 .
- "Flare sub-panel" on page 253 .
- "Force sub-panel" on page 246 .
- "Jitter sub-panel" on page 247 .

- “Magnet sub-panel” on page 256 .
- “MatrixSwarm sub-panel” on page 255 .
- “Node Clamp sub-panel” on page 252 .
- “Orbitor sub-panel” on page 253 .
- “Scaler sub-panel” on page 249 .
- “Sink sub-panel” on page 244 .
- “Source sub-panel” on page 239 .
- “Splat sub-panel” on page 256 .
- “Stream sub-panel” on page 247 .
- “Tint Shader sub-panel” on page 249 .



Adds the component selected in **Component List** to the particle sub-system selected in **Particle List**.

#### ▪ **Component list**

List of particle components available to particle sub-systems.

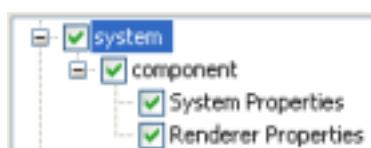
Note that the **System Properties** and **Renderer Properties** components are not listed, since they are always created with new particle sub-systems by default, and cannot be deleted.



Creates a new particle system, sub-system, or component, depending on the type of item currently selected in **Particle List**.

#### ▪ **If a particle system is selected:**

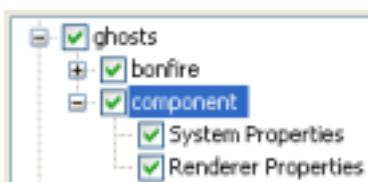
Creates a new particle system, named `system[n]B`, containing sub-system named `component`, with components **System Properties** and **Renderer Properties**.



Add button — If a particle system is selected

#### ▪ **If a sub-system is selected:**

Creates a new sub-system, named `component[n]B`, with the components **System Properties** and **Renderer Properties**.

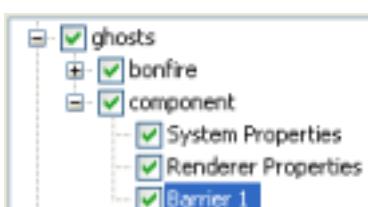


Add button — If a sub-system is selected

- **If a component is selected:**

Creates a component of the type selected in **Component List**, named  $<\text{component\_type}>n^B$ , and displays its respective configuration sub-panel.

If a component involves 3D tools, then a gizmo will be displayed in the viewport.



Add button — If a component is selected



Copies the selected particle system, sub-system, or component.

If a particle system or sub-system is selected, then it will be named **Copy of <item\_name>**. If a sub-system's component is selected, then will be named  $<\text{component\_type}>n^B$ .



Deletes the selected particle system, sub-system, or component.

The user is prompted to confirm the operation only if a particle system or sub-system is selected.

The button will be disabled if the sub-system component selected is either **System Properties** or **Renderer Properties**.

*A — For details, see "Menu items" on page 208 .*

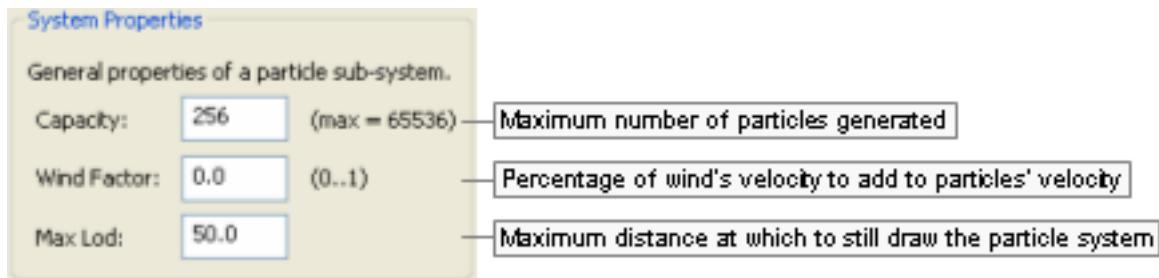
*B — Where n is a sequential number.*

#### 4.10.2.2. Component sub-panel

This is the lower part of the **Systems** panel, and displays the configuration options of the component selected in **General** sub-panel's **Particle List**.

##### 4.10.2.2.1. System Properties sub-panel

This sub-panel allows the user to set the basic properties of the particle sub-system.



System Properties sub-panel

The list below describes the fields on this sub-panel:

▪ **Capacity**

Maximum number of particles to be generated by the system.

Once this limit is reached, no more particles will be created, until some of them have been removed (via a Sink).

Value range is from 1 through 65536.

▪ **Wind factor**

Amount of effect that the wind will have on the particle system's velocity.

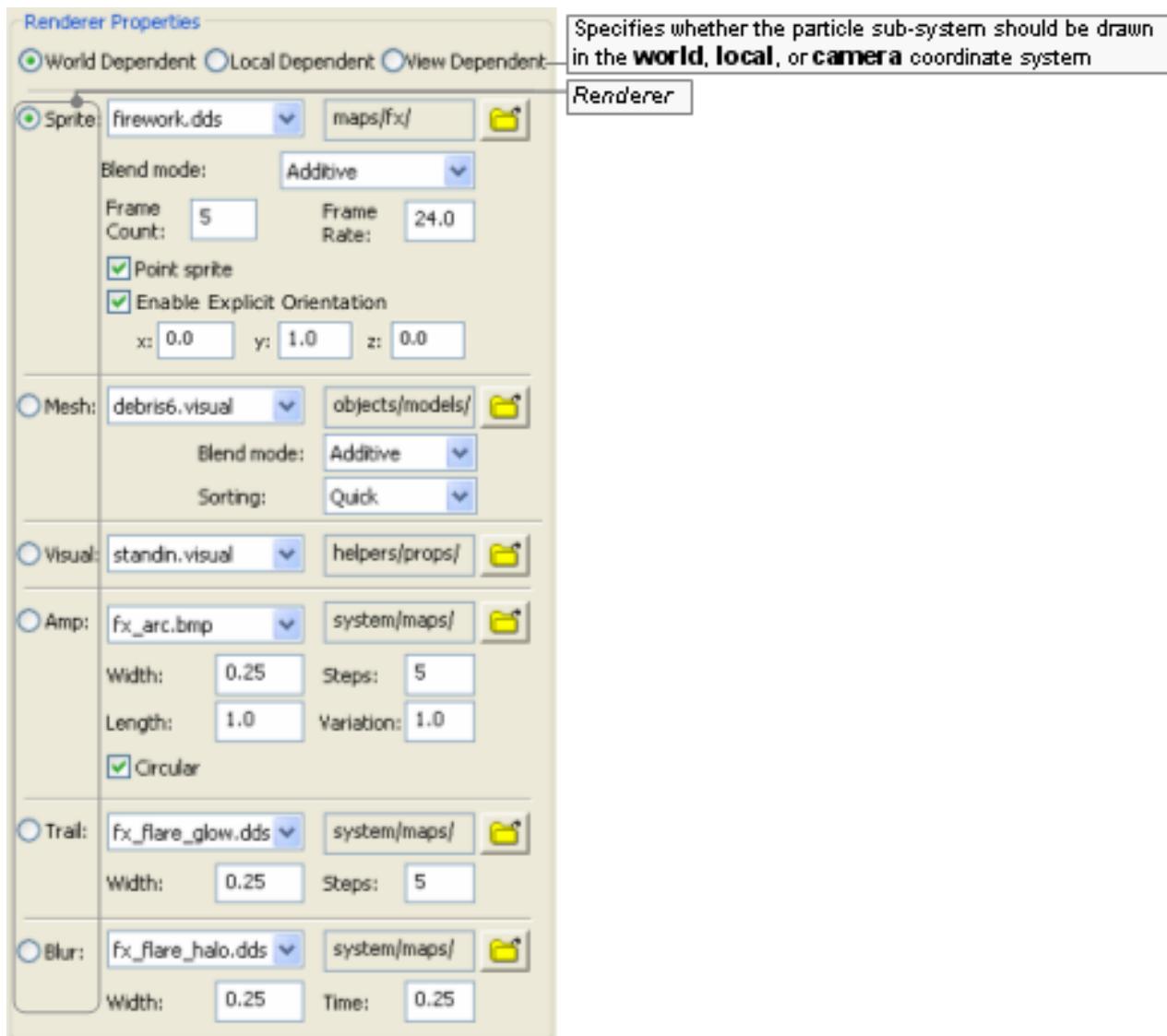
Value ranges from 0.0 (wind velocity will not be added to particles' velocity, *i.e.*, particles will not be affected by wind) to 1.0 (wind velocity will be fully added to particles' velocity).

▪ **Max LOD**

Furthest distance from camera for which the particle system will still be drawn.

#### 4.10.2.2.2. Renderer Properties sub-panel

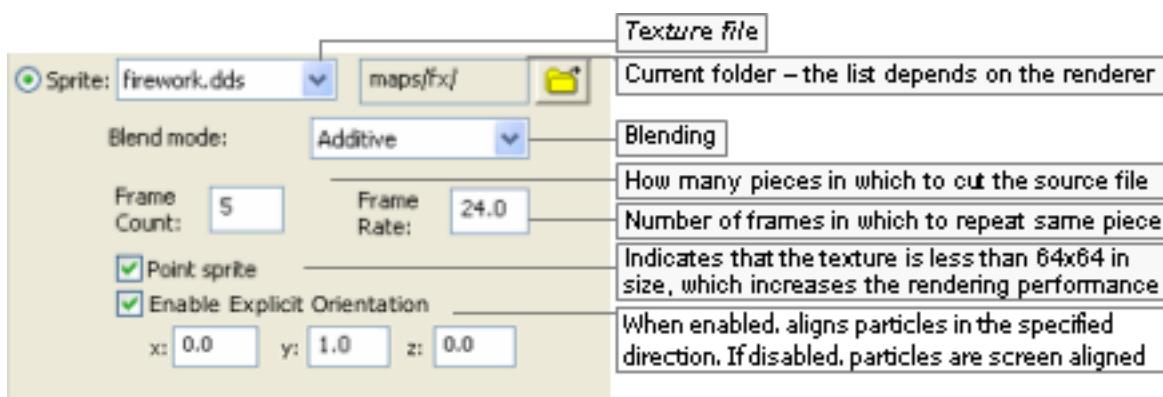
This sub-panel allows you to set the basic properties of the particle sub-system.



Renderer Properties sub-panel

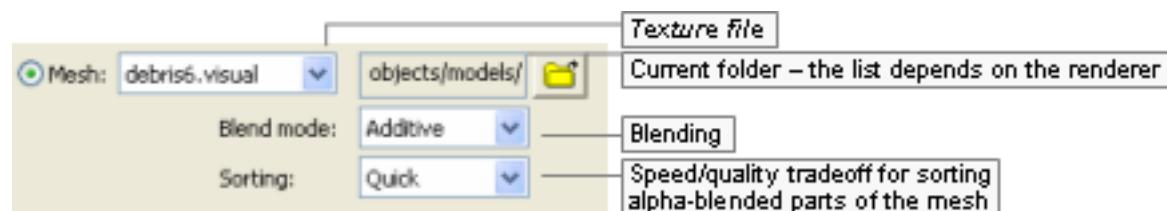
This sub-panel contains various sections, one for each renderer:

- **Sprite section**



Sprite section

- Mesh section



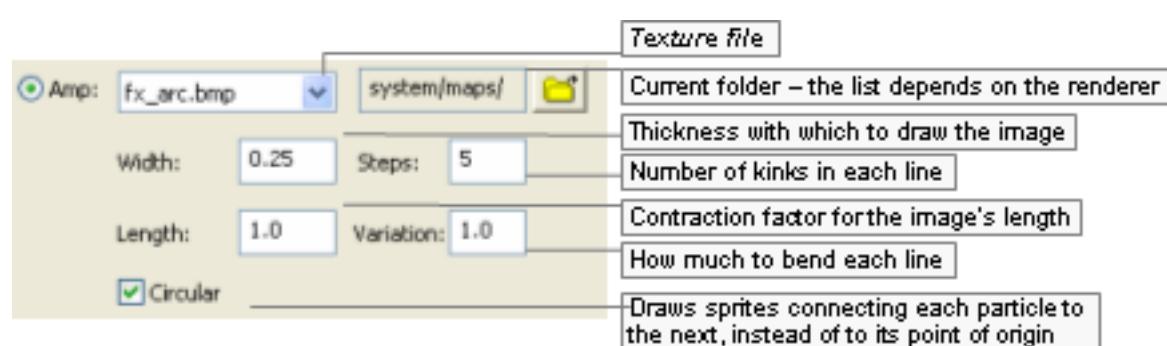
Mesh section

- Visual section



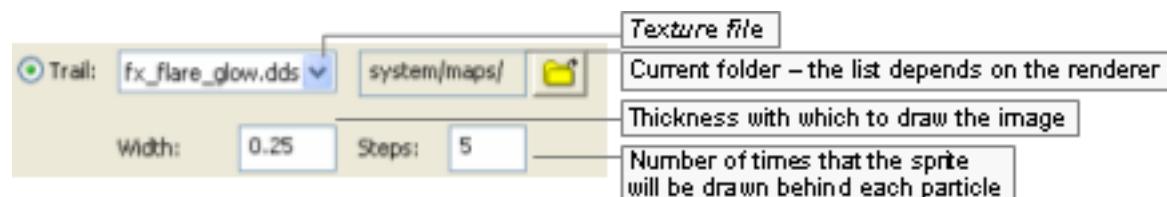
Visual section

- Amp section



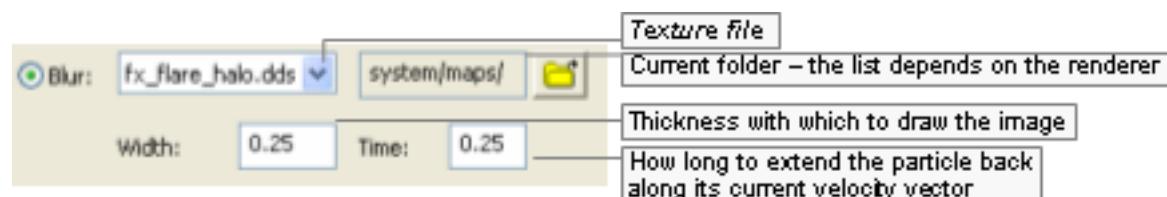
Amp section

- Trail section



Trail section

- Blur section



The list below describes the fields on this panel:

- World dependent

Sets whether the particle system should be drawn in the world's coordinate system.

- **Local dependent**

Sets whether the particle system should be drawn in the camera's coordinate system.

If this check box is selected, then particles will move with the particle system that spawned them.

- **View dependent**

Sets whether the particle system should be drawn in the camera's coordinate system.

If this check box is selected, then moving the camera will move the particles with it.

Useful for screen-based effects, *e.g.*, if the player was to see stars after a concussion.

- **Renderer**

The renderer to use on the particle sub-system.

- **Sprite**

A sprite is a bitmap that rotates to face the camera perspective.

This renderer provides various blending modes, described in the Blending Mode box below.

- **Mesh**

Allows the rendering of meshes exported from 3dMax or Maya using the Visual Exporter's **Mesh Particles** option button (for details, see "3ds Max visual exporter" on page 311, and "Exporting" on page 321 ).

This allows blending mode and tint shaders to be used.

- **Visual**

Allows a regular mesh to be drawn as a particle system.

It does not support tint shaders, unless they have a specially written shader, nor does it support blend modes like **Mesh** renderers.

- **Amp**

Draws a series of sprites from the particle system's origin to each particle. Ideal for electrical effects.

- **Trail**

Draws a trail behind each particle, while retaining information about previous positions of each one, allowing you to use centrifugal forces like **Orbitor**.

- **Blur**

Draws a trail behind each particle, based on its velocity, but does not retain information about previous positions of each particle.

It works by drawing multiple particles along one vector, therefore it might not work as intended if you have centrifugal forces controlling the particles (in this case, use **Trail** instead).

- **Renderer fields**

- **Texture file** (available for **Sprite**, **Mesh**, **Amp**, **Trail**, and **Blur**)



List of files on the folder specified in the  button, and that are relevant to the specified renderer.

For the Mesh renderer, only visual files (.visual) will be listed. For all other renderers, these files will be listed: Bitmap images (.bmp), TrueVision Targa Graphic (.tga), and Microsoft Direct Surface (.dds).

- **Current folder** (available for **Sprite**, **Mesh**, **Amp**, **Trail**, and **Blur**)

Opens the **Open** dialog box, where you can specify the folder from which to read the source files.

The dialog box displays only the folders in the resources folders list (or `<res>` — for details on how BigWorld compiles this list, see *Starting the Tools* on page 273), and the ones listed in the configuration file `bigworld/tools/particle_editor/paths.xml`.

- **Blend mode** (available for **Sprite**)

List of available modes to blend the particle.

The options are described below:

- **Additive**

Adds sprite's particle colour to the background using the alpha of the sprite's image as blend factor.

- **Additive alpha**

Uses the inverse of the sprite's alpha as a mask on the background, and adds the sprite's colour.

- **Blended**

Blends particles using the sprite's alpha channel.

- **Blended colour**

Uses colour values to blend particles, instead of the alpha channel.

- **Blended inverse colour**

The same as Blended colour. Available for backwards compatibility.

- **Solid**

Renders particles as solid sprites, with no blend.

- **Shimmer**

Shimmers the background, using the alpha channel to mask the shimmer.

- **Source alpha**

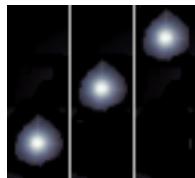
Uses the sprite's alpha channel as a mask where alpha values less than 128 are transparent.

- **Frame count** (available for **Sprite**)

Number of parts in which to cut the source file.

The **Frame Count** and **Frame Rate** fields provide a cheap way for using animated textures (the other method is using an animated texture — `.texanim` — file).

In this case, the source file should be a single bitmap with multiple frames in it. The **Texture File** on the right would have a **Frame Count** value of 3.

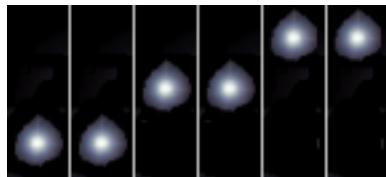


Example source file

- **Frame rate** (available for **Sprite**)

Number of frames displayed per second.

For the example texture file above, a **Frame Rate** value of 0.5 would result in the life cycle displayed below.



Example effect of Frame Rate value of 0.5

- **Point sprite** (available for **Sprite**)

Indicates that the sprite is smaller than 64x64 pixels and has no animation, which reduces the amount of necessary memory, thus increasing the rendering performance.

- **Enable Explicit Orientation** (available for **Sprite**)

When enabled, aligns particles in the specified direction. If disabled, particles are aligned to the screen.

- **Sorting** (available for **Mesh**)

Determines the quality of the alpha-blending sorting and makes a trade-off between quality and speed.

The options are described in the list below:

- **None**

The particle system as a whole will be rendered in order with respect to other sorted objects, and the triangles contained within will be sorted back to front. The particles themselves, however, will be rendered out of order.

Choose this method if speed is paramount and the visual artefacts introduced are not noticeable.

- **Quick**

Sorting will be done in a way that allows the renderer to still draw in groups of 15.

This introduces some sorting inaccuracies, but maintains most of the speed of unsorted mesh particles.

This method is highly recommended if the sorting inaccuracies are not noticeable.

- **Accurate**

Sorting of individual objects and triangles is performed.

This provides the most accurate sorting, but breaks the ability of the renderer to perform fast 15-at-a-time rendering, thus decreasing rendering performance.

If you choose this sorting method, then make sure to double-check the performance hit induced.

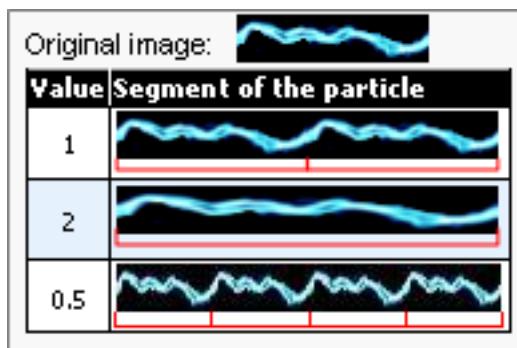
- **Width** (available for **Amp**, **Trail**, and **Blur**)

Thickness in which to draw the image in the source file.

- **Texture length** (available for **Amp**)

How compressed or elongated the original texture will be when rendering the particle — the particle is composed of continuous segments of the specified texture.

Fractional values below 1 specify the percentage by which the original image should be compressed, and values above 1 specify the percentage by which the image should be stretched.



Example

- **Steps** (available for **Amp** and **Trail**)

- **For Amp:**

Number of kinks in each line.

- **For trail:**

Number of times that the sprite will be drawn behind each particle, thus actually altering the length of the trail.

- **Variation** (available for **Amp**)

How much to bend each line.

- **Circular** (available for **Amp**)

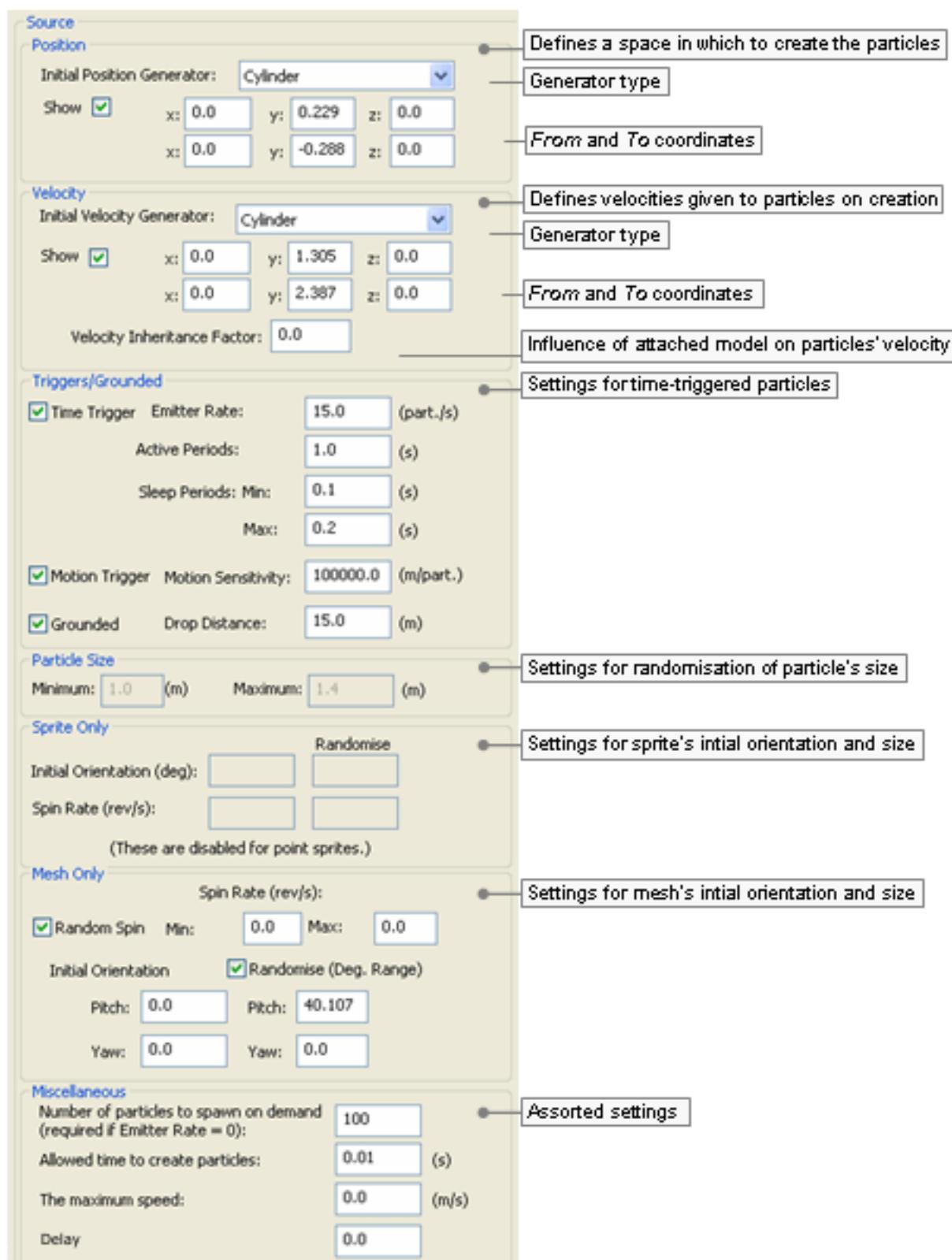
Indicates that the sprites should be drawn connecting each particle to the next, instead of connecting each particle to the point of origin.

- **Time** (available for **Blur**)

How long to extend the particle back along its current velocity vector.

### 4.10.2.2.3. Source sub-panel

This sub-panel allows the user to specify the dynamics of the particle sub-system, *i.e.*, the particles' source position, how much they should spread, and the number of particles to be created, among other things.



## Source sub-panel

The list below describes the fields on this panel:

- **Position**

Group of fields defining a space within which to create the particles.

- **Initial position generator**

Geometry of the position generator.

The list below describes the available options, and how they affect the **From** and **To** fields:

- **Box** (Enabled coordinates: **From** and **To**)
- **Cylinder** (Enabled coordinates: **From** and **To**)
- **Line** (Enabled coordinates: **From** and **To**)
- **Point** (Enabled coordinates: **From**)
- **Sphere** (Enabled coordinates: **From**)

- **Show**

Toggles the visibility of the area defined for the position generator, and of the 3D gizmos attached to its initial and final (if applicable) points.

Note that changing the position of the 3D gizmos in the viewport automatically updates the appropriate **From** and **To** coordinates in the sub-panel.

- **From**

The **x**, **y**, and **z** coordinates of the initial point of the position generator.

These values are automatically updated if you move the 3D gizmo in the viewport.

- **To**

The **x**, **y**, and **z** coordinates of the final point of the position generator.

These values are automatically updated if you move the 3D gizmo in the viewport.

Only enabled if Initial **Position Generator** is set to **Box**, **Cylinder**, or **Line**.

- **Velocity**

Defines a set of velocities that will be given to the particles on their creation.

- **Initial velocity generator**

Geometry of the velocity generator.

The list below describes the available options, and how they affect **From** and **To** fields:

- **Box** (Enabled coordinates: **From** and **To**)
- **Cylinder** (Enabled coordinates: **From** and **To**)
- **Line** (Enabled coordinates: **From** and **To**)

- **Point** (Enabled coordinates: **From**)
- **Sphere** (Enabled coordinates: **From**)

The gizmos define the possible velocity vectors — they are drawn from within the **Initial Position Generator**, and end within the **Initial Velocity Generator**.

The origin of the velocity vectors is determined by the type specified for it:

- **Box** — Bottom corner of the box.
- **Cylinder** — Centre of the base.
- **Line** — Base point of the line.
- **Point** — Point itself.
- **Sphere** — Centre of the sphere.

#### ▪ **Show**

Toggles the visibility of the area defined for the velocity generator, and of the 3D gizmos attached to its initial and final (if applicable) points.

Note that changing the velocity of the 3D gizmos in the viewport automatically updates the appropriate **From** and **To** coordinates in the sub-panel.

#### ▪ **From**

The **x**, **y**, and **z** coordinates of the initial point of the velocity generator.

These values are automatically updated if you move the 3D gizmo in the viewport.

#### ▪ **To**

The **x**, **y**, and **z** coordinates of the final point of the velocity generator.

These values are automatically updated if you move the 3D gizmo in the viewport.

Only enabled if Initial **Velocity Generator** is set to **Box**, **Cylinder**, or **Line**.

#### ▪ **Velocity inheritance factor**

Amount of effect that the model to which the particle system is attached to will have on its final velocity.

Value ranges from 0.0 (the model's velocity will not be added to the particles' velocity, *i.e.*, the particles will not be affected by the model's movement) to 1.0 (the model's velocity will be fully added to the particles' velocity).

#### ▪ **Triggers/ Grounded**

Group of fields for time-triggered particle sub-systems.

##### ▪ **Time trigger**

Indicates that the particle sub-systems will periodically generate particles.

All particle systems placed by WorldEditor must be time-triggered.

##### ▪ **Emitter rate (particle/s)**

Number of particles to be generated per second.

If the source seems to pause while releasing particles, then check the **System Properties** panel's **Capacity** field, and the setting for the **Sink** component.

- **Active period (s)**

Period during which new particles will be generated.

After the **Active Period**, the particle system enters the **Sleep Period**.

- **Sleep period (s)**

After an **Active Period**, a **Sleep Period** (*i.e.*, a period of inactivity) might be specified — this type of particle behaviour is useful for bursts of activity.

If **Min** is set to zero, and **Max** is set to -1, then particles will be continuously generated.

If **Max** is set to -1, then only the **Min** value is used.

- **Min**

Minimum period of inactivity (in seconds).

- **Max**

Maximum period of inactivity (in seconds).

- **Motion trigger**

Indicates that the particle sub-system is attached to a moving object.

Particles will be emitted per distance travelled by the sub-system.

- **Motion sensitivity (m/part)**

How quickly the particles are released with motion, measured in metres per particle. This corresponds to the distance the system must move to release one particle.

To test this feature, change the selection in **Sub-System Components** list box to **System Properties**, then move the 3D gizmo.

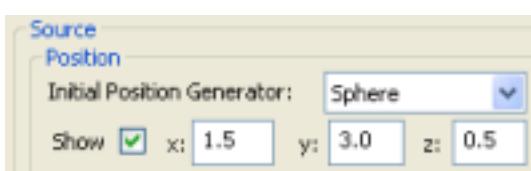
- **Grounded**

Indicates that particles should (if possible) be spawned at ground level.

- **Drop distance (m)**

Maximum distance (in metres) allowed between the ground and particle's initial height (specified in **Initial Position Generator's From's y** field) if particle is to be generated.

In the example below, if **Drop Distance** is set to a value greater than 3.0, then no particles will be generated.



## Example

- **Particle size**

Defines the limits for randomising the size of the particles.

- **Minimum**

Minimum size of particles.

- **Maximum**

Maximum size of particles.

- **Sprite only**

Group of fields defining initial orientation and spin rate for sprite-based particles.

- **Initial orientation (deg)**

Inclination to apply to the particles (in degrees).

- **Spin rate (rev/s)**

Number of revolutions per second to apply to the particles.

- **Randomise**

If a value is not specified for **Randomise**, then all generated particles will contain the initial inclination/spin rate specified in this field. Otherwise, it will be randomised between the value in this field and the one in **Randomise**.

- **Initial orientation**

Maximum value to be used for randomising the particles' inclination.

- **Spin rate**

Maximum value to be used for randomising the particles' spin rate.

- **Mesh only**

Group of fields defining initial orientation and spin rate for mesh-based particles.

- **Spin rate (rev/s)**

- **Random spin**

Indicates that the particles should revolve randomly, according to the settings below.

- **Min**

Minimum value to be used for randomising the particles' spin rate.

- **Max**

Maximum value to be used for randomising the particles' spin rate.

- **Randomise (deg range)**

Indicates that the particles' pitch and/or yaw should be randomised according to **Pitch** and **Yaw** settings.

If a value is not specified for **Randomise**, then all generated particles will contain the pitch/yaw specified in this field. Otherwise, it will be randomised between the value in this field and the one in **Randomise**.

- **Pitch**

Pitch of the initial position of the particles.

- **Yaw**

Yaw of the initial position of the particles.

- **Pitch (Randomise)**

Maximum value to be used for randomising the particles' pitch.

- **Yaw (Randomise)**

Maximum value to be used for randomising the particles' yaw.

- **Miscellaneous**

- **Number of particles to spawn on demand**

Number of particles to create, for non-continuous emitters.

This field is mandatory for non-continuous emitters, which are designed to be dynamically created by the game (and not via WorldEditor). For these particle systems, a game event must force the creation of particles.

- **Time (in seconds) allowed for the creation of particles.**

If the particles are not created within this time frame, then they will not be spawned. This is useful for grounded particles (see the Grounded check box), where system performance can be affected if too many particles are spawned.

- **The maximum speed**

This is the maximum speed (in m/s) at which the particle system can be moving and still generate particles.

- **Delay**

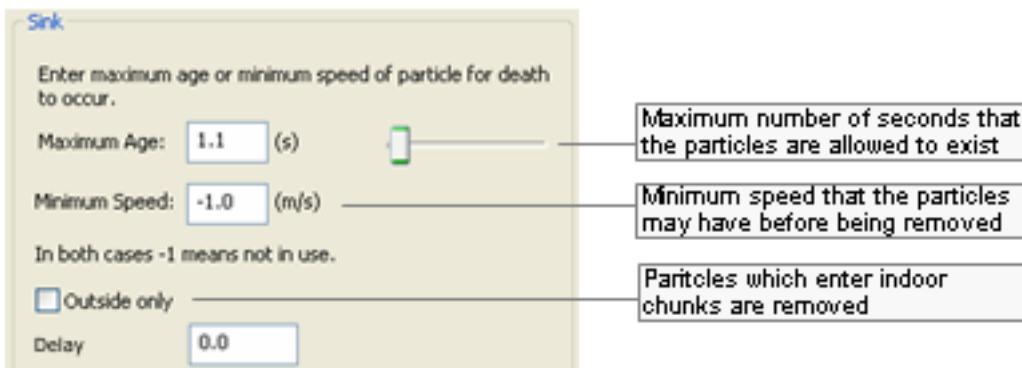
This is the delay in seconds that the action will wait before it starts.

#### **4.10.2.2.4. Sink sub-panel**

This sub-panel allows the user to specify how long the particles should live.

Sinks are essential for most particle systems, because they remove unwanted particles and thus prevent the particle system from reaching its maximum capacity, at which point no more particles will be spawned.

Sinks can remove particles using the particle's age or its speed.



Sink sub-panel

The list below describes the fields on this panel:

- **Maximum age**

Maximum lifetime (in seconds) of each particle.

A particle might be removed before its lifetime expires, if it reaches Minimum Speed.

- **Minimum speed**

Minimum speed (in metres per second) that the particles may have before being removed.

A particle might be removed without reaching Minimum Speed if its lifetime expires.

- **Outside only**

This ensures that the particles can only exist in outside chunks.

If a particle moves into an indoor chunk it is removed.

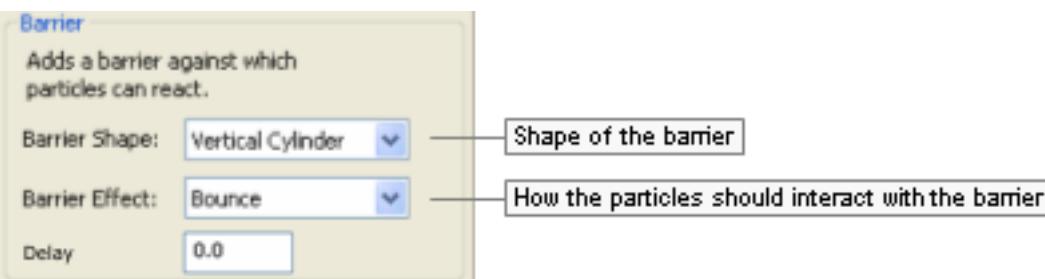
- **Delay**

This is the delay in seconds that the action will wait before it starts.

#### 4.10.2.2.5. Barrier sub-panel

This sub-panel allows the user to specify a barrier for the generated particles, and how they should interact with it.

Barriers can be used to bounce particles, remove particles (acts like a sink), or allow particles. To make particles bounce off the terrain, use a **Collide** sub-system instead of a **Barrier**. For more details, see “Collide sub-panel” on page 254 .



Barrier sub-panel

The list below describes the components of the **Barrier** sub-panel:

- **Barrier shape**

Shape of the barrier.

Contains the following options:

- None
- Vertical cylinder
- Box
- Sphere

- **Barrier effect**

How the particles should interact with the barrier.

Contains the following options:

- Bounce
- Remove
- Allow
- Wrap

- **Delay**

This is the delay in seconds that the action will wait before it starts.

#### 4.10.2.2.6. Force sub-panel

This sub-panel allows the user to specify a second force (independent of the initial force generator) to be applied to all particles in the sub-system.



Force sub-panel

This component is different from the **Stream** component in which it does not have a half-life setting (for details, see “Stream sub-panel” on page 247 ).

The list below describes the fields in this panel:

- **x, y, z**

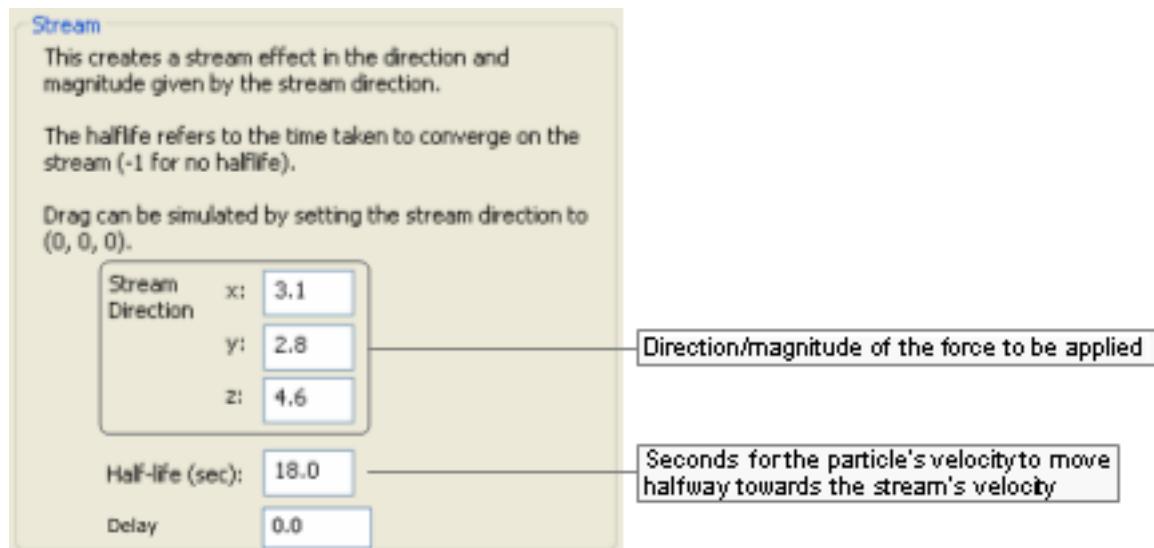
Direction/magnitude of the force to be applied to the particles in the sub-system.

- **Delay**

This is the delay in seconds that the action will wait before it starts.

#### 4.10.2.2.7. Stream sub-panel

This sub-panel allows you to specify how to apply a streaming effect to each particle.



Stream sub-panel

This component is similar to the **Force** one, except in that it allows control of the amount of force imparted to each particle per time, via the **Half-Life** field (for details on the **Force** panel, see “Force sub-panel” on page 246 ).

The list below describes the fields in this panel:

- **Stream direction**

Direction/magnitude of the force to be applied.

- **x, y, z**

Coordinates for the direction/magnitude of the force to be applied to the particles.

- **Half-life (sec)**

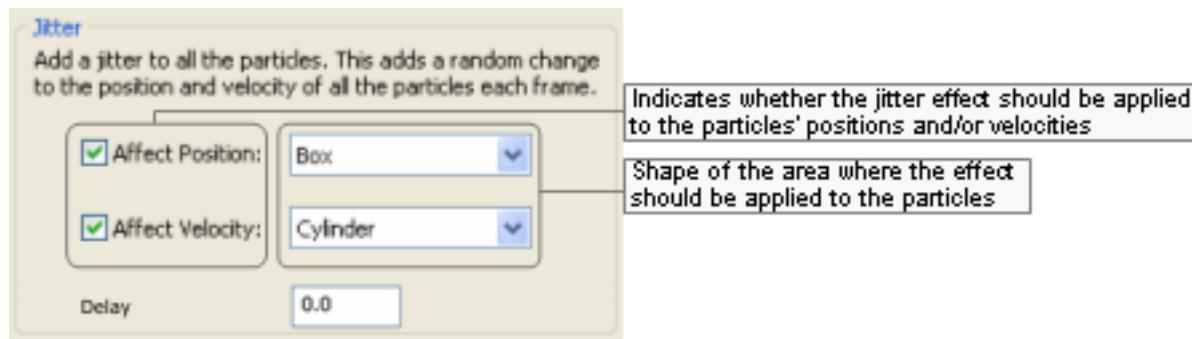
Number of seconds that the particle's velocity will take to move halfway towards the stream's velocity. A negative number means infinite half-life, *i.e.*, the particles will not be affected by the stream.

- **Delay**

This is the delay in seconds that the action will wait before it starts.

#### 4.10.2.2.8. Jitter sub-panel

This sub-panel allows the user to add a jittering/wobbling effect to the generated particles.



Jitter sub-panel

The list below describes the fields in this panel:

▪ **Affect position**

▪ **Check box**

Indicates that the jitter effect should be applied to the particles' positions.

▪ **Drop-down list box**

Shape within which the effect positions are created. Larger objects result in larger differences in particle position, resulting in a stronger jitter effect.

The available options are:

- Box
- Cylinder
- Line
- Point
- Sphere

▪ **Affect velocity**

▪ **Check box**

Indicates that the jitter effect should be applied to the particles' velocities.

▪ **Drop-down list box**

Shape within which the velocity vectors are created. Larger objects result in larger effect vectors, resulting in a stronger jitter effect.

The available options are:

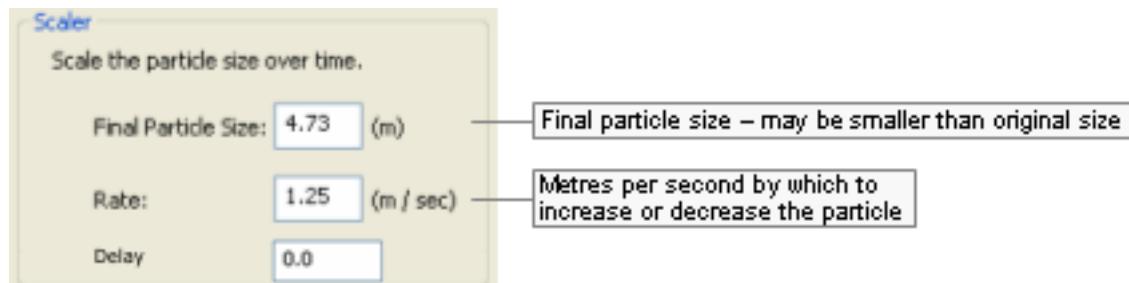
- Box
- Cylinder
- Line
- Point
- Sphere

- **Delay**

This is the delay in seconds that the action will wait before it starts.

#### 4.10.2.2.9. Scaler sub-panel

This sub-panel allows the user to specify how to change the size of the particles over time.



Scaler sub-panel

The list below describes the fields in this panel:

- **Final particle size**

Final size of the particle (in metres). Might be smaller than particle's original size.

- **Rate**

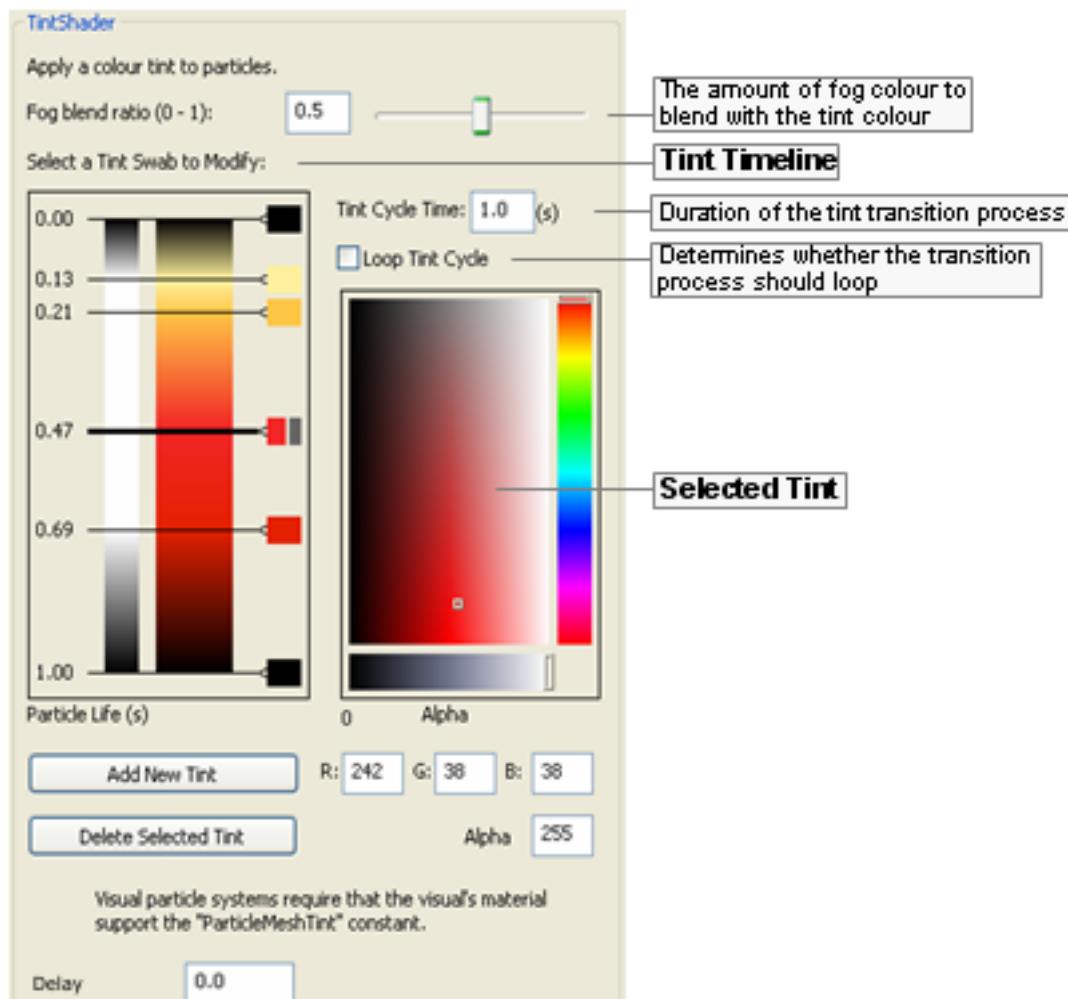
Number of metres per second by which to increase or decrease the particle.

- **Delay**

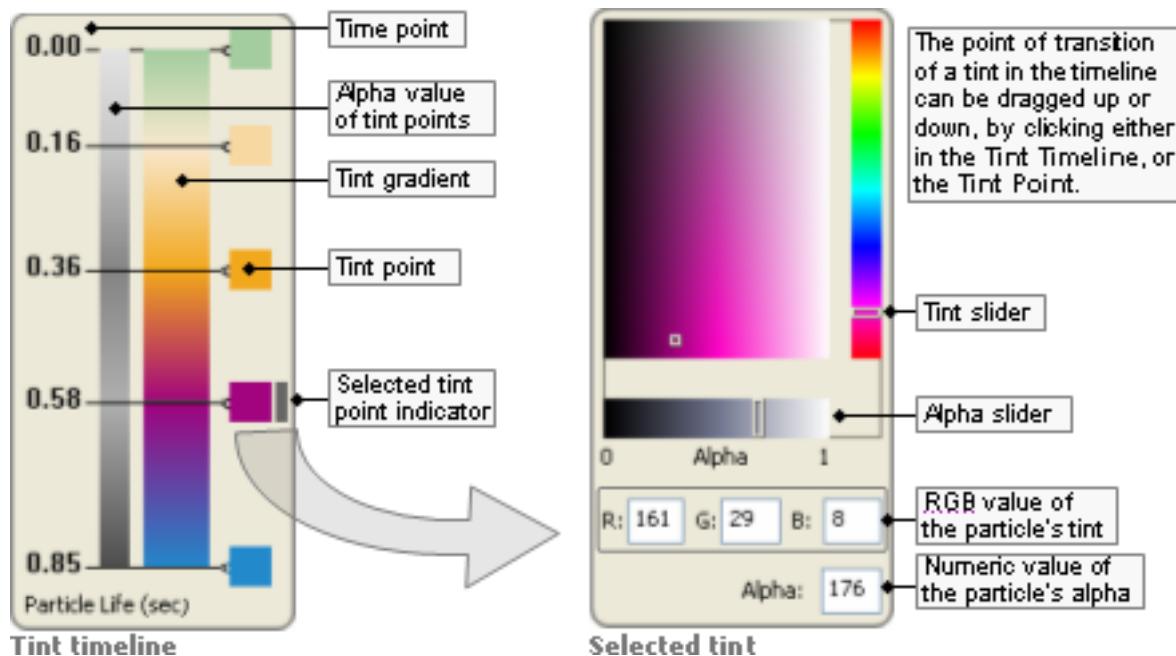
This is the delay in seconds that the action will wait before it starts.

#### 4.10.2.2.10. Tint Shader sub-panel

This sub-panel allows the user to specify how to colour the particles over time.



Tint Shader sub-panel



Tint Timeline and Selected Tint

The list below describes the fields on this panel:

- **Tint Timeline**

- **Time point**

Point of transition between two tints of the particle.

- **Alpha value**

Displays the alpha value — in grey gradient — of each **Tint Point** in the timescale, and the values in between.

Bright areas indicate low value for alpha (low opacity), while dark areas indicate high value for alpha (high opacity).

- **Tint gradient**

Displays the tint on each **Tint Point**, and the values in between.

- **Tint point**

Tint selected for the particle at the specified point in the timescale.

Can be dragged up and down (except the first and last one), with value in the timescale being automatically updated.

- **Selected tint indicator**

Indicates which **Tint Point** is currently selected.

The **Selected Tint** group of fields is automatically updated to reflect the selected tint values.

- **Fog blend ratio**

This is the ratio of fog colour to blend with the tint colour.

- **Tint cycle time**

Duration for the tint transition process.

The **Time Point** values in the **Tint Timeline** group are automatically updated.

- **Loop tint cycle**

Indicates that the tint transition process should be continuously applied to the particle sub-system.

- **Selected tint**

- **Tint slider/ selector**

Composed of 2 parts:

- **Slider**

Colour to be applied to the particle in the selected **Time Point**.

- **Selector**

Luminosity of the colour selected in the slider part of this field.

The tint might also be specified in the **RGB Value** fields. The **Tint Gradient** and **Tint Point** in the **Tint Timeline**, and the **RGB Values** are automatically updated with the values selected.

- **Alpha slider<sup>A</sup>**

Opacity of the particle in the selected **Time Point**, in values between 0 and 1.

The brightest area of the slider indicates the lowest value for alpha (lowest opacity), while the darkest area indicates the highest value for alpha (highest opacity).

The **Alpha Value** in the **Tint Timeline** and the **Alpha** field are automatically updated with the value selected.

- **RGB values**

- **R, G, B**

Red, green, and blue components of the tint in the selected **Time Point**.

The tint might also be specified in the **Tint Slider/Selector**.

The **Tint Gradient** and **Tint Point** in the **Tint Timeline**, and the **Tint Slider/Selector** are automatically updated with the values specified.

- **Alpha<sup>A</sup>**

Numeric value for the alpha to be applied to the particle in the selected **Time Point**.

Small values indicate low opacity, while great values indicate high opacity.

The **Alpha Value** in the **Tint Timeline**, and **Alpha Slider** are automatically updated with the value selected.

- **Add new tint**

Adds a new **Time Point** in the **Tint Timeline**.

The new **Time Point** is added on top of the final one, so it is not immediately visible to the user. You have to drag it up in the **Tint Timeline** before specifying its settings.

- **Delete selected tint**

Deletes the **Time Point** currently selected in the **Tint Timeline**.

The first and last **Time Points** cannot be deleted.

- **Delay**

This is the delay in seconds that the action will wait before it starts.

*A – While the Alpha slider varies from 0 to 1, the Alpha field varies from 0 to 255.*

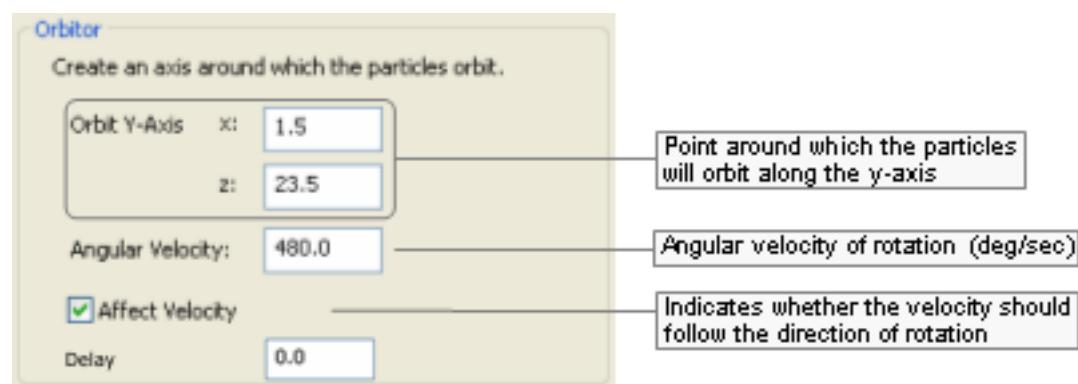
#### 4.10.2.2.11. Node Clamp sub-panel

This component is used to determine that the generated particles should be clamped to the origin of the particle sub-system.

There are no settings for this component, just the delay in seconds that the action will wait before it starts.

#### 4.10.2.2.12. Orbitor sub-panel

This sub-panel allows the user to specify a point around which the particles should orbit along the y-axis.



Orbitor sub-panel

The list below describes the fields on this panel:

- **Orbit y-axis**

- **x,z**

Coordinates of the point around which the particles will orbit along the y-axis.

To have the particle orbit around a different axis while placed in the word, simply rotate the particle sub-system in WorldEditor.

- **Angular velocity**

Angular velocity of the orbit (in degrees per second).

- **Affect velocity**

Indicates that the velocity should also be rotated with the particle.

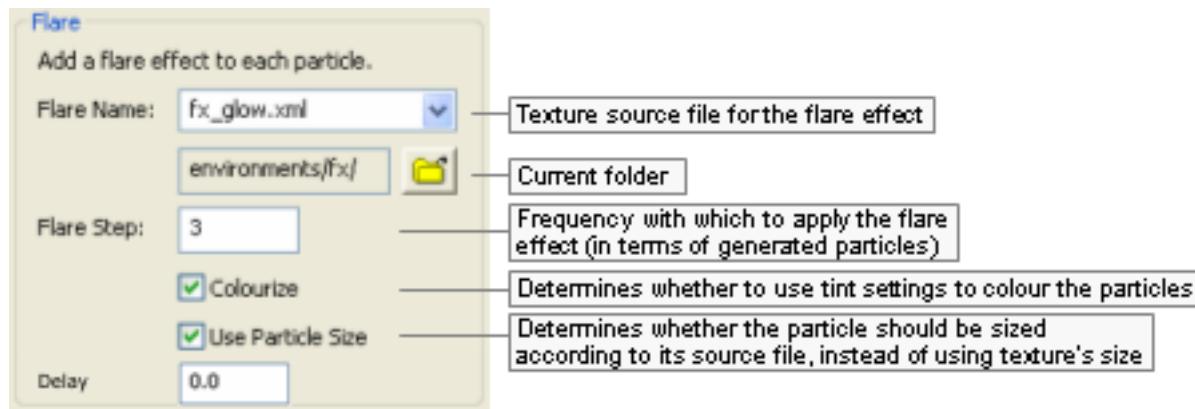
If this field if not selected, then the velocity will always be in the same direction.

- **Delay**

This is the delay in seconds that the action will wait before it starts.

#### 4.10.2.2.13. Flare sub-panel

This sub-panel allows the user to specify that a certain number of the particles should be spawned with a flare effect.



Flare sub-panel

The list below describes the fields in this panel:

▪ **Flare name**

Texture used to apply the flare effect to the particles.

▪ **Folder**

Opens the Open dialog box, where you can specify the folder from which to read the source files.

▪ **Flare step**

Frequency in which to apply the flare effect to the particles. Every  $n$ th particle will have the flare effect.

▪ **Colourize**

Determines whether to use the settings specified for the **Tint Shader** component (if any) to colour the particles (for details, see "Tint Shader sub-panel" on page 249 ).

▪ **Use particle size**

Determines whether the particle should be sized as per its source file, instead of using the size of the chosen texture for the flare.

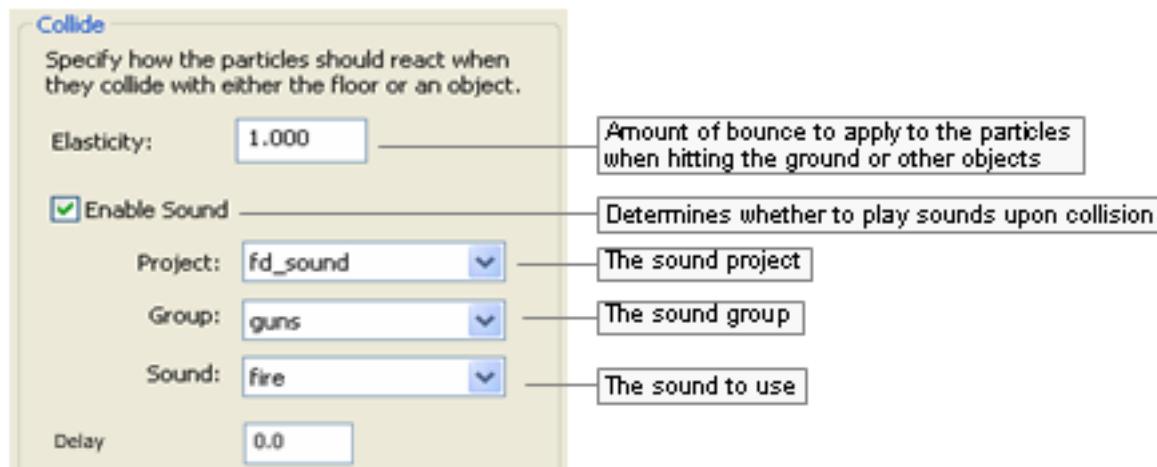
▪ **Delay**

This is the delay in seconds that the action will wait before it starts.

#### 4.10.2.2.14. Collide sub-panel

This sub-panel allows the user to specify how much the particles should bounce when hitting the ground or other objects.

Unlike the **Splat** component, which determines that the particles should be removed immediately after hitting the ground or collidable objects, the particles with the **Collide** component are bounced according to the specified **Elasticity**. For details on the **Splat** component, see "Splat sub-panel" on page 256 .



Collide sub-panel

The list below describes the fields in this panel:

- **Elasticity**

Amount of bounce to apply to the particle when hitting the ground or other objects (in which case their BSP trees are used for the calculation).

The elasticity is applied as a factor to which the incoming velocity should be multiplied to determine the outgoing velocity.

For example, if **Elasticity** is set to 0.75 and a particle hits the ground at a downward velocity of 1.0 m/s, then it will bounce upwards at a velocity of 0.75 m/s.

- **Enable sound**

- **Enable Sound**

Determines whether a sound should be played when particles hit the ground or other objects.

- **Sound Project**

The name of the sound project file from which to get the sound from. This is the project name is specified from the “File <engine\_config>.xml”.

- **Sound Group**

This is of the sound group to select the sound from.

- **Sound Name**

The actual sound event to play when collision occurs.

- **Delay**

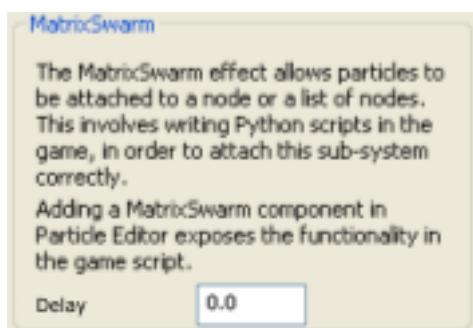
This is the delay in seconds that the action will wait before it starts.

#### **4.10.2.2.15. MatrixSwarm sub-panel**

The **MatrixSwarm** effect allows particles to be attached to a node or a list of nodes. This involves writing Python scripts in the game, in order to attach this sub-system correctly.

Adding a **MatrixSwarm** in ParticleEditor exposes the functionality in the game script.

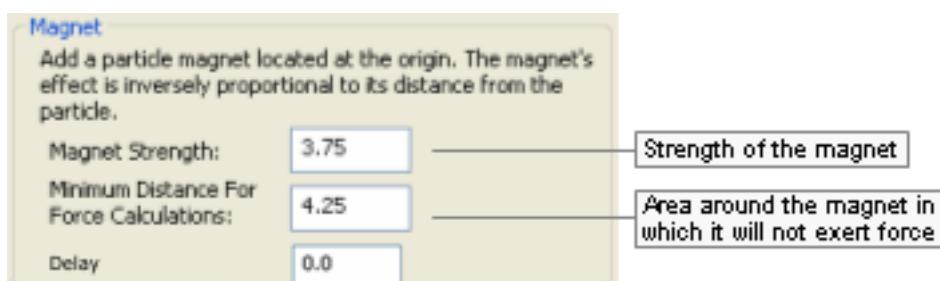
There are no settings for this component, just the delay in seconds that the action will wait before it starts.



MatrixSwarm sub-panel

#### 4.10.2.2.16. Magnet sub-panel

This sub-panel allows the user to specify a magnet effect to the particle's point of origin.



Magnet sub-panel

The list below describes the fields in this panel:

- **Magnet strength**

Strength of the magnet.

Determines how strongly the particles are attracted to it, and how fast they move in its direction.

- **Minimum distance for force calculations**

Area around the magnet in which it will not exert force.

- **Delay**

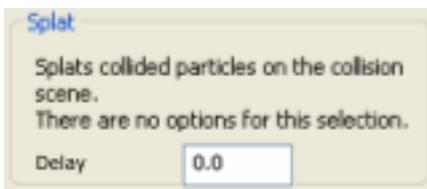
This is the delay in seconds that the action will wait before it starts.

#### 4.10.2.2.17. Splat sub-panel

The **Splat** component is used to specify that the particles should disappear once they hit the ground or other objects.

Unlike the **Collide** component, which determines that the particles should bounce after hitting the ground or collidable objects, the particles with the **Splat** component are removed immediately after the collision (for details on the **Collide** component, see “Collide sub-panel” on page 254 ).

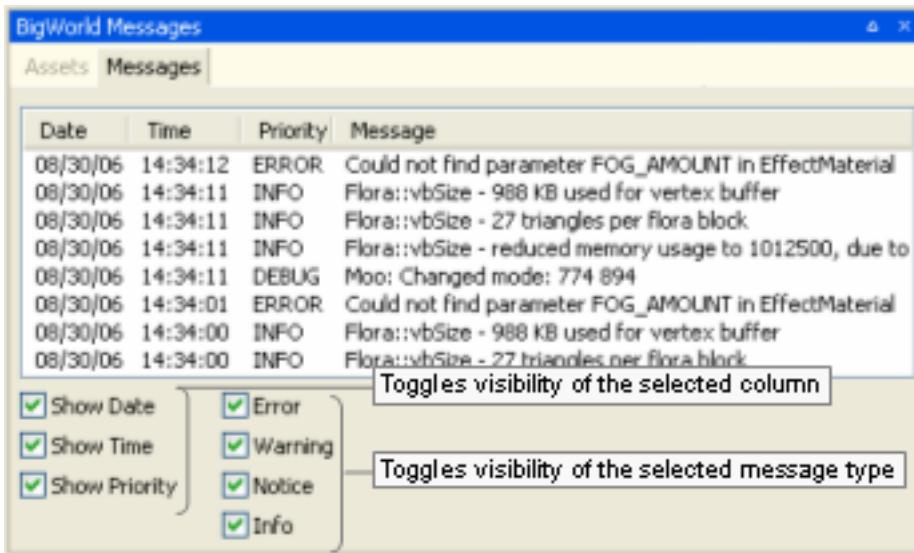
There are no settings for this component, just the delay in seconds that the action will wait before it starts.



Splat sub-panel

### 4.10.3. BigWorld Messages panel

This panel displays different levels of information related to loading, viewing, and manipulating particle systems.



BigWorld Messages panel

## 4.11. Loading a particle system via code

As mentioned in the beginning of this chapter, a particle system's XML file can be loaded by C++ coding, or Python scripting. The following sub-sections illustrate how to load the particle system with each mechanism.

### 4.11.1. C++

The example below illustrates how to load the bonfire particle system via C++:

```

// FOR A META PARTICLE SYSTEM
MetaParticleSystemPtr system = new MetaParticleSystem();
system->load( "bonfire.xml", "particles/" );

// to place the particle system somewhere other then the origin, attach it
PyMetaParticleSystem* pySystem = new PyMetaParticleSystem( system );
pySystem->attach( myMatrixLiaisonPtr );

// FOR AN INDIVIDUAL PARTICLE SYSTEM
// ParticleSystem::load will only load the first system in the file
ParticleSystemPtr system = new ParticleSystem();
system->load( "bonfire.xml", "particles/" );

// can attach as shown above or explicitly set the position (not usu.
// Required)

```

```
Vector3 newPosition(1.f, 1.f, 1.f);
system->explicitPosition(newPosition);
```

Example of placing a particle system via C++

## 4.11.2. Python

The example below illustrates how to load a particle system via Python:

```
import Pixie
system = Pixie.create( "particles/my_particle_system.xml" )
system.attach( myMatrixLiason )
```

Example of placing a particle system via Python

## 4.12. The Particle System

To understand the ParticleEditor interface, it is useful to first describe how a BigWorld particle system works.

A BigWorld particle system consists of the following classes:

- [MetaParticleSystem](#)
- [ParticleSystem](#)
- [ParticleSystemAction](#)
- [ParticleSystemRenderer](#)

Along with their python wrappers:

- [PyMetaParticleSystem](#)
- [PyParticleSystem](#)
- [PyParticleSystemAction](#)
- [PyParticleSystemRenderer](#)

All classes can be found in the Particle project.

The following sub-sections describe each of these classes.

### 4.12.1. MetaParticleSystem

This is a container for a number of [ParticleSystem](#) instances, and is generally only used for static particle systems that are to be placed in WorldEditor.

This allows an artist to create a particle effect using a group of individual particle systems. For example, a fire could consist of flame, smoke and spark particle systems. Those could then be grouped into a fire [MetaParticleSystem](#), which would appear as one object to WorldEditor.

A world builder can easily place such objects without concerns about each component.

### 4.12.2. ParticleSystem

This class contains the high-level information about the particle system, such as:

- How many particles the system can contain.

- Where the system is located.
- How the system will be rendered — all particles in a `ParticleSystem` are rendered through a common `ParticleSystemRenderer`.
- List of actions that determine how the particles behave.

### **4.12.3. ParticleSystemAction**

---

This is a base class implementing a variety of actions on particles, which affect each one over its entire lifetime.

The most useful actions are described in the list below:

- **BarrierPSA**

An invisible, impenetrable barrier in the shape of a box, sphere, or vertical cylinder.

At the barrier, particles can rebound, or be removed.

- **CollidePSA**

Allows particles to collide with the collision scene.

If particles are mesh-based, then a rotation will be applied on collision — the rotation property is contained in the `colour_` member.

- **FlarePSA**

Draws a lens flare at the nth particle created (flare step).

- **ForcePSA**

Applies a force to all particles in a particular direction.

- **JitterPSA**

Adds random position or velocity to the particles.

- **MagnetPSA**

Accelerates particles towards or away from a point.

- **OrbitorPSA**

Causes particles to orbit around a vertical line.

- **ScalerPSA**

Gradually grows or shrinks particles to a particular size.

- **SinkPSA**

Destroys particles of a particular age or minimum velocity.

- **SourcePSA**

Creates particles of a particular size, at a particular rate, within a given volume.

The rates can be time-triggered, motion-triggered, or neither, in which case the particles are created on demand by the application.

Only time-triggered particles can be previewed by the interface.

- **StreamPSA**

Converges particles to a given velocity over time (half-life concept for the magnitude of the effect).

- **TintShaderPSA**

Changes the tint of a particle over time (for sprites only).

#### **4.12.4. ParticleSystemRenderer**

---

This class provides various ways of rendering particles, as described in the list

- **Amp**

Draws a series of sprites from the particle system's origin to each particle.

Ideal for electrical effects.

- **Blur**

Draws a trail behind each particle, based on its velocity, but does not retain information about previous positions of each particle.

It works by drawing multiple particles along one vector, therefore it might not work as intended if you have centrifugal forces controlling the particles (use **Trail** instead).

- **Mesh**

Uses a mesh (.visual file) exported from 3dMax or Maya using the Visual Exporter's **Mesh Particles** option button (for details, see "3ds Max visual exporter" on page 311 and "Exporting" on page 321.)

This has blending modes and allows tints to be applied to mesh particle systems.

- **PointSprite**

A point sprite is a special case of **Sprite** renderer, in that it does not support textures bigger than 64x64 pixels or that have animation.

This restriction is made in order to decrease the amount of memory required, thus increasing rendering performance.

- **Sprite**

A sprite is a bitmap that rotates to face the camera perspective. This renderer provides various blending modes.

- **Trail**

Draws a trail behind each particle, while retaining information about previous positions of each particle, allowing you to use centrifugal forces like **Orbitor**.

- **Visual**

Uses an arbitrary mesh (.visual file) as a particle.

This does not allow blending modes or tint shading without specialized shaders

For more details on the settings for each rendering mode, see "Renderer Properties sub-panel" on page 232

# Chapter 5. Tools Consoles

The BigWorld tools have consoles that provide information and allow tweaking to world builders, artists, and script writers.

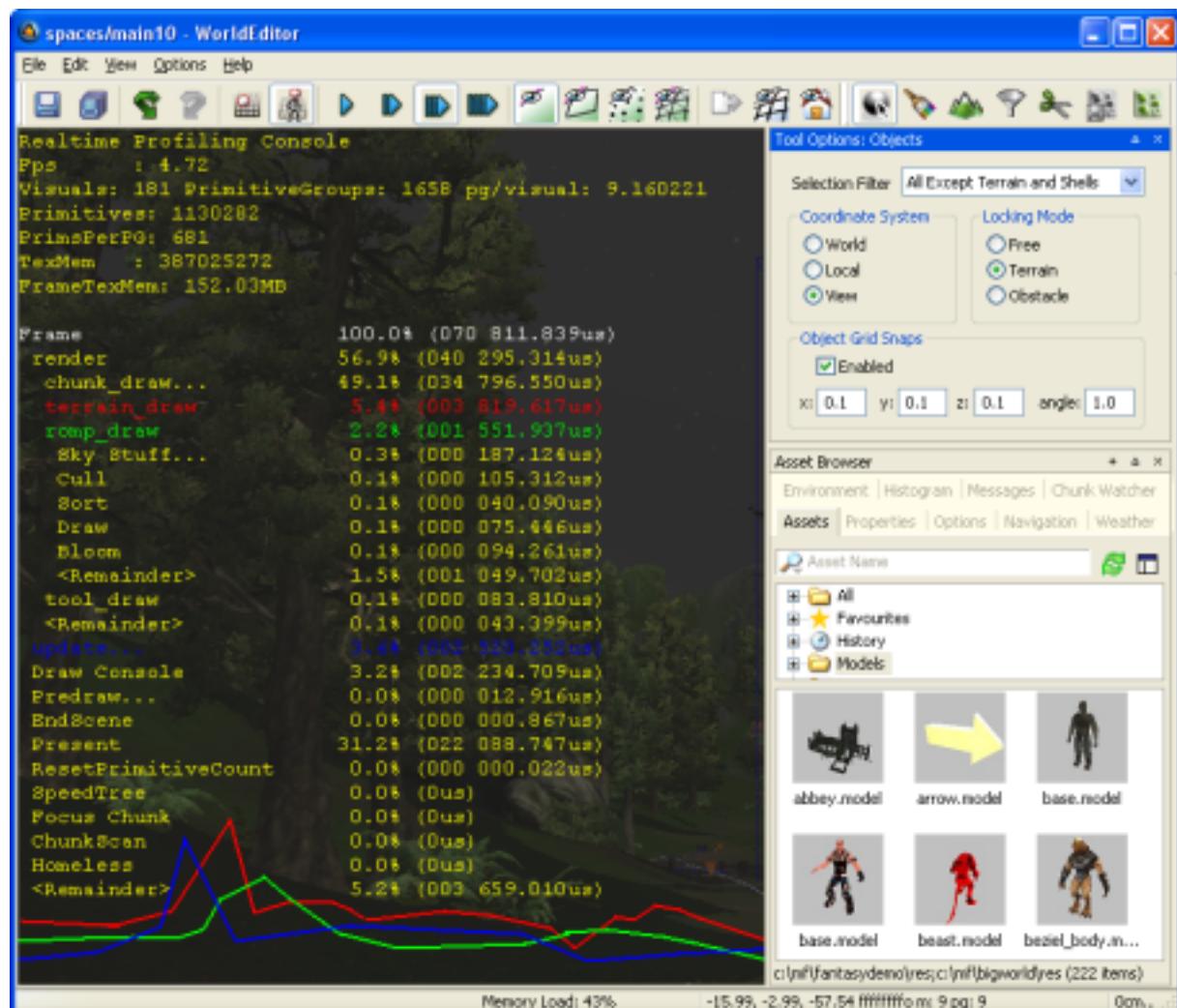
These consoles are described in the following sections:

- “Realtime Profiling console” on page 261 .
- “Debug (Watcher) console” on page 263 .
- “Histogram console” on page 266 .
- “Python console” on page 268 .

## 5.1. Realtime Profiling console

Available in WorldEditor, ModelEditor, and ParticleEditor, this console can be accessed via the **Ctrl+F5** keyboard shortcut, and left by pressing **Esc**.

The console displays real-time frame rendering statistics, and gives you the ability to display graphs for the chosen items (see the bottom part of the screenshot below).



Realtime Profiling console

### 5.1.1. Keyboard shortcuts

---

The list below describe the keyboard shortcuts available for the Realtime Profiling console:

- **Edit keys**

- **Enter**

Expands or collapses the profiling element currently selected — elements with children are indicated by an ellipsis (...) next to it.

- **Esc**

Exits the console.

- **Home**

Scrolls the list to display the first page.

- **Page Down**

Moves the selection to the next profiling element in the list.

Performs the same function as the ] (square right bracket) keyboard shortcut.

- **Page Up**

Moves the selection to the previous profiling element in the list.

Same as the [ (square left bracket) keyboard shortcut.

- **Symbols**

- **Numpad + (Plus sign)**

Scrolls the screen one line down.

- **Numpad - (Minus sign)**

Scrolls the screen one line up.

- **[ (Left square bracket)**

Moves the selection to the previous profiling element in the list.

Performs the same function as the Page Up keyboard shortcut.

- **] (Right square bracket)**

Moves the selection to the next profiling element in the list.

Performs the same function as the Page Down keyboard shortcut.

- **Alphabetic keys**

- **G**

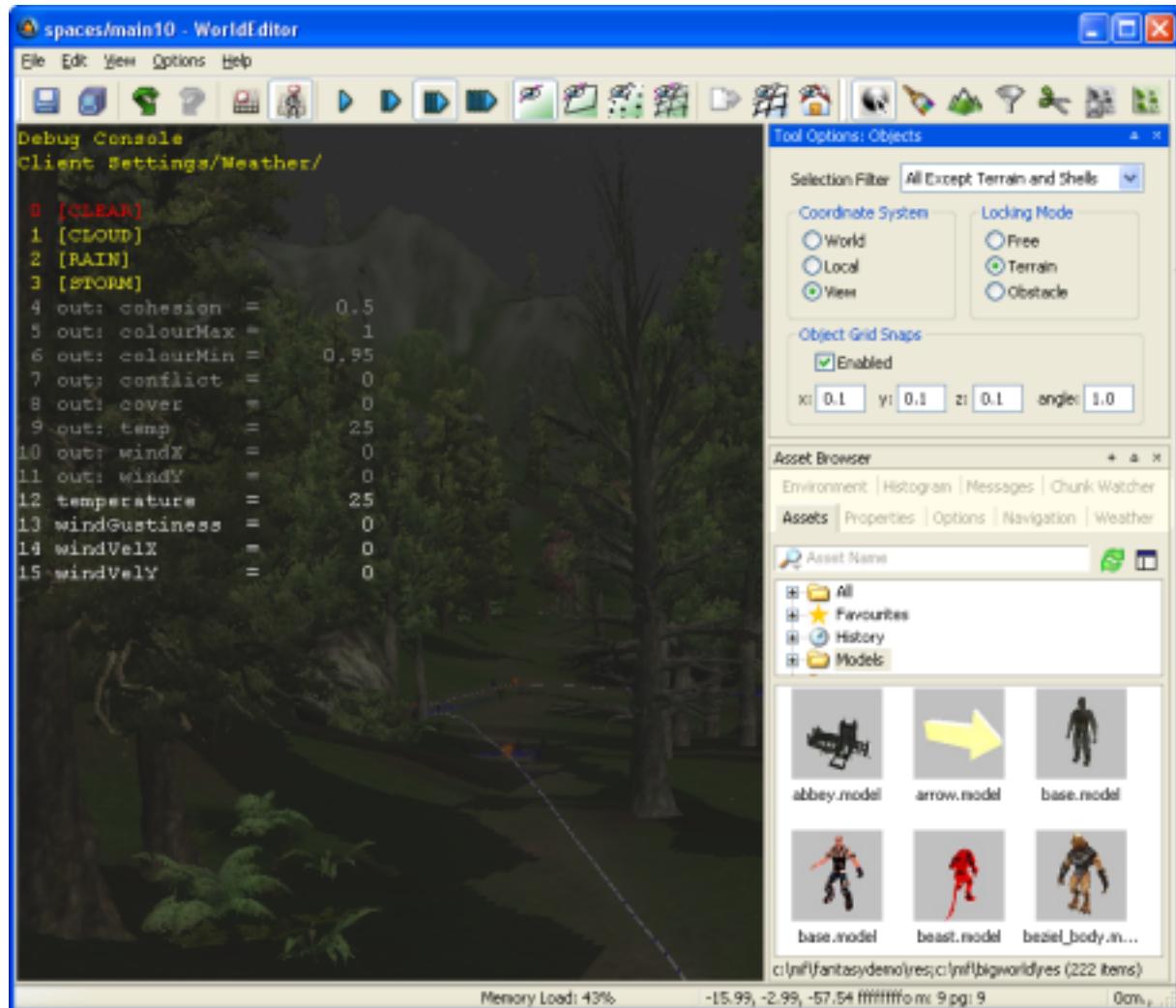
Draws a graph for the profiling element currently selected.

More than one element can be graphed at any one time. Each one will be assigned a different colour, which will be used to display the element's name, and to draw the graph itself.

## 5.2. Debug (Watcher) console

Available in WorldEditor, ModelEditor, and ParticleEditor, this console can be accessed via the **Ctrl+F7** keyboard shortcut, and left by pressing **Esc**.

The console gives access to the client watchers, and lets you change their values, to dynamically assess their effect in the world.



Debug (Watcher) console

### 5.2.1. Keyboard shortcuts

The list below describes the keyboard shortcuts available for the Debug (Watcher) console:

- **Key modifiers**
  - **Alt**
    - If [0-9] key in the alphanumeric keypad is pressed:  
Selects item 40+[0-9], or 50+[0-9] (if Shift is pressed).
  - **Ctrl**
    - If [0-9] key in the alphanumeric keypad is pressed:

Selects item 20+[0-9], or 30+[0-9] (if Shift is pressed).

- **Shift**

- **If [0-9] key in the alphanumeric keypad is pressed:**

Selects item 10+[0-9], 30+[0-9] (if Ctrl is pressed), or 50+[0-9] (if Alt is pressed).

- **Edit keys**

- **Backspace**

Returns the list to the previous branch of the watcher tree.

- **Enter**

- **If the selected node is not a leaf:**

Navigates one level down in the watcher tree.

- **If the selected node is a leaf:**

Opens the selected watcher for editing, or accepts the typed value if it is already in Edit mode.

- **Esc**

- **If the watcher is in Edit mode:**

Leaves Edit mode.

- **If the watcher is not in Edit mode:**

Exits the console.

- **Home**

Returns the list to the root of the watcher tree.

- **Page Down**

- **If the watcher is not in Edit mode:**

Moves the selection to the next item in the list.

- **If the watcher is in Edit mode:**

Decreases the watcher's value by 1, 10 (if Shift is pressed), 100 (if Ctrl is pressed), or 1,000 (if Alt is pressed).

- **Page Up**

- **If the watcher is not in Edit mode:**

Moves the selection to the previous item in the list.

- **If the watcher is in Edit mode:**

Increases the watcher's value by 1, 10 (if Shift is pressed), 100 (if Ctrl is pressed), or 1,000 (if Alt is pressed).

- **Symbols**

- **Numpad + (Plus sign)**

Scrolls the watcher list down.

- **Numpad - (Plus sign)**

Scrolls the watcher list up.

- **Numeric keys**

- **[0-5]**

- **If the alphanumeric keypad was used:**

Depending on the key modifier pressed (if any), selects the following:

- **n**

- **10+n** (if Shift is pressed)

- **20+n** (if Ctrl is pressed)

- **30+n** (if Ctrl+Shift is pressed)

- **40+n** (if Alt is pressed)

- **50+n** (if Alt+Shift is pressed)

- **Key combinations**

- **Alt+Page Down**

Decreases the watcher's value by 1,000.

- **Alt+Page Up**

Increases the watcher's value by 1,000.

- **Alt+[0-9]**

- **If the alphanumeric keypad was used:**

Selects list item 4[0-9].

- **Alt+Shift+[0-9]**

- **If the alphanumeric keypad was used:**

Selects list item 5[0-9].

- **Ctrl+Page Down**

- **If the watcher is in edit mode:**

Decreases the watcher's value by 100.

- **Ctrl+Page Up**

---

- **If the watcher is in edit mode:**

Increases the watcher's value by 100.

- **Ctrl+[0-9]**

- **If the alphanumeric keypad was used:**

- Selects list item 2[0-9].

- **Ctrl+Shift+[0-9]**

- **If the alphanumeric keypad was used:**

- Selects list item 3[0-9].

- **Shift+Enter**

- **If the watcher is in Edit mode:**

- Displays watcher modification history.

- **Shift+Page Down**

- **If the watcher is in Edit mode:**

- Decreases the watcher's value by 1.

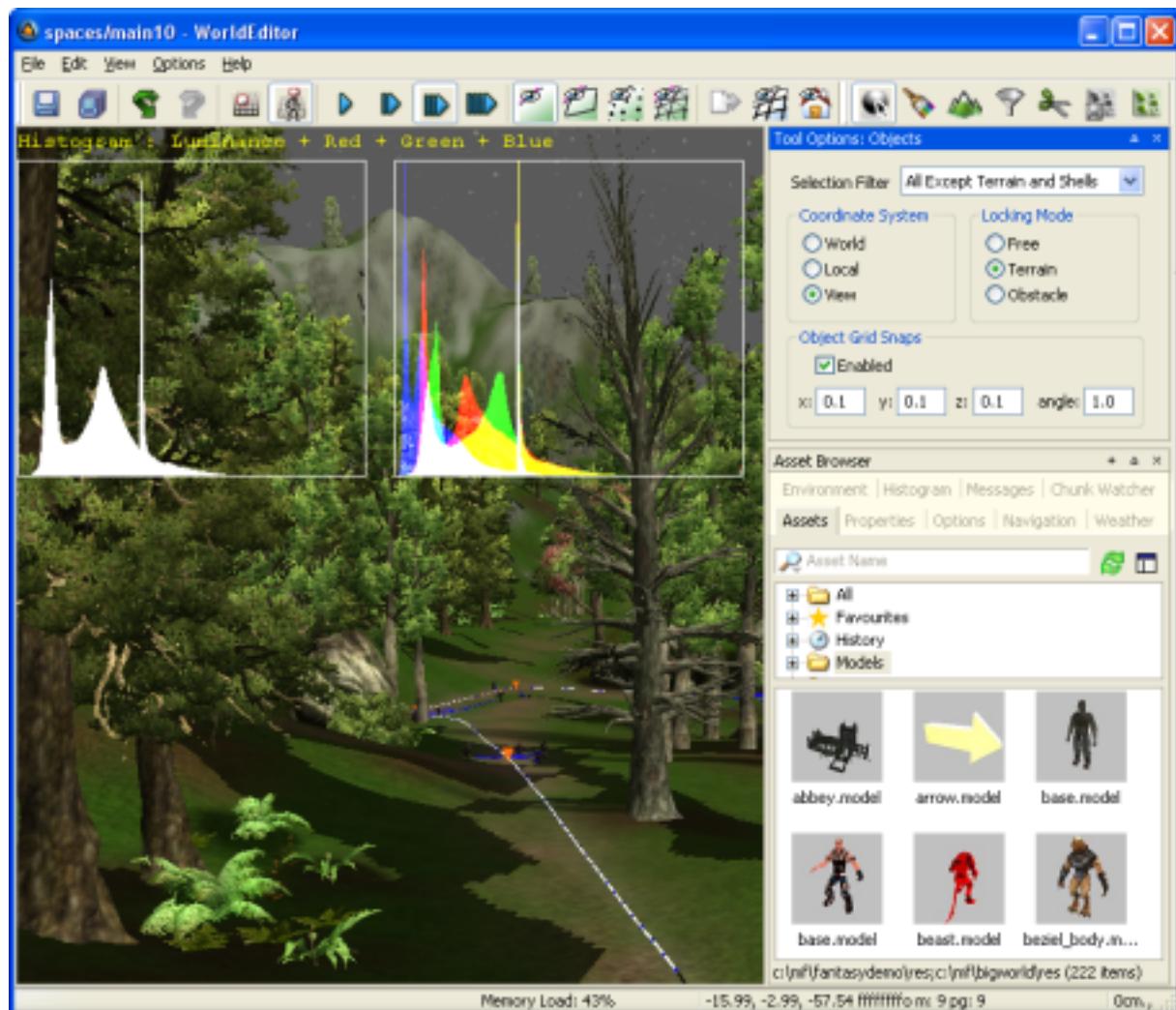
- **Shift+Page Up**

- **If the watcher is in Edit mode:**

- Increases the watcher's value by 1.

## 5.3. Histogram console

Available in WorldEditor, this console can be accessed via the F11 keyboard shortcut, and left by pressing Esc.



Histogram console

### 5.3.1. Keyboard shortcuts

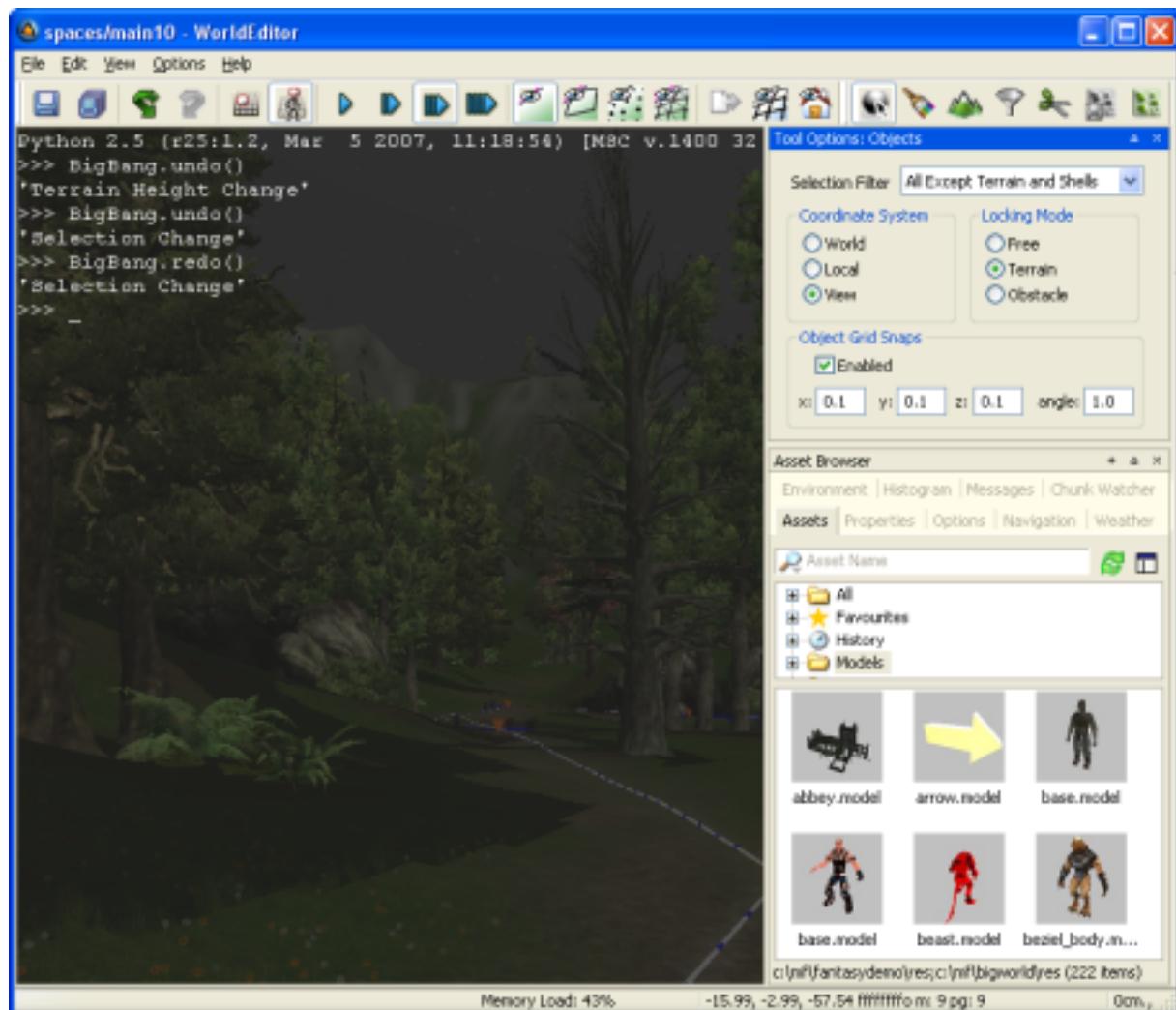
The list below describes the keyboard shortcuts available for the Histogram console:

- **Edit keys**
  - **Esc**  
Exits the console.
- **Numeric keys**
  - **0**
    - **If the alphanumeric keypad was used:**  
Toggles the graphing of luminance.
  - **1**
    - **If the alphanumeric keypad was used:**  
Toggles the graphing of the red component in the **RGB** histogram.

- **2**
  - **If the alphanumeric keypad was used:**  
Toggles the graphing of the green component in the **RGB** histogram.
- **3**
  - **If the alphanumeric keypad was used:**  
Toggles the graphing of the blue component in the **RGB** histogram.
- **4**
  - **If the alphanumeric keypad was used:**  
Toggles the rendering of the scene background on the histograms.
- **5**
  - **If the alphanumeric keypad was used:**  
Decreases the vertical range ratio of the **Luminance** and **RGB** histograms.
- **6**
  - **If the alphanumeric keypad was used:**  
Increases the vertical range ratio of the **Luminance** and **RGB** histograms.

## 5.4. Python console

Available in WorldEditor, ModelEditor, and ParticleEditor, this console can be accessed via the **Ctrl+P** keyboard shortcut, and left by pressing **Esc**.



Python console

#### 5.4.1. Keyboard shortcuts

The list below lists the keyboard shortcuts available for the Python console:

- **Edit keys**

- **Backspace**

Deletes the character to the left of the insertion point.

Performs the same function as **Ctrl+H**.

- **Delete**

Deletes the character to the right of the insertion point.

Performs the same function as **Ctrl+D**.

- **End**

Moves the insertion point to the end of line.

Performs the same function as **Ctrl+E**.

- **Enter**
  - If no command is specified:
    - Exits the console.
- **Esc**
  - Exits the console.
- **Home**
  - Moves insertion point to the beginning of line.
  - Performs the same function as **Ctrl+A**.
- **Key combinations**
  - **Ctrl+Backspace**
    - Cuts to the clipboard all text between the insertion point and beginning of word.
    - Performs the same function as **Ctrl+W**.
  - **Ctrl+Delete**
    - Cuts to the clipboard all text between insertion point and end of word.
    - Performs the same function as **Ctrl+R**.
  - **Ctrl+Insert**
    - Pastes the content of the clipboard after the insertion point.
    - Performs the same function as **Ctrl+Y**.
  - **Ctrl+Left Arrow**
    - Moves the insertion point to the beginning of word.
  - **Ctrl+Right Arrow**
    - Moves the insertion point to the end of word.
  - **Ctrl+A**
    - Moves the insertion point to the beginning of line.
    - Performs the same function as **Home**.
  - **Ctrl+D**
    - Deletes the character to the right of the insertion point.
    - Performs the same function as **Delete**.
  - **Ctrl+E**
    - Moves the insertion point to the end of line.

Performs the same function as End.

- **Ctrl+H**

Deletes the character to the left of the insertion point.

Performs the same function as Backspace.

- **Ctrl+K**

Cuts to the clipboard all text between insertion point and end of line.

- **Ctrl+R**

Cuts to the clipboard all text between the insertion point and end of word.

Performs the same function as Ctrl+Delete.

- **Ctrl+U**

Cuts to the clipboard all text between the insertion point and beginning of line.

- **Ctrl+W**

Cuts to the clipboard all text between the insertion point and beginning of word.

Performs the same function as Ctrl+Backspace.

- **Ctrl+Y**

Pastes the content of the clipboard after the insertion point.

Performs the same function as Ctrl+Insert.

# Chapter 6. Starting the Tools

BigWorld tools (and the client as well) can be invoked from the command-line, as well as from icons or from Visual Studio.

## Note

If the tools are installed from a version control system instead of the ZIP file, then the required Visual C++ DLL will not be present in the tools' executable folders and they will fail to open.

Whichever method you choose, the tool has to be able to locate the following folders:

- The game's assets folder
- BigWorld's assets folder

## Note

When specifying paths, both forward slash (/) and backslash (\) characters can be used.

The client engine will try to determine the folders to be used in the following order:

1. **--res|-r} game\_res\_folder[ ;bw\_res\_folder] argument**

If this argument is used in the command line, then the tool will use the folders specified in *game\_res\_folder* and *bw\_res\_folder* arguments.

2. **bigworld/tools/<tool>/paths.xml file**

Located on the same folder as the tool's executable, this file is the last resource for the client engine to determine the game's assets and BigWorld assets folders.

For details on this file's grammar, see the document File Grammar Guide's section *paths.xml*.

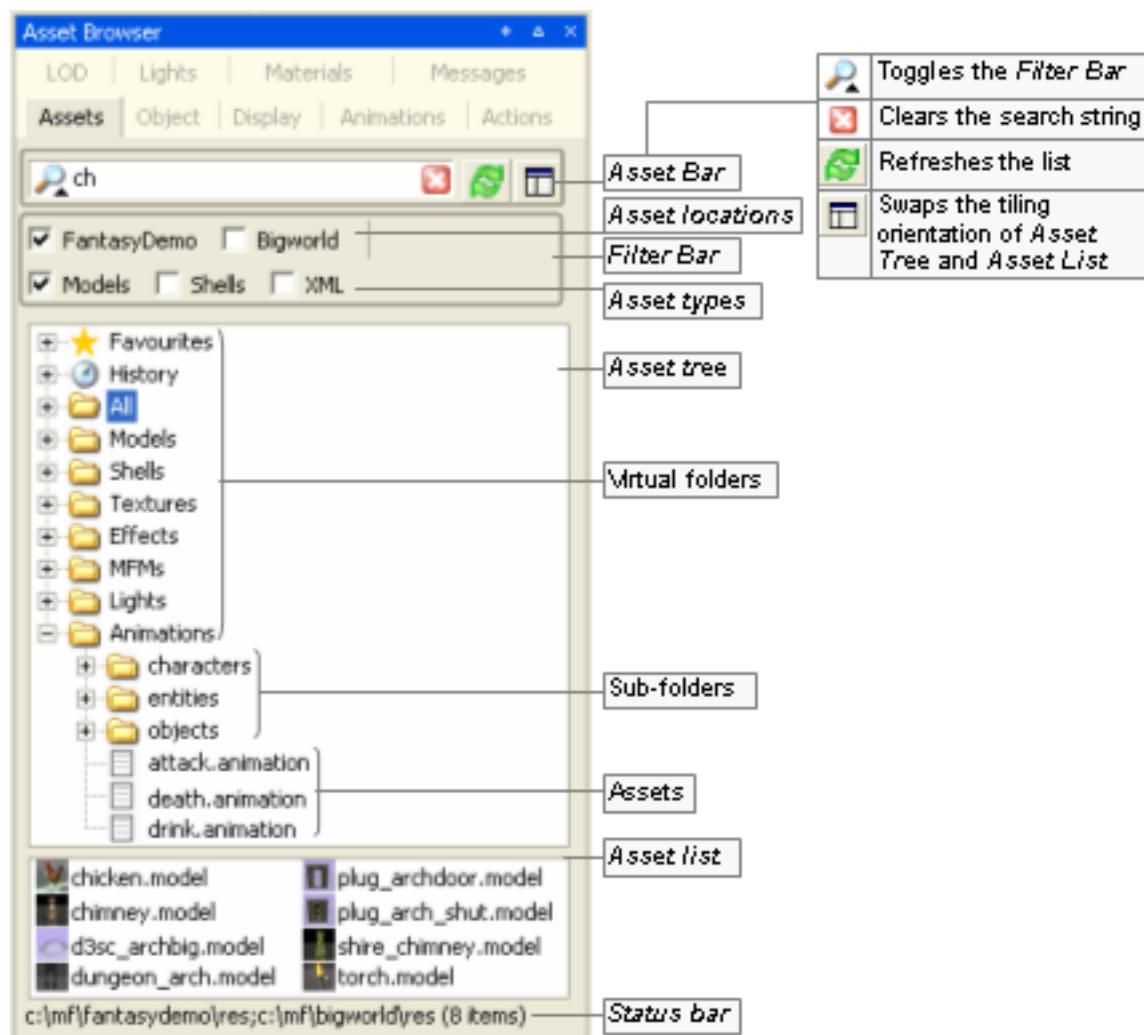
# Chapter 7. Asset Browser

The Asset Browser is a panel included in the BigWorld tools WorldEditor, ModelEditor, and ParticleEditor, that manages game assets in a uniform and effective way.

It can be customised via its configuration file `ual_config.xml` (for details, see “Customisation” on page 282) to attend to your particular needs.

The Asset Browser displays the various categories of assets available for each tool (*e.g.*, models, shells, textures, etc...) in a tree structure, with the asset type being the topmost level, and the subsequent levels being composed of the folders containing assets of that type. It also allows you to search assets by their name — metacharacters can be used.

Similarly to web browsers, the tools also allow you to store your most-used assets (in the **Favourites** virtual folder), apart from automatically storing the most recently used assets (in the **History** virtual folder).



Asset Browser

The list below describes the fields on this panel:

- **Asset bar**



Specifies the search string (with DOS-style wildcards) to dynamically apply to the **Asset List**.

The up/down arrow next to the magnifying glass expands/collapses the **Filter Bar**. A black arrow indicates that at least one filter criteria is checked in the Filter Bar, and a grey one indicates that none is checked.



Clears the search string.



Refreshes the **Asset List**.



Swaps between horizontal and vertical tiling of the **Asset Tree** and the **Asset List**.

#### ▪ **Filter bar**

##### ▪ **Asset locations**

Restricts the location of assets to be displayed in the **Asset List**.

If no location is selected, then all folders in the resources folders list (or `<res>`) will be searched.<sup>C</sup>

If at least one location is selected, then only those ones that are selected and are listed in the resources folders list will be searched. The list of locations is tool-specific, and can be configured.<sup>B</sup>

##### ▪ **Asset types**

Restricts the type of assets to be displayed in the **Asset List**.

The list of types is tool-specific, and can be configured.<sup>B</sup>

#### ▪ **Asset tree**

Set of virtual folders, in a tree-style view, giving access to the assets.

#### ▪ **Virtual folders**

Unless changed by the user, the list of virtual folders will always start with the nodes **Favourites**, **History**, and **All**. The remaining nodes are tool-specific, and can be configured either in the `ual.config.xml` configuration file<sup>B</sup>, or via drag-and-drop<sup>D</sup>.

Virtual folders also have context menus. For details, see “Virtual folder” on page 279 .

#### ▪ **Asset list**

List of assets resulting from the following combination:

- **Search string** (specified in the **Asset Bar**).
- **Selected filters** (specified in the **Filter Bar**).
- **Current virtual folder** (specified in the **Asset Tree**).

Drag-and-drop from the list is supported, and is tool-specific. For details, see:

- WorldEditor's implementation in "Drag-and-drop" on page 94
- ModelEditor's implementation in "Drag-and-drop" on page 161
- ParticleEditor's implementation in "Drag-and-drop" on page 225
- **Status bar**

Displays information about the current item in the **Asset Tree** (virtual folder, or virtual folder's sub-folder), or in the **Asset List** (asset file).

For details, see "Status bar information" on page 277 .

*A — The appearance and inclusion of these buttons is tool-specific, and can be configured. For details, see "Customisation" on page 282 .*

*B — For details, see "Customisation" on page 282 .*

*C — For details on how BigWorld compiles this list, see Starting the Tools on page 273 .*

*D — For details, see "Drag-and-drop" on page 281 .*

## 7.1. Status bar information

The status bar displays information about the item selected in the Asset Tree or in the Asset List, as described in the list below:

- **Virtual folder — <result\_folders> (<number\_of\_found\_files> items)**

<result\_folders> is the list of folders in the search path for which at least one asset was actually found.

## Example 7.1. Example

Assuming the following:

# Search path contains the folders below:

```
# C:\mf\gamebkp\res\avatars
# C:\mf\gamebkp\res\npc
# C:\mf\gamedev\res\avatars
# C:\mf\gamedev\res\npc
```

# Only the following folders contain at least one file with the extension configured for the selected virtual folder:

```
# gamebkp/res/avatars (2 files with the relevant extension)
# gamecli/res/avatars (2 files with relevant extension)
# gamedev/res/npc (1 files with the relevant extension)
# gametest/res/avatars (1 files with the relevant extension)
```

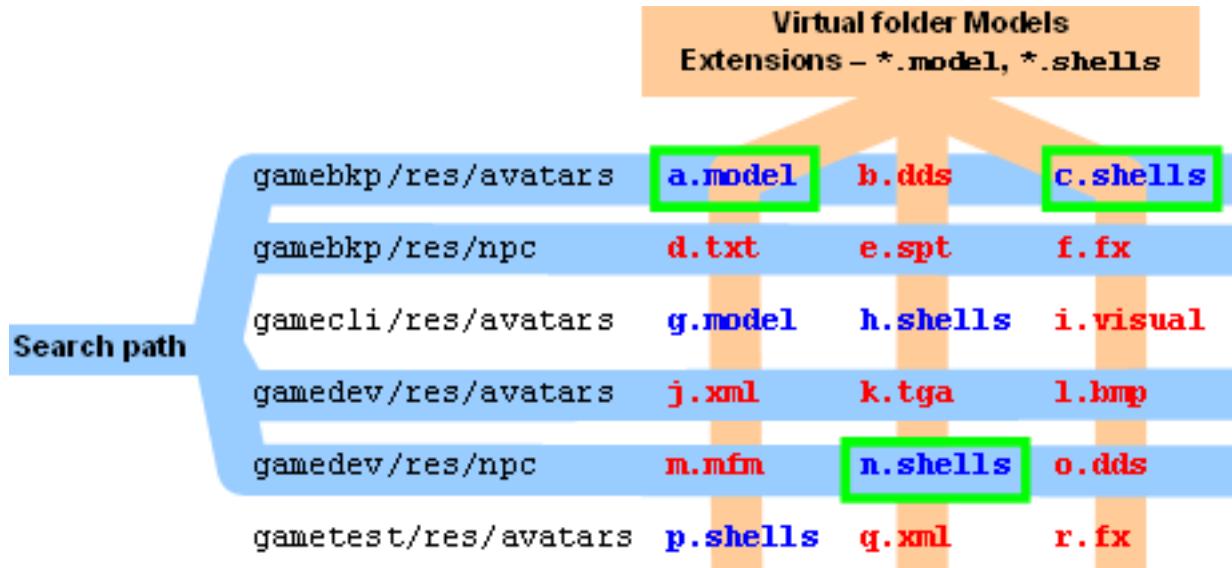
# <result\_folders> would then contain the following folders:

```
# gamebkp/res/avatars
# gamedev/res/npc
```

The status bar would then display the following:

```
# C:\mf\gamebkp\res\avatars;C:\mf\gamedev\res\npc (3 items)
```

The diagram below illustrates how this is established.



- Sub-folder – <source\_folders> (<number\_of\_found\_files> items)

<source\_folders> is the list of paths containing the folder which assets are displayed in the Asset List.

Note that all folders in the list will be displayed, regardless of them containing assets or not.

## Example 7.2. Example

Assuming the following:

# The search path contains the folders below:

```
# C:\mf\gamedev\res\npc
# C:\mf\gametst\res\npc
# C:\mf\gamebkp\res\npc
```

# The file system contains the folders below:

```
# C:\mf\gamedev\res\npc
# C:\mf\gamebkp\res\npc
```

The status bar would then display the following:

```
# C:\mf\gamedev\res\npc;C:\mf\gamebkp\res\npc (<n> items)
```

- Asset file – **<absolute\_path><filename>**

## 7.2. Context menus

Context menus are accessed by right-clicking a screen element.

### 7.2.1. Virtual folder

The list below describes the menu items available in the virtual folder's context menu:

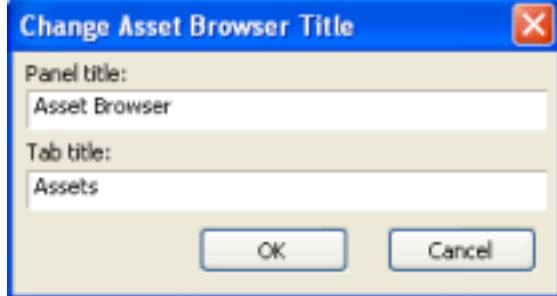
- List view styles
  - List, Small icons, Big icons

Swaps the display style in the **Asset List**.

- Change this panel's title

Opens the **Change Asset Browser Panel Title** dialog box, where you can specify new full window and short titles for the **Asset Browser** panel.

The **Full Window Title** is used as the panel's title, and the **Short Title** as the tab's title.



Change Asset Browser Title dialog box

- Reload default folders

Reloads all virtual folders specified in the configuration file , in their original order.

- Remove '<name>'

Removes the current virtual folder.

- **Clear contents<sup>A</sup>**

Clears the items in the list of the selected virtual folder.

*A — Only available for **Favourites** and **History** virtual folders.*

## 7.2.2. Sub-folder

---

The list below describes the menu items available in the sub-folder's context menu:

- **List view styles**

- **List, Small icons, Big icons**

Swaps the display style in the **Asset List**.

- **Open folder in Explorer<sup>A</sup>**

Opens a new Windows Explorer window, displaying the contents of the selected sub-folder.

- **Copy path to clipboard<sup>A</sup>**

Copies the sub-folder's absolute path to the clipboard.

*A — If the sub-folder is available in more than one folder in the search path, then one menu item will be created for each of them.*

## 7.2.3. Asset list

---

The list below describes the menu items available in the asset list's context menu:

- **List view styles**

- **List, Small icons, Big icons**

Swaps the display style in **Asset List**.

## 7.2.4. Asset

---

The list below describes the menu items available in the asset's context menu:

- **List view styles**

- **List, Small icons, Big icons**

Swaps the display style in **Asset List**.

- **Add to favourites**

Adds the selected model to the special virtual folder **Favourites**.

- **Open folder in Explorer<sup>A</sup>**

Opens a new Windows Explorer window, displaying the contents of the selected sub-folder.

- **Copy path to clipboard<sup>A</sup>**

Copies the sub-folder's absolute path to the clipboard.

- **Edit in ModelEditor<sup>C</sup>**

Opens the selected item in ModelEditor.

- **Edit in ParticleEditor<sup>C</sup>**

Opens the selected item in ParticleEditor.

- **Open model<sup>B</sup>**

Opens the selected model in the viewport.

- **Add model<sup>B</sup>**

Performs the same functions as ModelEditor's **File → Add Model** menu item. For details, see "Menu items" on page 140 .

*A — If the sub-folder is available in more than one folder in the search path, then one menu item will be created for each of them.*

*B — Available only in ModelEditor.*

*C — Available only in WorldEditor*

## 7.3. Drag-and-drop

Items in the **Asset Tree** and **Asset List** provide drag-and-drop features, as described in the following sections.

### 7.3.1. Virtual folder

The effect of virtual folder's drop action depends on where it occurs:

- **On Asset Tree**

Virtual folder's position in the tree is changed to where it was dropped.

- **On Asset Tree of another Asset Browser panel**

Virtual folder is copied to the other **Asset Browser** panel's **Asset Tree**.

- **Anywhere else**

An **Asset Browser** panel is created, containing the **Asset Bar**, **Filter Bar**, **Asset Tree** (having only the dragged virtual folder), and **Asset List**. Note that the new panel allows drag-and-drop like any other panel (for details, see "Drag-and-drop" on page 281 ).

### 7.3.2. Sub-folder

The effect of sub-folder's drop action depends on where it occurs:

- **On Asset Tree**

A new virtual folder is created, with contents of the dragged sub-folder.

- **On Asset Tree of another Asset Browser panel**

Sub-folder is copied to the other **Asset Browser** panel's **Asset Tree**.

- **Anywhere else**

An **Asset Browser** panel is created, containing the **Asset Bar**, **Filter Bar**, **Asset Tree** (having only the dragged sub-folder), and **Asset List**. Note that the new panel allows drag-and-drop like any other panel (for details, see "Drag-and-drop" on page 281 ).

### 7.3.3. Asset file

The effect of asset file's drop action depends on where it occurs:

- **On Asset Tree's Favourites virtual folder**

File is copied to the virtual folder.

- **On application's viewport**

Tool-specific behaviour.

For details, see:

- WorldEditor's implementation in "Drag-and-drop" on page 94
- ModelEditor's implementation in "Drag-and-drop" on page 161
- ParticleEditor's implementation in "Drag-and-drop" on page 225

- **Anywhere else**

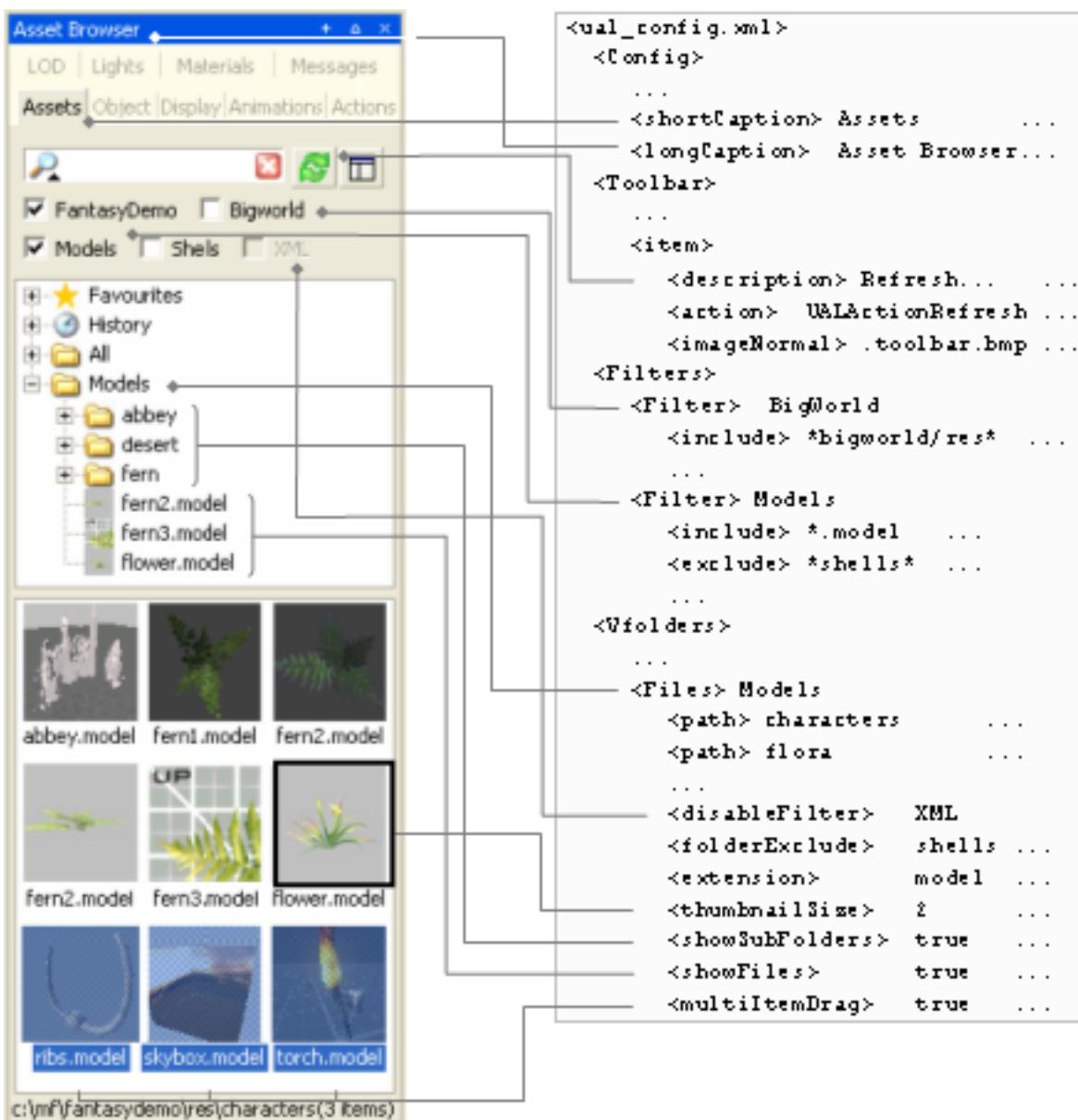
Disabled.

## 7.4. Customisation

Various elements of the Asset Browser can be customised, with each tool having its own configuration.

The configuration is saved on the tool's `resources/ual` folder, in the `ual_config.xml` file. For details on this file's grammar, see the document File Grammar Guide's section `ual_config.xml`.

The illustration below shows which elements can be configured, and how.



Example of Asset Browser customisation

## 7.5. Finding assets

The files displayed in the **Asset List** are determined by the list of search paths, the locations selected in **Asset Locations**, and the types selected in **Asset Types**.

### 7.5.1. Determining the search path

Each node in the **Asset Tree** (with the exception of **Favourites**, **History**, and **All**) has a list of sub-folders to include in the search (specified in the configuration file (for details, see “Customisation” on page 282 ).

Each of these folders is then prefixed by all folders in the search path, which is specified according to the rule below:

- **If no check box is selected in Asset Locations:**

The search path will contain all folders in the resources folders list (or `<res>`) — for details on how BigWorld compiles this list, see *Starting the Tools* on page 273 .

- **If at least one location is selected**

The search path will contain only the resource folders that are selected *and* are listed in the resources folders list.

### Example 7.3. Example

**Assuming the following:**

# The characters virtual folder is configured to search the following folders:

```
# avatars
# npc
```

# The configuration file specifies the following **Asset Locations**:

```
# Base assets — *base/res*
# Level 1 (novice missions) — *level1/res*
# Level 2 (expert missions) — *level2/res/*
# Level 3 (final chapter) — *level3/res/*
```

# **Asset Locations** has the following check boxes selected:

```
# Base Assets
# Level 1
# Level 2
```

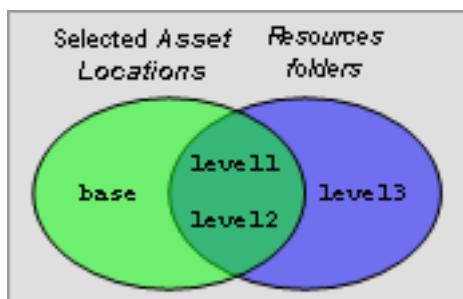
# **Resources folders** list is set to:

```
# C:\mf\level1\res;C:\mf\level2\res;C:\mf\level3\res
```

**To determine <search\_path>:**

# Make a list of all folders that are present in the resources folders list and are selected in **Asset Locations**:

```
# In our example: C:\mf\level1\res;C:\mf\level2\res
```



# Use the list to prefix all search folders specified for selected virtual folder. The folder in the resulting <search\_path> will be:

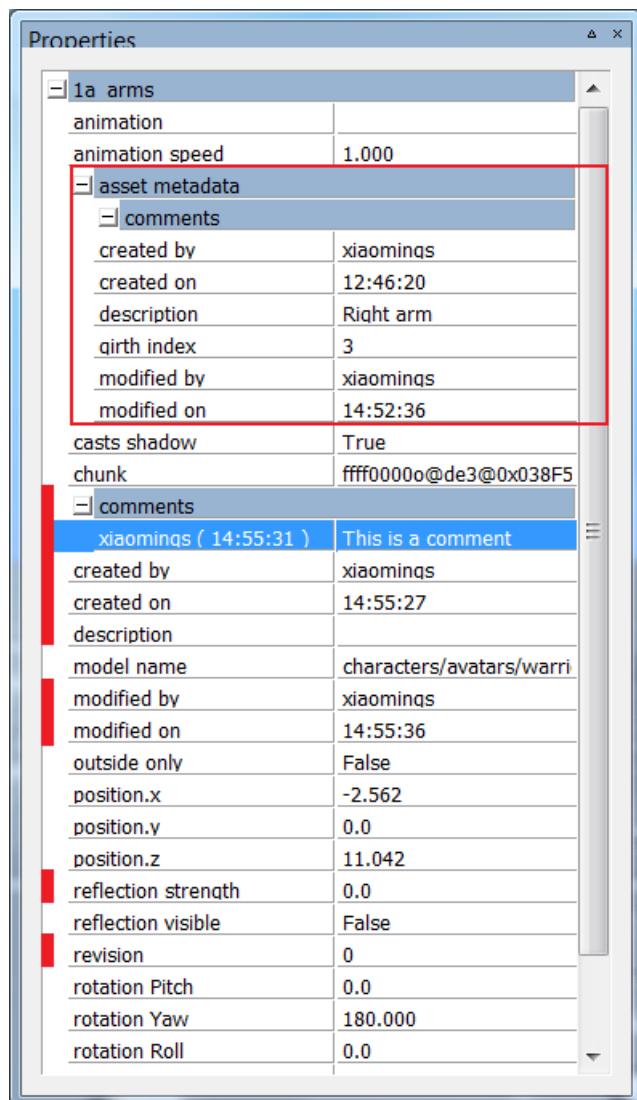
```
# C:\mf\level1\res\avatars
# C:\mf\level1\res\npc
# C:\mf\level2\res\avatars
# C:\mf\level2\res\npc
```

# Chapter 8. Meta Data

Meta Data can be used to define arbitrary properties for existing objects. With meta data, you can add extra properties to models, particle systems or any objects in chunk. Those properties are listed along other properties and can be edited in the same way.

Currently we have two kinds of meta data:

- **Asset meta data:** They are extra properties added to individual asset like model, particle system, etc. They are saved with the asset.
- **Instance meta data:** They are extra properties added to the instance of an asset in the space. They are saved to chunk file by **WorldEditor**.



Meta Data

Above is the **Properties** panel of **WorldEditor**, it shows properties of a selected model. The properties listed under "asset metadata" (surrounded by the red rectangle) are the meta data properties of the model itself (asset meta data). The properties marked by a prefix red bar are the meta data properties of this chunk model instance (instance meta data).

**Note:** Asset meta data is read-only in **WorldEditor**.

Meta data properties are defined by XML files. Currently we only support three kind of meta data, they are:

- Meta data for models: its definition file is defined in section `editor/metaDataConfig/model` of `resources.xml`, the default value is `helpers/meta_data/model.xml`
- Meta data for particles: its definition file is defined in section `editor/metaDataConfig/metaParticleSystem` of `resources.xml`, the default value is `helpers/meta_data/meta_particle_system.xml`
- Meta data for chunk items: its definition file is defined in section `editor/metaDataConfig/chunkItem` of `resources.xml`, the default value is `helpers/meta_data/chunk_item.xml`

Each section in the files defines a property. Its format is:

```
<PropertyName>
    <description> optional description </description>
    <type> TYPE </type>
</PropertyName>
```

Currently, the types we support are STRING, INT, FLOAT, COMMENT and DATETIME. If description section is not presented, we will use. For example, if you want to add a new property named "girth index", which is the index into a girth array to describe the model's girth. As "girth index" cannot be used as XML section name, a description must be provided. This property could be defined as follow:

```
<girth_index>
    <description> girth index </description>
    <type> INT </type>
</girth_index>
```

In addition to the properties defined in the XML files, each object with meta data also has some default properties. They are defined in the engine. Currently we only have 6 default properties: "created by", "created on", "modified by", "modified on", "comments" and "description".

"created by" and "created on" are automatically filled when the object linked to this meta data is first created, i.e. when a model is exported by the exporter, a meta particle system is created in ParticleEditor or an object placed/cloned inside WorldEditor. "modified by" and "modified on" are automatically filled when there is any modification made to the object. All those fields are generated by the system and are read-only to the user.

"description" is a single string field used to add a simple description to the object while "comments" can have multiple entries under it. Besides the text, each comment also records the user who creates the comment and the time the comment is created.

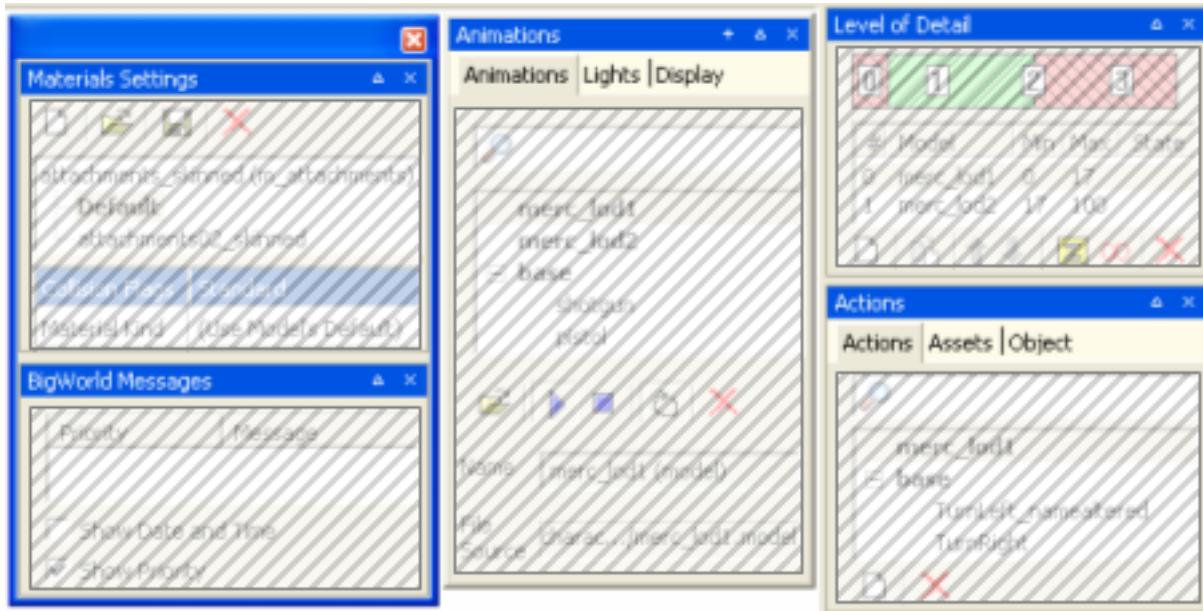
If one of the definition files does not exist, the corresponding objects will still get their default properties.

# Chapter 9. Panel System

BigWorld tools such as WorldEditor, ModelEditor and ParticleEditor, give the user the ability to change the layout of the application's different panels using the Panel System.

The Panel System allows the user to have different parts of the application in different positions in the screen, as a tab or as a panel.

The picture below illustrates the basic elements of the system (fields are blurred to highlight the relevant items):



## 9.1. Manipulating the panels/tabs

The panels can be manipulated in two ways:

- via the title bar buttons
- via drag-and-drop

### 9.1.1. Title bar buttons

The panels might be manipulated by the following buttons:

- Create New Floating Panel button
- Expand / collapse button /
- Close button

### 9.1.2. Drag-and-drop

Most of the manipulation can be done via drag-and-drop, with grey rectangles indicating the area where the dragged area will be fit.

**Note**

Pressing **Ctrl** makes the panel system ignore dockable areas.

- **To create a docked panel on an area of the viewport**

Drag the desired tab or panel, and drop it near the top, bottom, left, or right of the viewport.



Before dragging the tab to the left side of the viewport



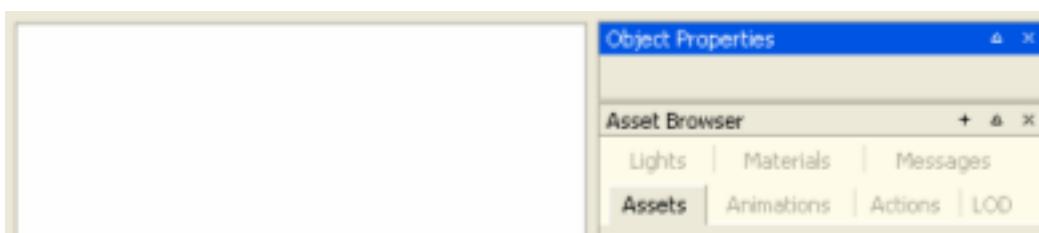
After dragging the tab to the left side of the viewport — New docked panel created

- **To create a new docked panel inside another docked panel**

Drag the desired tab or panel, and drop it near the panel's title bar — if the drop happens inside the title bar, then a new tab is created.



Before dragging the tab near the panel's title bar

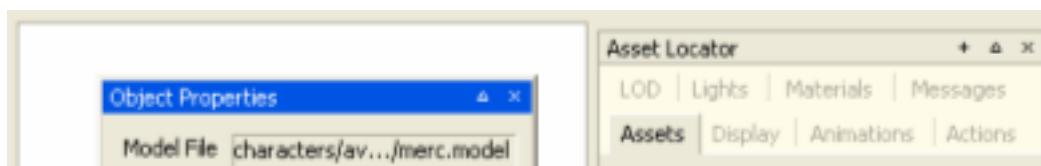


After dragging the tab near the panel's title bar — New docked panel created

- **To create a new floating panel**

Drag the desired tab or panel, and drop it in the viewport.





After dragging the tab to the viewport — New floating panel created

- **To create a new window**

Drag the desired tab or panel, and drop it inside a floating panel, near its title bar — if the drop happens inside the title bar, then a new tab is created.



Before dragging the tab near the floating panel's title bar



After dragging the tab near the floating panel's title bar — New window created

- **To create a new panel**

Drag the desired tab or panel, and drop it near an existing tab or panel's title bar — if the drop happens near the title bar, then a new panel is created.



Before dragging the tab inside the panel's title bar



After dragging the tab inside the panel's title bar — New tab created

## 9.2. Layout management

Upon exit, panel layouts are automatically saved to the `layout.xml` file inside the tool's application folder. Upon startup, the last panel layout is reloaded. If the layout file does not exist, then the tool will load its default panel layout. Please note that the `layout.xml` file should not be edited manually.

In all tools, the user has the option to load the tool's default panel layout, or reload the last customised layout.

For details on the menu items related to the Panel System, see:

- WorldEditor's menu items in "Menu items" on page 12
- ModelEditor's menu items in "Menu items" on page 140
- ParticleEditor's menu items in "Menu items" on page 208

# Chapter 10. NavGen

NavGen is the BigWorld tool used to create the navigation mesh. The navigation mesh is a space-covering connected set of polygonal prisms. It allows an entity to navigate between any two arbitrary points in the scene.

After you have created a space with WorldEditor, or changed a chunk, you can open NavGen and generate the navigation mesh.

NavGen uses the exclusive locks acquired in WorldEditor with the Lock Server (`bwlockd`). — for details, see *Lock Server (BWLockD)* on page 333 .

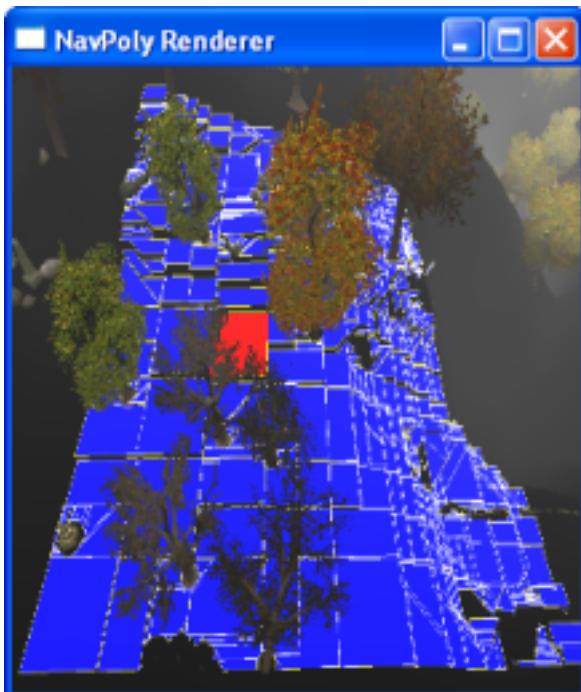
When you open NavGen, you are presented with two main windows and an error log:

- **NavPoly Renderer** — Displays the 3D scene of the space.
- **NavPoly Generator** — Displays the output from the navpoly generation.
- **Error Log** — Outputs information messages and error messages.

The main windows both use the following colours to draw the chunk elements:

- **Blue** — Navpoly
- **Red** — Selected navpoly
- **Black** — Empty space

Both windows are illustrated below:



Navpoly Renderer

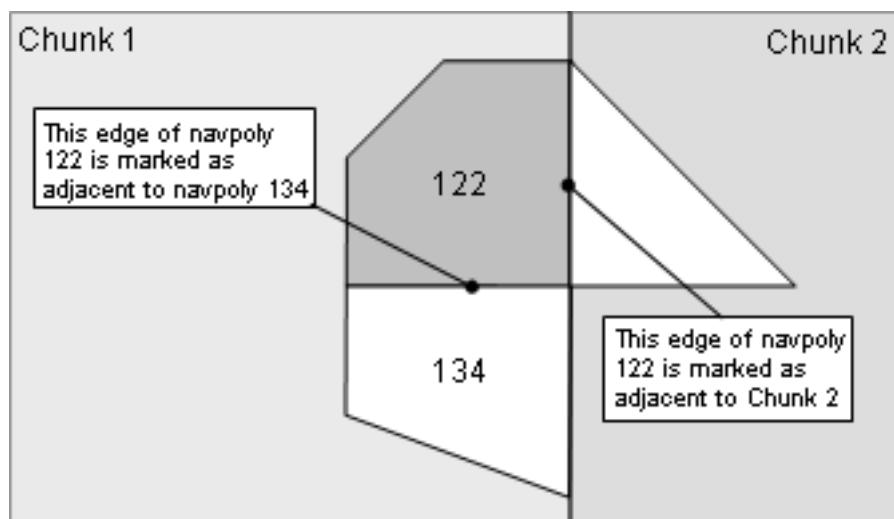


Navpoly Generator

A navpoly might be selected in either window, and is rendered in red in both of them

Double-clicking a navpoly on either window invokes the Navpoly Info dialog box, with height, and vertex coordinates and adjacency information on the selected navpoly. For more details, see “Navpoly Info dialog box” on page 300 .

Each edge on a navpoly can be shared with the edge of an adjacent region. Alternatively, an edge may be marked as being adjacent to a different chunk. This means that movement between these two regions is allowed.



Navpoly edge demarcation

## 10.1. NavPoly Generator menu items

The list below describes the menu items available in NavPoly Generator:

- **File → Open space**

Used to open a space inside NavGen.

- **File → Open**

Opens the Open dialog box, where you can select the adjacency map or chunk file that you want to load.

- **File → Remove all NavGen data**

Removes the NavGen data for the current space.

- **File → Generate all**

Generates the navigation mesh for all chunks in the space that have changed since the last generation.

- **File → Generate all overwrite**

Generates the navigation mesh for all chunks in the space, regardless of whether it has changed since the last generation.

- **File → Cluster generate**

Opens the **Cluster Generate** dialog box (for details, see “Cluster Generate dialog box” on page 299), which allows you to generate the navigation mesh in parallel (across multiple computers) for all chunks in the space that have changed since the last generation.

For details, see “Generating the navmesh on multiple machines” on page 302 .

- **File → Exit**

Quits the application.

- **View → Adjacencies**

Toggles the visibility of grid point adjacencies as white lines overlaying the chunk.

These points are created during the flood fill phase of the generation of the navigation mesh — for details see “Navpolys, vertices and adjacency” on page 301 .

Like BSP nodes, adjacencies will not be visible if the chunk was loaded from a chunk file; only when directly generated for a single chunk or loaded from a .tga file.

- **View → BSP nodes**

Toggles the visibility of BSP nodes to a given depth of the BSP tree.

These nodes are created during the generation of the navigation mesh — for details see “Generating the navmesh” on page 303 .

Like adjacencies, BSP nodes will not be visible if the chunk was loaded from a chunk file; only when directly generated for a single chunk or loaded from a .tga file.

The . (Period) and , (Comma) keys increase and decrease the depth displayed, respectively.

The BSP node is drawn as a polygonal prism with an additive colour. The list below describes how the BSP nodes will be displayed:

- **Blue**

The node is completely traversable, *i.e.*, it is a navpoly.

- **Green**

The node is a combination of traversable and non-traversable regions.

- **Transparent**

The node is completely non-traversable.

- **View → Polygon area**

Toggles the visibility of the navpolys on both the **Renderer** and the **Generator** windows.

If selected, the navpolys in the chunk will be rendered in blue, and the selected one in red.

- **View → Polygon borders**

Toggles the visibility of the borders of the navpolys on both the **Renderer** and the **Generator** windows.

- **View → Statistics**

Opens the **Statistics** dialog box, with information about the chunk.

For more details, see “[Statistics dialog box](#)” on page 298 .

- **View → NavPoly info**

Opens the **Navpoly Info** dialog box, with information about the selected navpoly.

For more details, see “[Navpoly Info dialog box](#)” on page 300 .

- **View → Rendered scene**

Opens the **NavPoly Renderer** window (if it is closed) and brings it to the front.

- **View → Error log**

Toggles the display of the **Error Log** dialog box.

- **Zoom → In on navmesh**

Zooms in the chunk view in the **NavPoly Generator** window.

- **Zoom → Out on navmesh**

Zooms out the chunk view in the **NavPoly Generator** window.

- **Chunk → Display<sup>A</sup>**

Loads the navigation mesh for the chunk in which the camera currently is, and displays it.

- **Chunk → Generate<sup>A</sup>**

Generates the navigation mesh for the chunk in which the camera currently is, and displays it.

- **Chunk → Generate shrunk<sup>A</sup>**

Performs the same operation as the **Generate** menu item (this item was implemented for previous versions, when multiple girths were not supported).

- **Chunk → Reannotate<sup>A</sup>**

Reannotates the disconnected edges of the navigation mesh for the current chunk (annotation is the final step of navigation mesh generation).

**Note**

This functionality is now **deprecated**.

- **Help → Help**

Opens the **Help** dialog box.

*A — The shortcuts available for these menu items must be used in the **NavPoly Renderer** window. For details, see “**NavPoly Renderer keyboard shortcuts**” on page 296 .*

## 10.2. NavPoly Generator status bar

The status bar displays information about the current chunk. A typical status bar is illustrated below:

Girth 0.5 LPoint(2.61, 4.31) Point (-97.39, 4.31) Grid (6,10)

NavPoly Generator status bar

The list below describes the pieces of information displayed in the status bar, as they appear:

- **Mesh's girth label** (in the example, **Girth 0.5**)

Girth label of the navigation mesh currently displayed, as configured in the file `bigworld/tools/misc/navgen_settings.xml`. For more details, see “**Changing settings**” on page 309 .

- **Local chunk coordinates** (in the example, **Lpoint (2.61, 4.31)**)

Location of the mouse cursor in local chunk coordinates.

- **Global space coordinates** (in the example, **Point (-97.39, 4.31)**)

Location of the mouse cursor in global space coordinates.

- **Local navigation mesh coordinates** (in the example, **Grid (6,10)**)

Location of the mouse cursor in local navigation mesh coordinates.

In addition, when calculations are done (via **Generate All**, **Generate All Overwrite**, or **Generate Cluster** menu items — for more details, see “**NavPoly Generator menu items**” on page 292), the status bar displays the following information:

- **Number of chunk being processed** (Text: **Calculating chunk n1 of n2**)

Number of chunks that have been calculated, and how many are to do in total.

During cluster generation<sup>A</sup>, the number of calculated chunks includes the number of chunks skipped by your computer (these chunks are calculated by other computers in the cluster).

- **Progress of calculation of current chunk** (Text: **Generation Status: stage: Processed n1 points (current stack size n2)**)

Rough estimate of how much calculation has been done in the current chunk.

There are usually about 40,000 points to process in a chunk.

*A — For details, see “**Generating the navmesh on multiple machines**” on page 302 .*

## 10.3. NavPoly Generator keyboard shortcuts

The sections below list the keyboard shortcuts available for NavPoly Generator.

### 10.3.1. Symbols

- **+** (Plus sign)

Zooms into the chunk view in the **NavPoly Generator** window.

Performs the same function as the **Zoom → In** menu item.<sup>A</sup>

- **-** (Minus sign)

Zooms out of the chunk view in the **NavPoly Generator** window.

Performs the same function as **Zoom → Out** menu item.<sup>A</sup>

- **[** (Square left bracket)

Decreases the girth for which to display the navigation mesh.<sup>B</sup>

- **]** (Square right bracket)

Increases the girth for which to display the navigation mesh.<sup>B</sup>

*A — For more details, see “NavPoly Generator menu items” on page 292 .*

*B — The available values for girth are defined in `bigworld/tools/misc/navgen_settings.xml`. For more details, see “Changing settings” on page 309 .*

## 10.4. NavPoly Renderer keyboard shortcuts

The sections below list the keyboard shortcuts available for NavPoly Renderer.

### 10.4.1. Key modifiers

- **Ctrl**

Increases the navigation speed by a factor of 5. Can be used in conjunction with **Caps Lock**.

### 10.4.2. Edit keys

- **Caps Lock**

Increases the navigation speed by a factor of 10. Can be used in conjunction with **Ctrl**.

- **Enter**

Performs the same function as the **Chunk → Display** menu item<sup>A</sup>.

*A — For more details, see “NavPoly Generator menu items” on page 292 .*

### 10.4.3. Symbols

- **!** (Exclamation mark)

Generates the navigation mesh for the chunk in which the camera is, and displays it.

Performs the same function as the **NavPoly Generator’s Chunk → Generate** menu item<sup>A</sup>.

- **\* (Asterisk)**

Reannotates the disconnected edges of the navigation mesh for the current chunk.

Performs the same function as the **NavPoly Generator's Chunk → Reannotate** menu item<sup>A</sup>.

- **, (Comma)**

Increases the depth displayed of the BSP nodes.

To display BSP nodes, select the **NavPoly Generator's View → BSP Nodes** menu item<sup>A</sup>.

- **. (Period)**

Decreases the depth displayed of the BSP nodes.

To display BSP nodes, select the **NavPoly Generator's View → BSP Nodes** menu item<sup>A</sup>.

- **@ (At sign)**

Generates the navigation mesh for the chunk in which the camera is, and displays it.

Performs the same function as the **NavPoly Generator's Chunk → Generate Shrunk** menu item<sup>A</sup>.

- **[ (Left square bracket)**

Decreases the girth for which to display the navigation mesh.<sup>B</sup>

- **] (Right square bracket)**

Increases the girth for which to display the navigation mesh.<sup>B</sup>

*A* — For details, see “*NavPoly Generator menu items*” on page 292 .

*B* — The available values for girth are defined in *bigworld/tools/misc/navgen\_settings.xml*. For details, see “*Changing settings*” on page 309 .

#### 10.4.4. Alphabetic keys

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- **A**

Moves the camera to the left

- **D**

Moves the camera to the right.

- **E**

Moves the camera upwards.

- **Q**

Moves the camera downwards.

- **S**

Moves the camera backwards

- **W**

Moves the camera forward.

## 10.5. NavPoly Generator mouse controls

The list below describes the mouse controls available for NavPoly Generator.

- **Left button click**

Selects the navpoly.

- **Left button double-click**

Opens the **NavPoly Info** dialog box for the selected navpoly.

For more details, see “[Navpoly Info dialog box](#)” on page 300 .

- **Right button drag**

Moves the navigation mesh in the direction of the mouse movement.

- **Scroll wheel rotate**

Zooms the navigation mesh in and out, according to the direction of scroll.

## 10.6. NavPoly Renderer mouse controls

The list below describes the mouse controls available for NavPoly Renderer.

- **Left button click**

Selects the navpoly.

- **Left button double-click**

Opens the **NavPoly Info** dialog box for the selected navpoly.

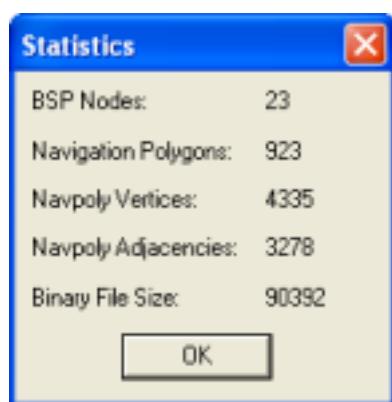
For more details, see “[Navpoly Info dialog box](#)” on page 300 .

- **Right button drag**

Rotates the camera in the direction of the drag.

## 10.7. Statistics dialog box

This dialog box is accessed via the **View → Statistics** menu item (for details, see “[NavPoly Generator menu items](#)” on page 292 ), and displays statistics regarding the current chunk.



Statistics dialog box

The list below describes the information displayed in the dialog box:

- **BSP nodes**

Number of BSP nodes in the navigation mesh.

These nodes are created during the generation of the navigation mesh — for more details see “Generating the navmesh” on page 303 .

- **Navigation polygons**

Number of navpolys in the navigation mesh.

- **Navpoly vertices**

Sum of the number of vertices of all navpolys in the navigation mesh.

Most vertices will be counted more than once, since they might belong to more than one navpoly. This way, the number displayed for this field is the number of <vertex> tags present in the generated .chunk file for the chunk navigation mesh.

- **Navpoly adjacencies**

Number of adjacencies of the vertices of all navpolys in the navigation mesh.

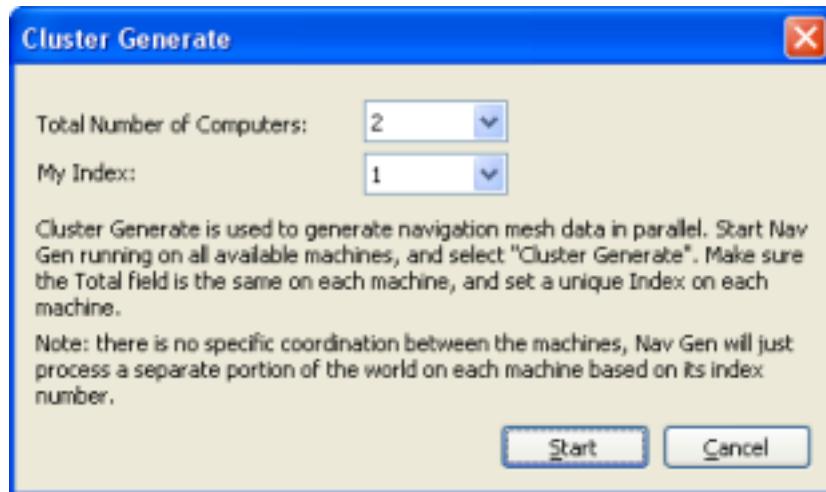
Note that adjacency is not generated for a vertex bordering an empty space.

- **Binary file size**

Size of the navigation mesh in the .cdata binary file.

## 10.8. Cluster Generate dialog box

This dialog box is accessed via the **File → Cluster Generate** menu item, and displays options to run NavGen on the space across multiple machines (for details, see “Generating the navmesh on multiple machines” on page 302 ).



Cluster Generate dialog box

The list below describes the information displayed in the dialog box:

- **Total number of computers**

Number of computers processing space data in parallel.

This number should be the same in all computers.

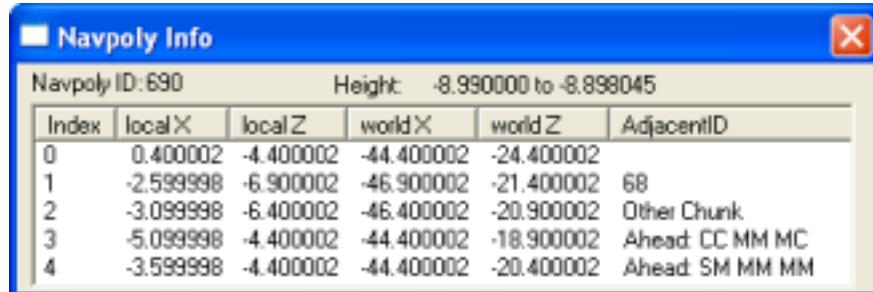
- **My index**

Unique identifier for the computer processing space data.

This number should be unique.

## 10.9. Navpoly Info dialog box

This dialog box is accessed via the **View → Navpoly Info** menu item, or by double-clicking a navpoly on either window, and displays height and vertex coordinate and adjacency information for the selected navpoly.



Navpoly Info dialog box

The list below describes the information displayed in the dialog box:

- **Navpoly ID**

Integer used as a unique identifier for the navpoly in the chunk.

- **Height**

Vertical range of the navpoly prism.

- **Vertex table**

- **Index**

Vertex sequential number

- **Local x, Local z**

XY coordinates of the vertex in local coordinates.

- **World x, World z**

XY coordinates of the vertex in world coordinates.

- **Adjacent ID**

ID of the element adjacent to the vertex.

The list below displays how the possible elements adjacent to the vertex are displayed:

- **Other navpoly in same chunk**

**Displayed as:** Navpoly ID

- **Empty area**

**Displayed as:** Blank

- **Chunk**

**Displayed as:** Literal 'Other Chunk'

- **Obstacle**

**Displayed as:** Literal 'Ahead: [S|M|R|C][S|M|R|C] [S|M|R|C][S|M|R|C]  
[S|M|R|C][S|M|R|C]'

The text after the literal contains information about obstacles ahead, 45° to the left, and 45° to the right of the vertex.

It consists of three pairs of obstacle information: the first letter of the pair contains information about the bottom half of the corresponding direction, while the second letter contains information about the top half of the corresponding direction.

The list below describes the possible values of the pairs' letters and the corresponding obstacle status:

- **S** – Solid
- **M** – Mixed
- **R** – Reserved
- **C** – Clear

For example, an Adjacent ID column with value of 'Ahead: SM SC MM' stands for the following information about obstacles and the vertex:

- **Ahead**
  - **Bottom half** – Solid
  - **Top half** – Mixed
- **45° to the left**
  - **Bottom half** – Solid
  - **Top half** – Clear
- **45° to the right**
  - **Bottom half** – Mixed
  - **Top half** – Mixed

## 10.10. Navpolys, vertices and adjacency

A chunk is divided into navpolys, which are convex polygons. The polygon indicates an area where it is clear to move. Therefore, if a room is completely empty, it will have a single navpoly. However, if it has a bench in the middle, then it will have four navpolys, to avoid covering the bench —*i.e.*, there will be a hole in the passable area of that chunk. Entities can move around a navpoly, and between adjacent ones.

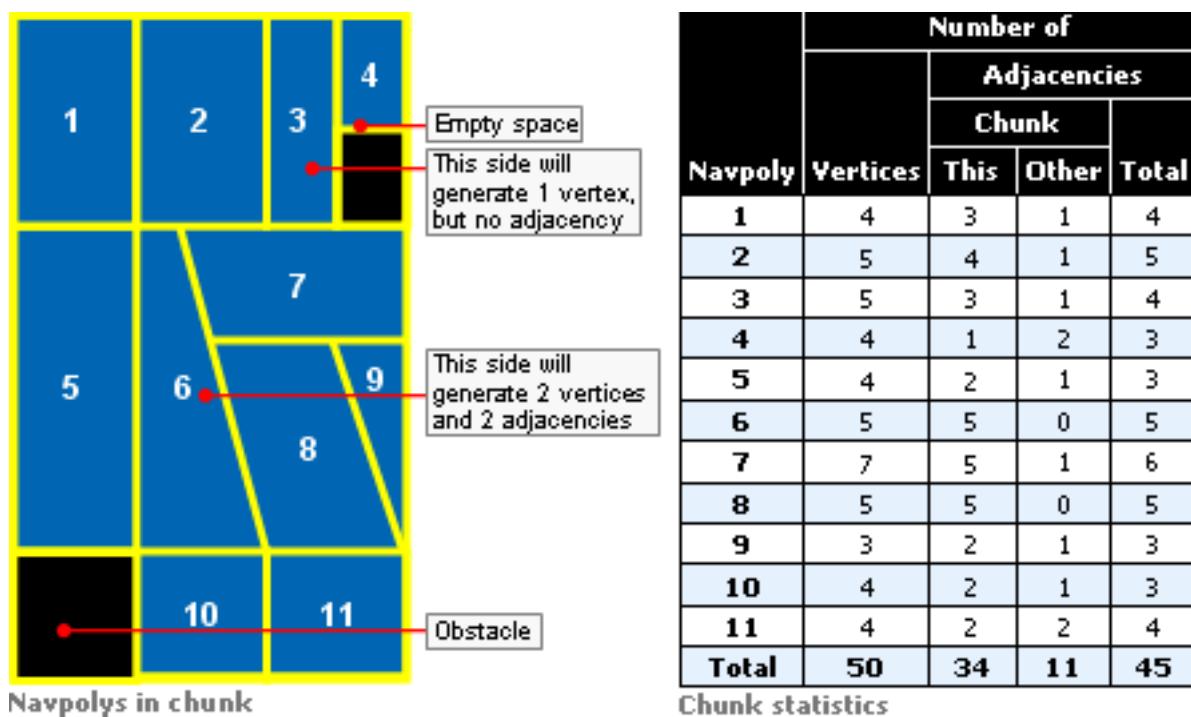
The polygons have a height too, so they are actually polygonal prisms. The navigation mesh works in 3D for scene elements such as staircases and overhangs. Even though it can be used for flying entities, enhancements are needed for better support.

For NavGen, a vertex is a continuous portion of the navpoly border that is adjacent to only one other navpoly, chunk, object, or empty space. It means that if one side of a navpoly is adjacent to 2 others, then that side has 2 vertices.

In the illustration below, note the following:

- Navpoly 2 has one side that is adjacent to navpolys 6 and 7. NavGen will generate one vertex for each navpoly adjacency.
- NavGen might generate a vertex with no adjacency for vertices that are bordering an empty space. For the portion of the side of navpoly 3 that is adjacent to an empty space, NavGen will generate 1 vertex, but no adjacency.
- NavGen generates vertex data for each navpoly at a time. That means that vertices shared between navpolys in the same chunk are present in the resulting .chunk files twice — once for each navpoly. This excludes vertices that are adjacent to another chunk.

The illustration below shows an example of a chunk with 11 navpolys and 2 empty spaces, and a table with the number of vertices and adjacencies for each of them.



Navpolys In Chunk vs. Chunk Statistics

## 10.11. Generating the navmesh on multiple machines

Running NavGen on large spaces can take some time to process. To reduce processing time, it is possible to divide the computation across multiple computers, each one working only on a subset of chunks (first make sure that each computer has an up-to-date copy of the space being calculated). It is best to use cluster generation in conjunction with a version control system, such as CVS or SVN.

Select the **File → Cluster Generate** menu item (for details, see “NavPoly Generator menu items” on page 292 ), then in the **Cluster Generate** dialog box (for details, see “Cluster Generate dialog box” on page 299 ), enter the number of computers that will be generating the cluster, and a unique index for each of them. The computers will proceed individually (there is no coordination between machines). To get the results from each computer back into one space use the version control system’s check-in functionality (e.g.,

cvs commit). There should be no overlap between the computers over the changed files, so merging individual files should be unnecessary.

If you stop the process (because, for example, NavGen did not finish overnight and you wish to use the machines again), then you can continue the calculation process when convenient. In this case, NavGen will quickly skip over already calculated chunks.

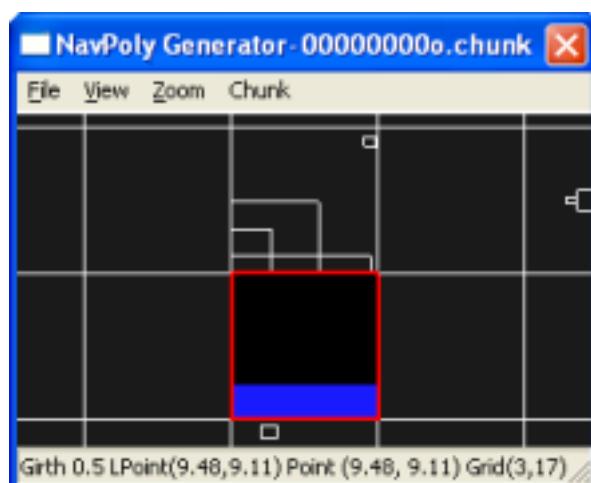
## 10.12. Generating the navmesh

Besides generating the navigation mesh for the whole space, it is also possible to generate it just for a specific chunk.

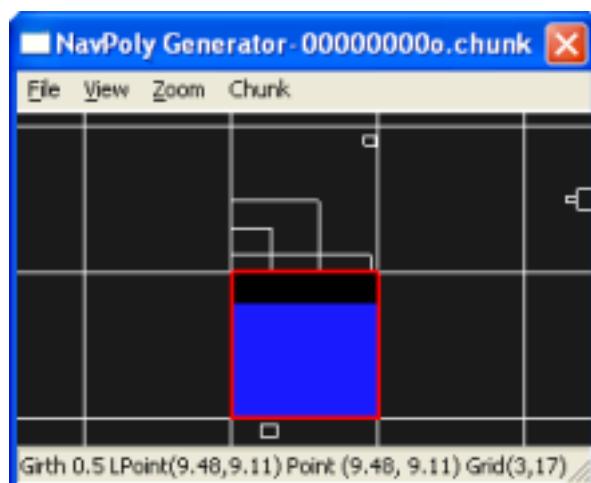
To do so, position the camera in the desired chunk, then select the **Chunk → Generate** menu item. This method of mesh generation does not display progress status.

When generating the navigation mesh for the space (via the **File → Generate All** or **File → Generate All Overwrite** menu item), the first chunk to be processed is the one where the camera is in. Upon completion of the chunk, the adjacent ones will be processed. Only chunks changed in WorldEditor since the last generation will be processed.

The generation process takes approximately 3 to 5 minutes per chunk, and if all chunks are being processed, then a real-time view of the progress is displayed in the window.



Progress of navigation mesh generation — Step 1



Progress of navigation mesh generation — Step 2

Once the navigation mesh has been generated, the results can be viewed on a chunk-by-chunk basis. In the NavPoly Renderer window, navigate to the desired chunk, then press `Enter` — this will display the navigation mesh for that chunk (for details, see “NavPoly Renderer keyboard shortcuts” on page 296).

For more details on the format of the generated `.chunk` files, see the document Server Overview’s section *Server Components* → “CellApp” → “Navigation System”.

### **10.12.1. Processing time**

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The process of generating the navigation mesh for a space is a time-consuming one, due to the amount of calculation necessary for a fast and efficient final product.

For completely flat chunks without obstacles, the generated mesh will be composed of a single large navpoly. But any other geometry requires an initial matrix of collision scene tests from each direction to every other one, followed by a BSP-based reduction scheme to arrive at the final navpolys. The time invested in creating an efficient mesh is greatly compensated by the result of a fast navigation through the space.

Please note that while this may seem slow, the time spent on adding scene elements to the world via WorldEditor will in most cases amount to much longer than the time taken to generate the navigation mesh for it. Furthermore, the navmesh generation can occur overnight.

On the other hand, if you have written your own tools to auto-generate large parts of your world (and server-controlled entities can roam freely over those parts), then this equation could change. If that is your case, then contact the BigWorld support engineers so that they can guide you in auto-generating your world and the navigation mesh at the same time.

Based on terrain and other geometric information in the chunk files, NavGen creates the convex navpoly polygons in three main phases:

1. It flood fills each chunk, using client physics rules.
2. It uses a BSP algorithm to recursively subdivide the space and form convex polygonal prisms.
3. It then annotates the polygon edges and writes the results back into the binary `.cdata` files.

The following sub-sections describe this process in details.

#### **10.12.1.1. Adjacency and height map calculation (from black to blue)**

The flood fill algorithm currently samples the chunk geometry using a grid of 0.5 metre resolution.

This is the default resolution, and whilst it is configurable via `bigworld/tools/misc/navgen_settings.xml`, it is ideal for human-sized entities, since a courser resolution would be less accurate, and a finer resolution would end up generating excessive navpolys. Also, since the same point in the grid may exist at several heights within each chunk (in case of elements such as tunnels and bridges), 16 grids are used to describe the connectedness of the scene in each chunk.

Within each grid, the movement is tested from each point on the grid to its eight neighbours. As an intermediate step, this information is saved to a TGA file (the file is saved in the folder specified by the option `floodResultPath` in `bigworld/tools/misc/navgen_settings.xml`). For more details, see “Adjacency map filtering (blue)” on page 305.). NavGen also saves the origin point, the sample resolution, and the y-values for each grid point to the TGA header. This means that the polygons can be generated from the TGA file alone — the TGA file could be viewed with an ordinary TGA viewing program if only one grid was used.

The flood fill algorithm currently only allows bi-directional movements, *i.e.*, movements allowed in only one direction — such as jumping off a cliff — are not accepted.

The algorithm also checks the hulls of neighbouring chunks. It stops flooding when it crosses to another hull (actually it stops flooding just after crossing). Thus, each chunk’s grids slightly overlap another one by one

flood movement unit, and as far as navpoly are concerned this is how chunk adjacencies are calculated. For more details, see “Adjacency map filtering (blue)” on page 305 .

The following points are the seed points for the flood fill:

- Centre of the chunk.
- Points along the perimeter of the chunk and its internal portals — they are moved in slightly towards the centre of the chunk along the portal plane normal.
- Points where an entity has been placed in the scene.

Having multiple seed points is necessary in cases where a chunk is composed of multiple disjoint but internally connected regions.

After the calculation, each chunk will have a 3D bitmap representing an adjacency grid.

### 10.12.1.2. Adjacency map filtering (blue)

Smoothing filters are applied to this adjacency grid bitmap, to smooth it out and remove any artifacts that would lead to degenerate polygons.

In general, this step only removes connections — it does not add them. If the `floodResultPath` configuration option is defined in `bigworld/tools/misc/ navgen_settings.xml`, then TGA files are saved to that path. These files represent the states before and after filtering.

### 10.12.1.3. Navpoly generation (yellow)

This step reduces the filtered adjacency grid bitmap into a set of convex polygonal prisms. The fewer resulting prisms the better, since less geometry will need to be loaded by the server during the game.

The basic approach is to sub-divide the space by generating a 3D BSP, until each leaf node is entirely traversable, (*i.e.*, it presents no obstructions for navigating), or entirely non-traversable. It makes the process easier that all leaf nodes of a BSP are guaranteed to be convex (a nice side effect of this approach is that, given a point, the BSP could be used to quickly find its navpoly. Such feature is not currently implemented, because performance has not been an issue — and the BSP would take extra memory — but it is good to keep this ability in mind).

The heuristic for splitting the space has two goals:

- Try to produce a balanced tree, by splitting the space near the centre.
- Try to split the space along boundaries between traversable and non-traversable regions.

For each point in the region, if the point has an adjacency in one direction (*e.g.*, north), but none along one of the neighbouring directions (*e.g.*, northwest or northeast), then mark a possible split along the line from north to south. The split is given a value according to its distance from the centre of the region, and the split closest to the centre is chosen.

To make the tree more balanced initially, if the region is larger than the value of constant `EVEN_SPLIT_THRESHOLD` (defined in C++ source file `src/lib/waypoint/ waypoint_generator.cpp`, with a default value of 25 metres) in any dimension, then it is split in half along the shortest axis. In some cases, a vertical split must be made.

After having generated the BSP, the process of forming the polygons is simple, consisting of the following sub-steps:

- **Vertices are created wherever lines intersect.**

The edge of a polygon will be split if it is adjacent to more than one polygon, since each vertex can have only a single adjacency.

- If the resulting polygon is convex, then adjacent polygons are joined.

This sub-step is repeated until it is no longer possible to combine any polygons. Often, 50% of polygons can be joined.

- **Chunk adjacencies are calculated.**

This sub-step calculates chunk adjacencies.

As mentioned in section “Adjacency and height map calculation (from black to blue)” on page 304, chunks may overlap each other by one flood movement unit. This way, NavGen can use this information and determine that if both sides of an edge are inside the hull of a neighbouring chunk, then this edge is marked as adjacent to that chunk.

Note that the adjacency will be marked in the .cdata file as being related to a chunk, but not which one. This is because a space might be connected to another one in the server, in which case the adjacent chunk will not be assigned until runtime.

#### 10.12.1.4. Edge annotation (yellow)

With help from the GPU, the edges of navpolys that are not adjacent to another one (*i.e.*, adjacent to a non-traversable region) are annotated with the situation visible from that edge.

The scene looking out from that edge is rendered orthographically into an offscreen buffer and then analysed. The situation is represented with two bits for each of the top half and the bottom half of the screen.

The following list describes the possible values for these two bits:

- **Completely clear**

The edge has visibility to the navpoly ahead of it, even though the navpolys are not adjacent.

**Example:** A chasm between the two navpolys.

- **Completely blocked**

The edge has no visibility to other navpolys.

**Example:** A wall between the navpolys.

- **Partially blocked**

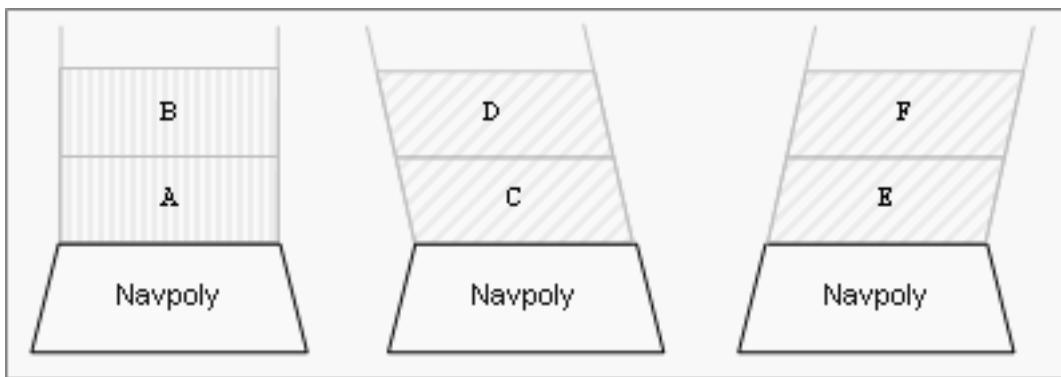
The edge has visibility to some navpolys, but not to others.

**Example:** A tree between the navpolys, so some of them are visible through the branches.

This procedure is performed considering three directions for each edge (resulting in 12 bits of information per non-adjacent edge):

- **Straight ahead**
- **45° to the left**
- **45° to the right**

The illustration below describes the assembling of the navpoly adjacent ID ABCDEF:



Assembling of navpoly adjacent ID field with value ABCDEF

The actual value stored in the .chunk file for the vertex's adjacent\_ID field is the logical NOT of this 12-bit value, since BigWorld considers all negative adjacency values as meaning that none exists.

The purpose of annotation is to provide hints about the world to AI algorithms on the cell that go beyond simply what regions are traversable and which are not. At the moment, the method `findCover` is the only one that takes advantage of this situational information. Adding others, however, will be trivial if the need arises.

#### 10.12.1.5. Saving (orange)

The navigation mesh is generated in binary format and saved in .cdata files, since it can become very large for outside chunks.

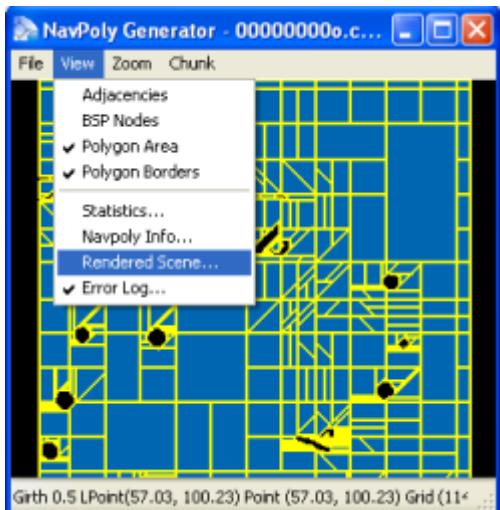
#### 10.12.2. Inspecting the navmesh

---

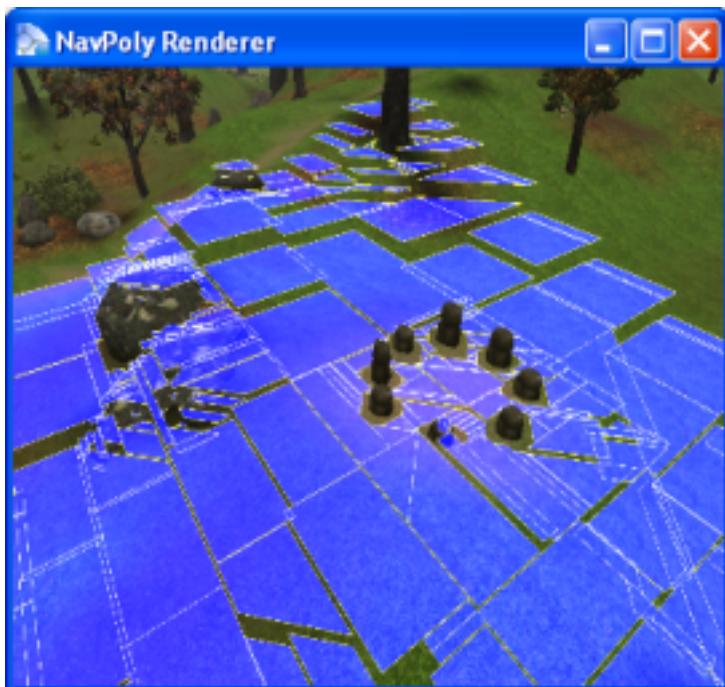
After generating the space's navmesh, you may want to examine the result. You can do this by doing the following:

1. In the **NavPoly Generator** window, select the **View → Rendered Scene** menu item (for details, see “NavPoly Generator menu items” on page 292) — this will move focus to the **NavPoly Renderer** window.
2. Inspect the navmesh
  - In the **NavPoly Renderer** window, navigate to the point of interest using either the keyboard or the mouse (for a complete list of keyboard shortcuts and mouse controls available in NavPoly Renderer, see “NavPoly Renderer keyboard shortcuts” on page 296 and “NavPoly Renderer mouse controls” on page 298 ).
  - Display the navmesh by pressing **Enter**.
  - Navmeshes of different girths can be selected using the [ (left square bracket) and ] (right square bracket) keys.

The navmesh is displayed as a collection of blue polygons.



Generated navmesh — Navpoly Generator



Generated navmesh — Navpoly Renderer

## 10.13. Moving entities

Once there is a navigation mesh for the space, you can use the `Entity.navigate` and `Entity.navigateStep` methods in cell scripts to move the entities. For more details, see the CellApp Python API's entry [Main Page](#) → [Cell](#) → [BigWorld](#) → [Classes](#) → [Entity](#) → `navigate`.

You should use the filter `AvatarDropFilter` on the client for such entities. This is because the position sent by the server is the top of the navpoly prism, which is dropped up to two metres<sup>1</sup> to find the real position on the ground. This saves the server from doing many ground position tests, and improves the client's interpolation, so that interpolated positions can also look right. If you do not use this filter, then the entities will hover slightly above hills.

---

<sup>1</sup>Navpolys cannot be taller than two metres

## 10.14. Changing settings

The settings for NavGen are stored in the `bigworld/tools/misc/navgen_settings.xml` file<sup>2</sup>.

```
<navgen_settings.xml>

<space> spaces/desert </space> ①

<girth> 0.5 ②
    <always> </always>
    <width> 0.90 </width>
    <height> 1.95 </height>
    <depth> 0.65 </depth>
</girth>

<girth> 4.0 ③
    <width> 4.0 </width>
    <height> 4.0 </height>
    <depth> 2.0 </depth>
</girth>

<bwlockd> server1:8168 </bwlockd> ④
<standalone> false </standalone> ⑤

<floodResultPath> \mf\fantasydemo\res </floodResultPath> ⑥

</navgen_settings.xml>
```

Example file `bigworld/tools/misc/navgen_settings.xml`

- ① Space to load.
- ② Entity girth definitions.
- ③ Entity girth definitions.
- ④ WorldEditor Lock Server (`bwlockd`) control. For details, see *Lock Server (BWLockD)* on page 333
- ⑤ WorldEditor Lock Server (`bwlockd`) control. For details, see *Lock Server (BWLockD)* on page 333
- ⑥ Path where the pre-filter and post-filter TGA files are generated. For more details, see “Adjacency map filtering (blue)” on page 305 .

Each `<girth>` tag defines the profile of an entity that will use that layer of navigation mesh. In each chunk, NavGen generates a mesh for each girth specified in `navgen_settings.xml`.

Using smaller girths allows paths to pass closer to obstacles. A mesh for the default girth of 0.5 metres should always be defined in the settings file. Additional girths can be also be specified for use by non-human-sized entities, such as vehicles, which might use a girth of 4.0 metres. Each additional girth defined can significantly add to the amount of memory needed by the server.

The navmesh used at runtime is the one whose girth matches that given in the call to the navigation function. The girth must exactly match one that has been generated, or the navigation attempt will fail.

The number of the girth (the default is 0.5) in current versions of NavGen is just a label, but it was originally the girth (*i.e.*, radius) of the entity. The cell once attempted to dynamically apply the girth of the entity moving through the navmesh when calculating its movement path, so that entities with a large girth would be prevented from passing through openings too narrow for them. However, this behaviour has been removed since no reliable fast algorithm could be found for reusing the navmesh generated by one girth in another. Now the navmesh must be generated for each girth independently, and no interpretation of the actual girth floating-point value ever occurs.

---

<sup>2</sup>For details on this file's grammar, see the document File Grammar Guide's section `navgen_settings.xml`.

The `<girth>` section contains the tags `<width>`, `<height>` and `<depth>` of that entity's profile. These should be the same values as those used to control `BigWorld.Physics` objects on the client. The optional tag `<always>` can also be defined in the `<girth>` section, to cause it to be always generated.

It is recommended to leave the girth settings at their default values until the actual models that will need to use them have been tested in the game.

Each additional layer of girth adds to the processing cost to generate it, as well as to the size of its .cdata files and the RAM they take up when loaded by the server. Navigation mesh information does not affect client performance at all in a production environment, since it is stripped by the resource packager before .cdata files are sent to the client.

## 10.15. Discontinuous navmesh

The final space might contain areas that are not reachable on foot from other areas, examples might be the roofs of buildings, ledges, or pits.

Entities should be placed in islands of navigable terrain to ensure that their navigation mesh is generated. Also, be aware that unreachable areas that span multiple chunks will still have navmesh generated for them, even if there are no placed entities present.

# Chapter 11. 3ds Max and Maya Exporters

BigWorld offers plug-ins that allow you to export geometry and animation data from 3ds Max and Maya to the formats used by the game engine.

## 11.1. 3ds Max

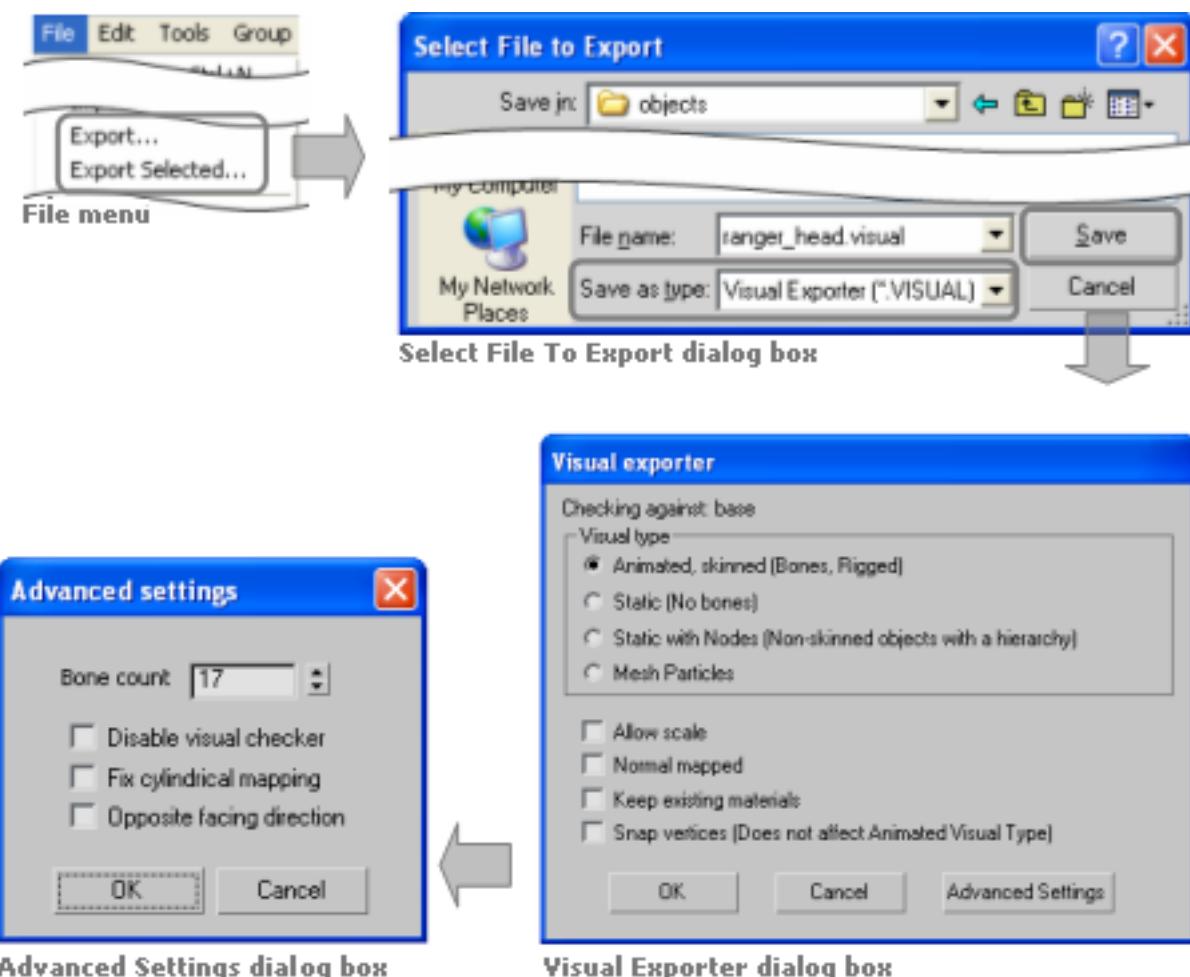
BigWorld offers plug-ins for exporting visuals and animations, supporting 3ds Max versions 2008, 2009, 2010 and 2011.

### 11.1.1. 3ds Max visual exporter

The 3ds Max visual exporter is a plug-in that exports mesh data to the .visual format used by the BigWorld engine.

It exports meshes, physiqued meshes, skinned meshes, transform nodes, morph targets, BSP trees, hard points, and portals, and can also generate tangents and binormals for normal mapping.

In order to access the Visual Export plug-in, set the **Select File To Export** dialog box's **Save As Type** drop-down list box to **Visual Exporter (\*.VISUAL)**, as illustrated below:



Accessing the Visual Export plug-in in 3ds Max

**Note**

For unskinned meshes Visual Exporter can automatically select a 32-bit index buffers if there are more than 65355 vertices in the model. However, skinned meshes are limited to 65355 vertices.

The client engine can load both 16- and 32-bit index buffers automatically, but some low-end graphic cards do not support the latter. On those cards, objects with 32-bit index buffer will not render.

The components of the **Visual Exporter** and **Advanced Settings** dialog boxes are described below:

- **Visual type**

Type of visual being exported, and hence what kind of information to save.

- **Animated, skinned**

Specifies that the plug-in should export everything as is, *i.e.*, every piece should be exported as a separate object, and all transform nodes and morph targets should be exported.

This option should only be used for visuals that have moving parts rigged with physique, skinned, or separate moving parts.

This option does not generate BSP trees from the meshes. If you want to have a (static) BSP tree for an animated object, then you will have to create a custom one.

- **Static**

Specifies that the plug-in should combine all meshes into one, discarding all transform nodes and modifiers, and generating a BSP tree for the combined mesh (unless there is a custom one in the current scene).

This option should be used for shells and other static objects placed in the scene.

- **Static with nodes**

Specifies that the plug-in should combine all meshes into one, exporting all transform nodes.

This option is similar to **Static**, except that it will export all transform nodes for the scene.

- **Mesh particles**

Specifies that the plug-in should allow these meshes to be sorted when rendered, so that alpha blending works correctly. Each individual object in the scene is exported as one particle, in the format used by the mesh particle renderer.

There is a limit of 17 particle meshes exported for each mesh particle object.

Visuals exported using this option can be used as a particle system in ParticleEditor. For details, see “Renderer Properties sub-panel” on page 232 .

- **Allow scale**

Indicates that the transform nodes should be exported with scale.

This is generally not necessary, and should only be used if you want to export animations that include scale.

- **Normal mapped**

Specifies that the plug-in should create additional data to be used for normal-mapping the model.

This option must be checked to use a normal-mapped material on the model.

- **Keep existing materials**

Specifies that the plug-in should keep changes made to the material in ModelEditor.

This option must be checked if you are overwriting a previously exported model, and want to keep material changes made in ModelEditor.

- **Snap vertices**

Specifies that the plug-in should snap the vertices of all geometry to the nearest tenth of a millimetre.

This option has been added primarily to support the new use of portals — because the grid and axis alignment restrictions have been removed for portals, snapping portals to the nearest tenth of a millimetre can pull portals off bounding box or hull boundaries.

This option does not affect geometry exported when the **Visual Type** drop-down list box is set to **Animated**.

- **Advanced Settings dialog**

- **Bone count**

Specifies the number of bones used by the Visual Splitter to divide up any mesh.

It is set to a default of 17 because all BigWorld skinned shaders are designed to use a maximum of 17 bones. When a visual file uses more than 17 bones, the Visual Splitter divides the object into 17, or less, bone segments.

Only change this field if you have created shaders that support a different number of bones.

The field's maximum value is 87, which is the upper limit of BigWorld vertex format.

- **Disable visual checker**

Specifies that the plug-in should not check the exported model against the visual rules.<sup>A</sup>

- **Fix cylindrical mapping**

Specifies that the plug-in should try to use an alternative method for generating texture space vectors used for normal mapping.

This option must be checked if there are artifacts along seams when using normal-mapped shaders.

- **Opposite facing direction**

Specifies that the model has been modelled facing in the incorrect direction and that it should be rotated by 180 degrees so that it appears correctly inside the engine.

*A — The rules are defined in bigworld/tools/res/visual\_rules.xml. For details, see "Validation rules" on page 329 .*

### 11.1.1.1. Configuration file

The plug-in automatically generates the file `visualexporter.cfg`, under 3ds Max's folder `plugcfg`.

The list below describes the configuration options written to this file:

- **allowScale**

Last value set for the **Allow Scale** check box in the exporter dialog box.

- **bumpMapped**

Last value set for the **Bumpmapped** check box in the exporter dialog box.

- **exportMode**

Last export mode used in the exporter dialog box.

- **unitScale**

Conversion factor for units between 3ds Max and BigWorld.

The default value is 0.1, which means that 1 unit in 3ds Max equals 0.1 units in BigWorld.

It is important to note that you need to change this value in both `animationexporter.cfg` and `visualexporter.cfg`.

*This configuration option can be set only in the configuration files.*

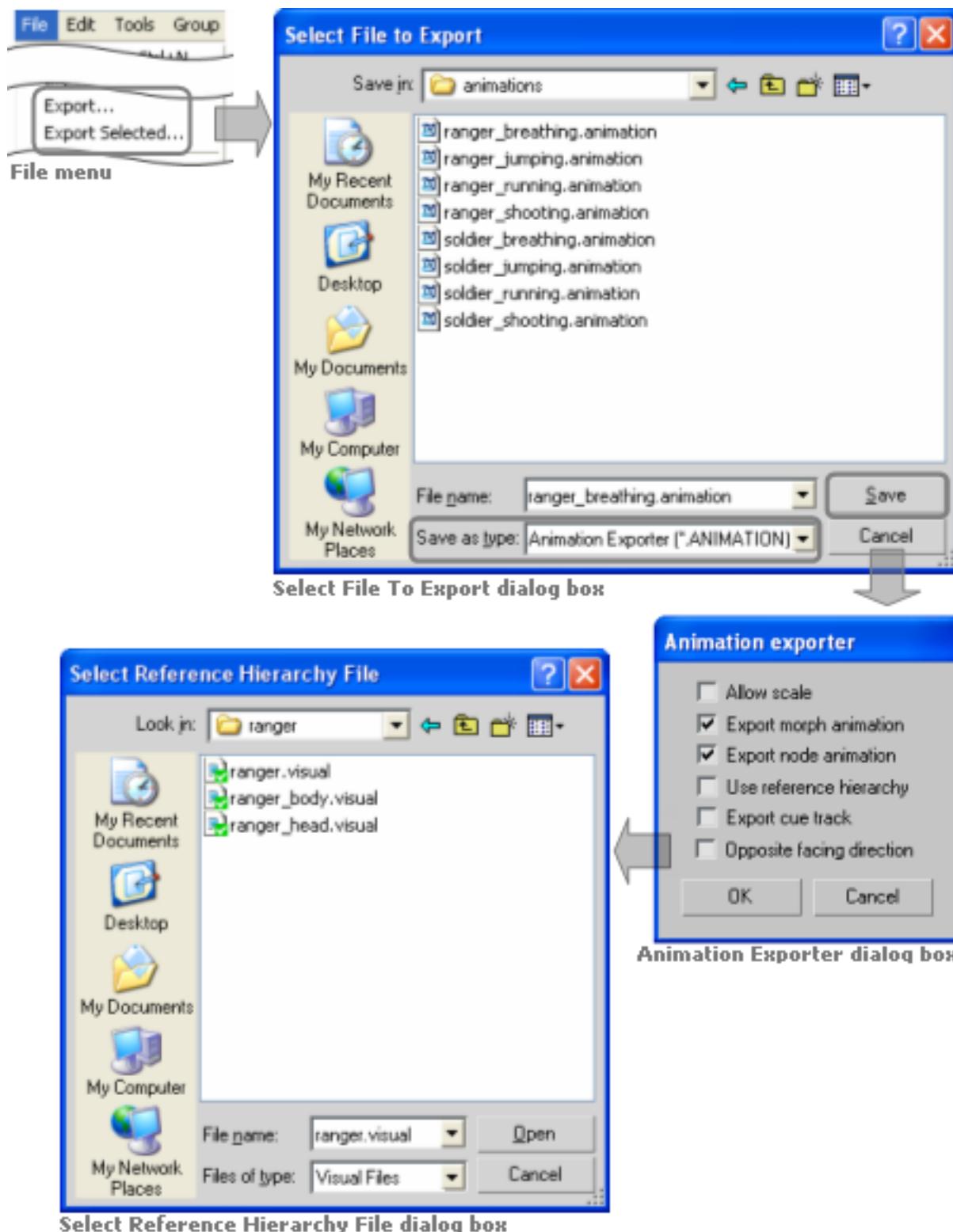
### **11.1.2. 3ds Max animation exporter**

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The 3ds Max Animation Exporter is a plug-in that exports animations to the `.animation` format used by the BigWorld engine.

It supports exporting of node and morph animations (using the morpher modifier).

To access the **Animation Export** plug-in, in the **Select File To Export** dialog box set the **Save As Type** drop-down list box to **Animation Exporter (\*.ANIMATION)**, as illustrated below:



Accessing the Animation Export plug-in in 3ds Max

The list below describes the components of the Visual Exporter dialog box:

- **Allow scale**

Indicates that the animation should be exported with scale keys in it.

If you wish to use scaling animations, you have to export the visual you want to animate with this option enabled as well. For more details, see “3ds Max visual exporter” on page 311 .

This option only applies to node animation.

- **Export morph animation**

Indicates that morph animations should be exported.

- **Export node animation**

Indicates that node animations should be exported.

- **Use reference hierarchy**

Indicates that the animation should be exported with a node hierarchy different from the one in the current 3ds Max file.

Once this option is selected, the **Select Reference Hierarchy File** dialog box is displayed, where you can select the visual file with the desired node hierarchy.

For details, see “Exporting custom node hierarchy” on page 328 .

- **Export cue track**

Not supported for this version.

- **Opposite facing direction**

Specifies that the model has been modelled facing in the incorrect direction and that it should be rotated by 180 degrees so that it appears correctly inside the engine.

### 11.1.2.1. Configuration file

The plug-in automatically generates the file `animationexporter.cfg`, under 3ds Max's folder `plugcfg`.

The list below describes the configuration options written to this file:

- **allowScale**

Last value set for the **Allow Scale** check box in the exporter dialog box.

- **exportMorphAnimation**

Last value set for the **Export Morph Animation** check box in the exporter dialog box.

- **exportNodeAnimation**

Last value set for the **Export Node Animation** check box in the exporter dialog box.

- **referenceNodesFile**

Last reference nodes file used for exporting animation.

- **unitScale**

Conversion factor for units between 3ds Max and BigWorld.

The default value is 0.1, which means that 1 unit in 3ds Max equals 0.1 units in BigWorld.

It is important to note that you need to change this value in both `animationexporter.cfg` and `visualexporter.cfg`.

This configuration option can be set only in the configuration files.

### 11.1.3. Data supported

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The list below gives an overview of the data supported by the plug-in:

- **BSP tree**

If the selected option in **Visual Exporter** dialog box's **Visual Type** group box is either **Static** or **Static With Nodes**, then BSP trees are generated from the exported object.

It is also possible to define a custom BSP tree, by postfixing an object name with '\_bsp'. If a custom BSP tree exists, then a new one will not be generated from the exported object.

- **Hard point**

All nodes having the name prefixed by 'HP\_' will be exported as a hard point (hard points are attachment points for joining two models).

Except for the transform node, no object will be exported for a hard point.

- **Material**

If a standard 3ds Max material is applied to an object, then the identifier, the diffuse map, and the self-illumination factors of the material will be exported.

If a DirectX 9 shader material is applied to a model, then the properties and the shader name referenced by the material will be exported.

When exporting an existing visual, the plug-in tries to keep its material settings.

- **Mesh**

Meshes in the current set will be exported according to the selected option in the **Visual Exporter** dialog box's **Visual Type** group box.

If **Visual Type** is set to **Animated**, then the plug-in will also export any morpher, skin, and physique modifiers applied to the object.

- **Node**

If the selected option in **Visual Exporter** dialog box's **Visual Type** group box is either **Animated** or **Static With Nodes**, then all transform nodes in the current set will be exported.

- **Portal**

Portals are generally a single Quad with the surface normal pointing toward the main body of the shell that it is part of.

The type of portal to export is defined by editing the user properties of the object in 3ds Max. To define it, follow the steps below:

1. Right-click the object.
2. In the context menu, click **Properties**.
3. In the **Object Properties** dialog box, click the **User Defined** tab.
4. In the multi-line field **User-Defined Properties**, enter the value according to the type of portal, as described in the list below:

- **Portal type: Standard**

Used to link two shells together in WorldEditor.

- **User-defined properties:**

```
portal=true
```

- **Portal type: Exit**

Used to link the outside world to a shell.

- **User-defined properties:**

```
portal=true
exit=true
```

- **Portal type: Heaven**

Lets you see the outside world from an inside chunk.

- **User-defined properties:**

```
portal=true
exit=true
heaven=true
```

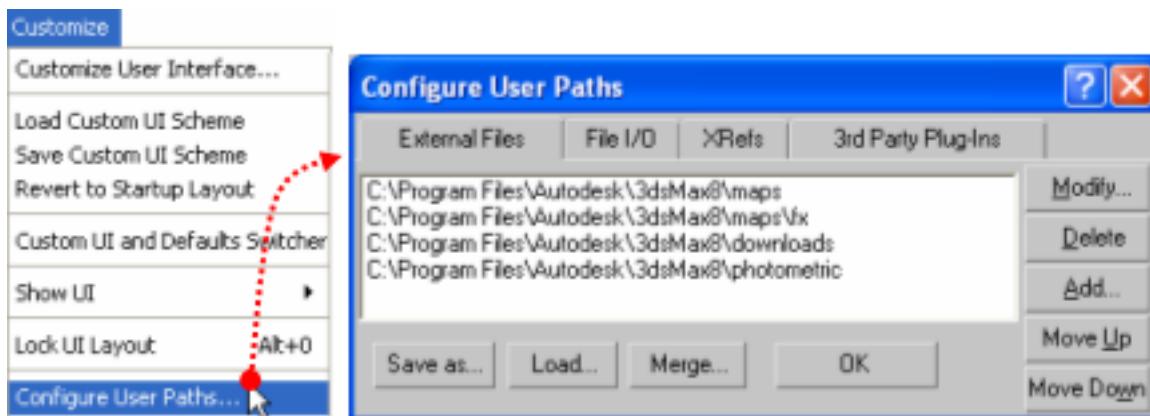
#### 11.1.4. Installing the 3ds Max exporters

The proprietary 3ds Max exporters are provided for 3ds Max versions 2008, 2009, 2010 and 2011, and can be found in the folder `bigworld\tools\exporter`

To install the 3ds Max exporter, follow the steps below:

1. Open 3ds Max.
2. Open the **Configure System Paths** dialog box:

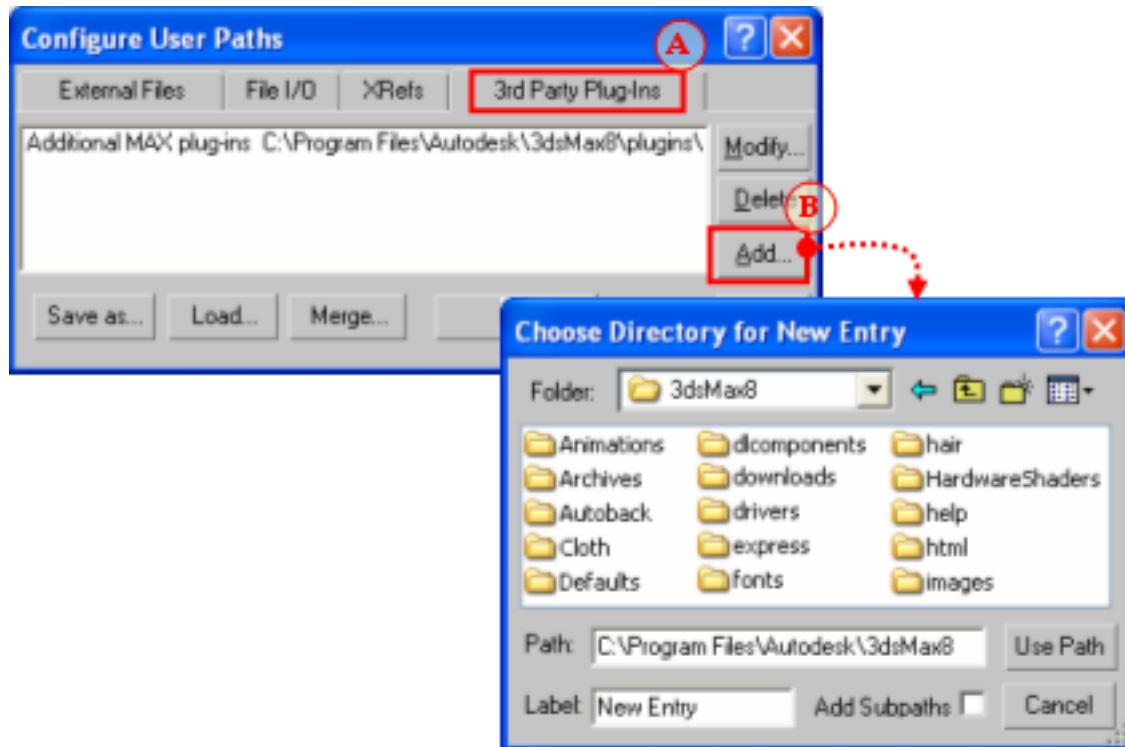
On 3ds Max 2008, 2009, 2010 and 2011, select the **Customize → Configure System Paths** menu item.



Invoking the Configure User Paths dialog box

3. On the **Configure System Paths** dialog box:

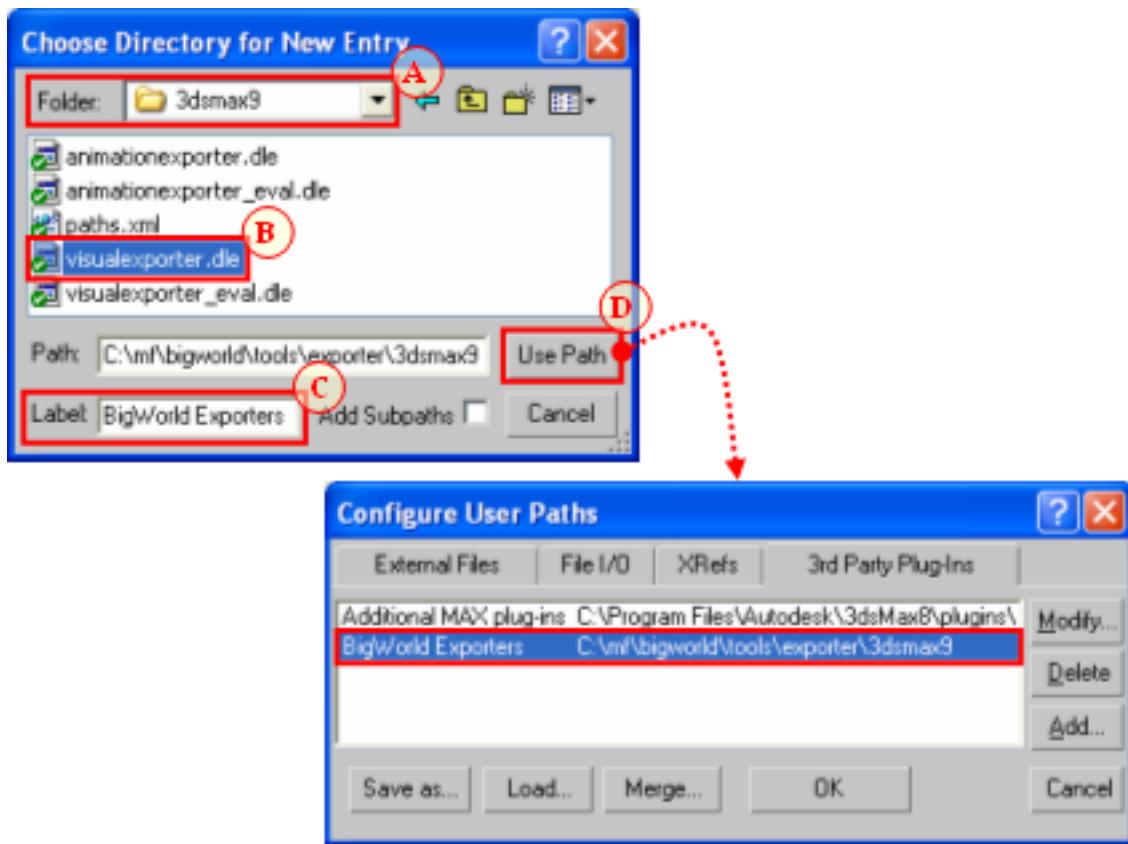
- Click the **3rd Party Plug-Ins** tab.
- Click the **Add** button — the **Choose Directory For New Entry** dialog box will open.



Invoking the Choose Directory For New Entry dialog box

4. On the **Choose Directory For New Entry** dialog box:

- a. On the **Folder** drop-down list, select the folder containing the BigWorld exporter plug-in for your 3ds Max version, e.g. `bigworld\tools\exporter\3dsmax2011`.
- b. On the file list, select `visualexporter.dle`.
- c. On the **Label** field, type 'BigWorld exporters'.
- d. Click the **Use Path** button — the **Configure System Paths** dialog box will be reactivated, listing BigWorld's exporter plug-in.



Setting the Choose Directory For New Entry dialog box

## 11.2. Maya

The BigWorld plug-in allows you to export Maya visual and animations created with versions 2008, 2009, 2010 and 2011.

Its features and installation steps are described in the sub-sections below.

### 11.2.1. Maya visual and animation exporter

The Maya Visual and Animation Exporter is a plug-in that exports mesh and animation data respectively to the .visual and .animation formats used by the BigWorld engine.

The visual exporter portion exports meshes, skinned meshes, transform nodes, BSP trees, hard points, portals and morph targets, and can also generate tangents and binormals for normal mapping. The animation exporter portion exports node animations and morph animations.

This version supports:

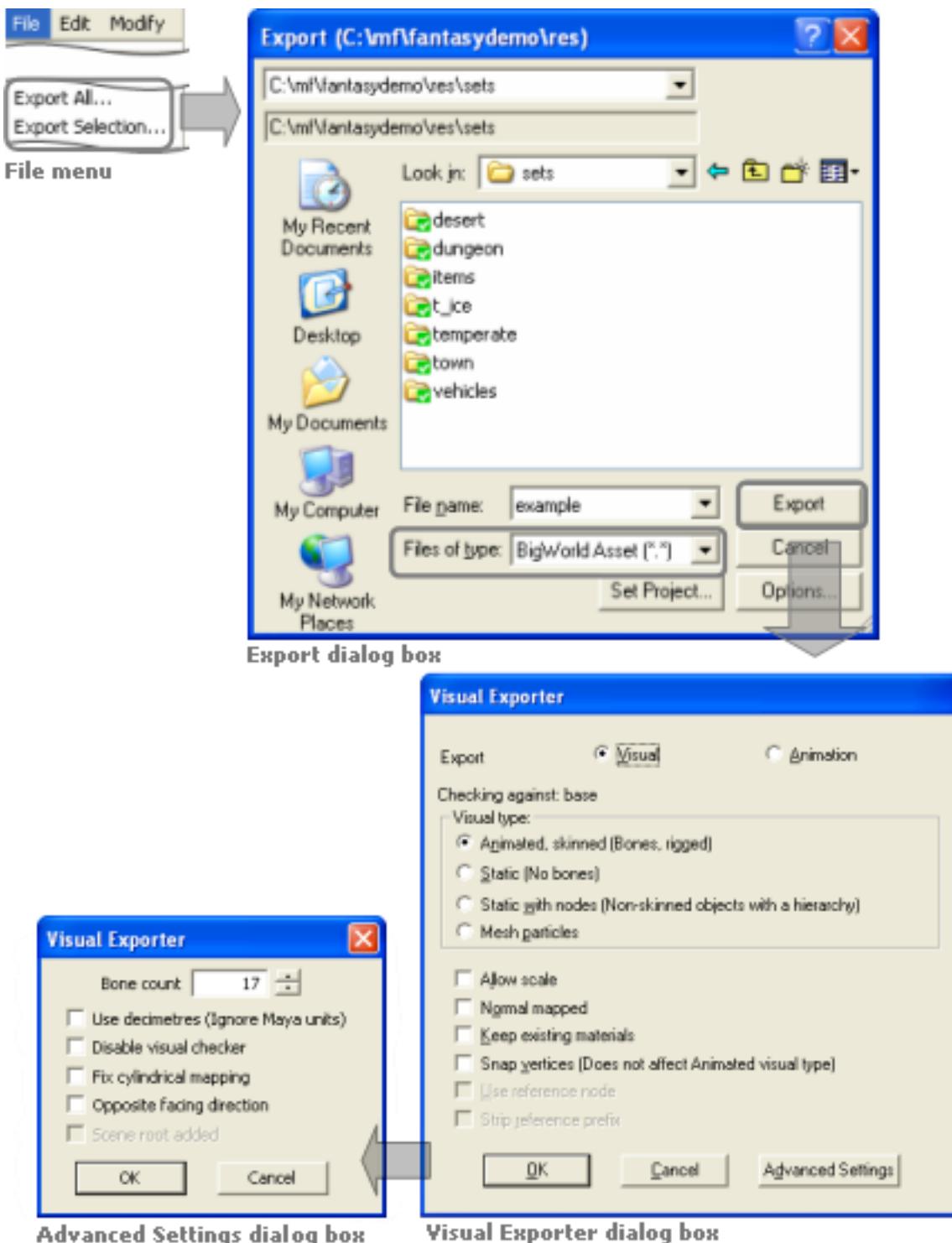
- Static Models
- Static Models with Nodes
- Normal Models
- Animations
- Mesh Particles

- Custom BSPs
- Custom Hulls
- Bump Mapping
- Morph Targets and Animation
- Custom node hierarchies.

### 11.2.2. Exporting

---

In order to access the **Visual and Animation Exporter** plug-in, set the **Export** dialog box's **Files Of Type** drop-down list box to **BigWorld Asset (\*.\*)**, as illustrated below:



Invoking the Visual and Animation Exporter plug-in

The list below describes the components of the **Export All Options** dialog box:

- **Export**

Sets the type of file being exported.

- **Visual**

Specifies that the objects should be saved into a `.visual` file.

- **Animation**

Specifies that the objects should be saved into a `.animation` file.

- **Visual type**

Sets the type of visual being exported, and hence what information to save.

- **Animated, skinned**

Specifies that the plug-in should export everything as is, *i.e.*, every piece should be exported as a separate object, and all transform nodes and morph targets should be exported.

This option should only be used for visuals that have moving parts, either skinned or separate moving parts.

This option does not generate BSP trees from the meshes. If you want a (static) BSP tree for an animated object, then you will have to create a custom one.

- **Static**

Specifies that the plug-in should combine all meshes into one, discarding all transform nodes and modifiers, and generating a BSP tree for the combined mesh (unless there is a custom one in the current scene).

This option should be used for shells and other static objects placed in the scene.

- **Static with nodes**

Specifies that the plug-in should combine all meshes into one, exporting all transform nodes.

This option is similar to the option Static, except in that it will export all transform nodes for the scene

- **Mesh particles**

Specifies that the plug-in should allow these meshes to be sorted when rendered, so that alpha blending works correctly. Each individual object in the scene is exported as one particle, in the format used by the mesh particle renderer.

There is a limit of 17 particle meshes exported for each mesh particle object.

Visuals exported using this option can be used as a particle system in ParticleEditor. For details, see “Renderer Properties sub-panel” on page 232 .

- **Allow scale**

Indicates that the object should be exported with scale keys in it.

If you wish to use scaling animations, then you have to export both the visual and the animation with this option enabled.

- **Normal mapped**

Specifies that the plug-in should create additional data to be used for normal-mapping the model.

This option must be checked to use a normal-mapped material on the model.

- **Keep existing materials**

Specifies that the plug-in should keep changes to material made in ModelEditor.

This option must be checked if you are overwriting a previously exported model, and want to keep material changes made in ModelEditor.

- **Use reference node**

Indicates that the animation should be exported with a node hierarchy different from the one in the current Maya file.

Once this option is checked, the **Select Reference Hierarchy File** dialog box is displayed, where you can select the visual file with the desired node hierarchy. For more details, see “Exporting custom node hierarchy” on page 328 .

- **Snap vertices**

Specifies that the plug-in should snap the vertices of all geometry to the nearest tenth of a millimetre.

This option has been added primarily to support the new use of portals — because the grid and axis alignment restrictions have been removed for portals, snapping portals to the nearest tenth of a millimetre can pull portals off bounding box or hull boundaries.

This option does not affect geometry exported when the **Visual Type** drop-down list box is set to **Animated**.

- **Strip reference prefix**

Specifies that the plug-in should strip the model name prefix from the names of the animation nodes when using referenced models inside Maya.

When animating a model in Maya that uses a reference to a rigged model, the name of the model will be prefixed to the name of each animated node. As a result the node names of the original model will not match those of the animation, so the animation will not affect the model. By selecting this option, the model name will be stripped from the names of the animation nodes so that the node names in the visual file match those in the animation file.

- **Advanced Settings dialog**

- **Bone count**

Specifies the number of bones used by the Visual Splitter to divide any mesh up.

It is set to a default of 17 because that is the maximum that all BigWorld skinned shaders are designed to use. When a visual file uses more than 17 bones, the Visual splitter divides the object into 17 or less bone segments.

Only change this field if you have created shaders that support a different number of bones.

The field's maximum value is 87, which is the upper limit of BigWorld vertex format.

- **Use decimetres**

Specifies that Maya units are interpreted as decimetres (1 unit = 10 decimetres) rather than metres.

- **Disable visual checker**

Specifies that the plug-in should not check the exported model against the visual rules.<sup>A</sup>

- **Fix cylindrical mapping**

Specifies that the plug-in should try to use an alternative method for generating texture space vectors used for normal mapping.

This option must be checked if there are artifacts along seams when using normal-mapped shaders.

- **Opposite facing direction**

Specifies that the model has been modelled facing in the incorrect direction and that it should be rotated by 180 degrees so that it appears correctly inside the engine.

- **Scene root added**

Specifies that the model already has a dummy scene root added by the artist. If not selected, a scene root will be added automatically so that the correct node gets examined as the itinerant when testing for the “Is Movement” action inside the BigWorld engine. This option provides support for customers with manually added dummy scene roots, therefore not requiring assets to be altered.

*A — The rules are defined in file bigworld/tools/res/visual\_rules.xml. For details, see “Validation rules” on page 329 .*

### 11.2.3. BigWorld shelf

---

The BigWorld Shelf contains useful shortcuts for working with shells.

These icons are described in the list below:

-  — Adds the Portal attribute to the object's face currently selected.
-  — Adds the Exit attribute to the object's face currently selected.
-  — Adds the Heaven attribute to the object's face currently selected.

### 11.2.4. Creating Shells

---

The requirements for creating in 3ds Max the game assets to be used in BigWorld Technology are covered in the document Content Creation Manual (accessible via WorldEditor's, ModelEditor's, and ParticleEditor's **Help → Content Creation** menu item, or directly by opening the `bigworld/doc/content_creation.chm` file).

But there is a major difference between 3ds Max and Maya in the creation of portals. To create a portal in Maya, follow the steps below:

1. Create a face on your shell model covering the area of the portal.
2. Ensure the normals for the portal are facing outwards from the shell.
3. Extract the face from the rest of the shell model.
4. Apply the portal attribute (and *heaven* and *exit* attributes, if applicable).
5. If the portal is not being recognised, then try the steps below:
  - a. Recreate your portal, based on a face extracted from the shell model.

- b. Centre the pivot point of the portal plane.
- c. Ensure that the transforms for the shell and portal are all zeroed.

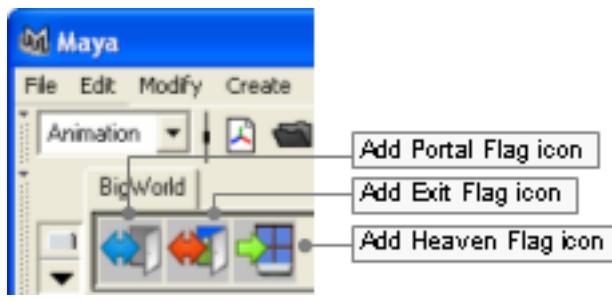
### 11.2.5. Installing the Maya exporters

In order to use the plug-in, you need to update your environment variables and Maya's plug-in settings. To do that, follow the steps below:

#### Note

The steps below are the same for all supported versions of Maya, only folder names for the latest version of Maya are shown

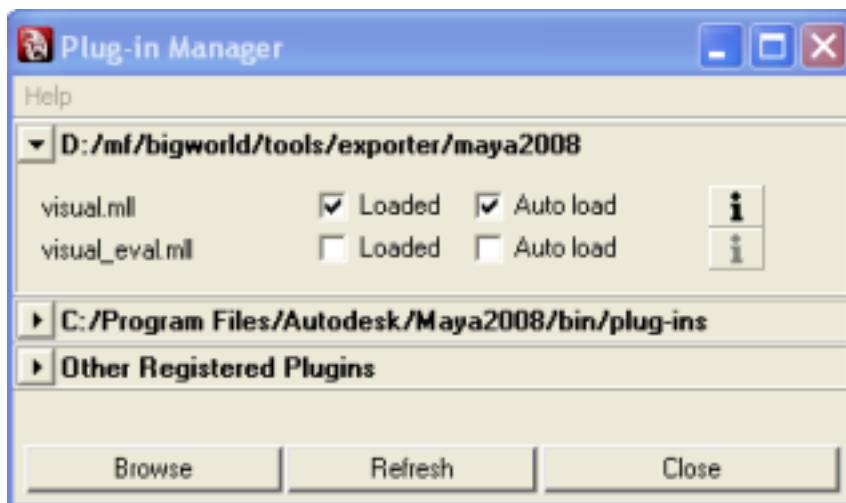
1. Add the BigWorld exporter folder as an additional plugin path to Maya:
    - a. Open Maya.env, e.g. My Documents/maya/2011/Maya.env.
    - b. Add the BigWorld exporter path to the MAYA\_PLUG\_IN\_PATH variable, e.g. MAYA\_PLUG\_IN\_PATH = C:/mf/bigworld/tools/exporter/maya2011.
- #### Note
- Each installed version of Maya can point to its appropriate version of the BigWorld exporters.
2. Copy the BigWorld's export script to the Maya folder:
    - a. Open Windows Explorer.
    - b. Navigate to the folder bigworld/tools/exporter/maya2011.
    - c. Select the visualfileexporterscript.mel file.
    - d. Copy the file to the My Documents/maya/2011/scripts folder.
  3. Copy BigWorld's shelf and its icons to Maya folder:
    - a. Open Windows Explorer.
    - b. Navigate to the folder bigworld/tools/exporter/maya2011.
    - c. Select the shelf\_bigworld.mel file.
    - d. Copy the file to the My Documents/maya/2011/prefs/shelves folder.
    - e. Navigate to the folder bigworld/tools/exporter/maya2011.
    - f. Select the bitmap files exit\_portal.bmp, heavenly\_portal.bmp, and standard\_portal.bmp.
    - g. Copy the selected files to the the My Documents/maya/2011/prefs/icons folder
    - h. Open Maya — you should see the BigWorld's tab in the shelf area (if that option is selected in Maya), and the icons displayed below (for details, see "BigWorld shelf" on page 325 ).



BigWorld shelf

## 4. Update Maya's plug-in settings:

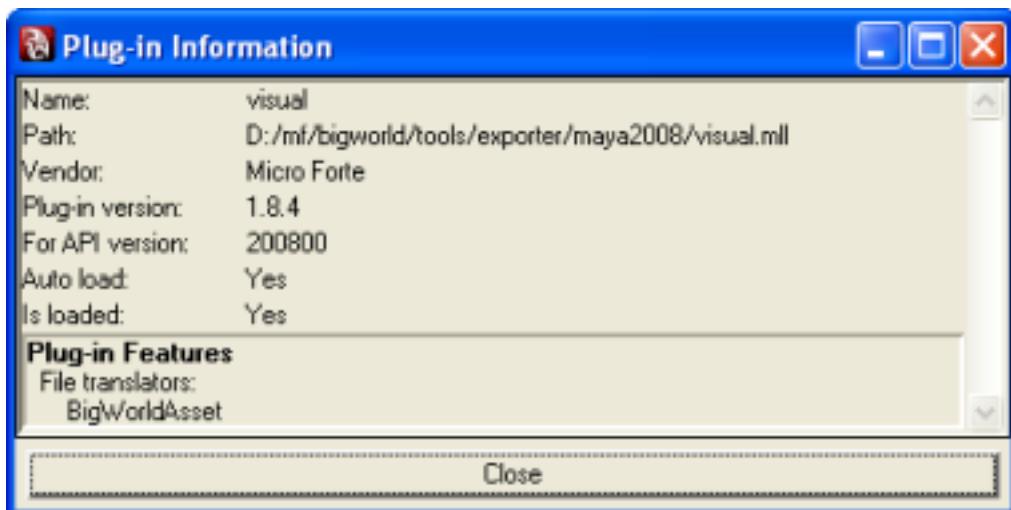
- Open Maya.
- Select the **Window → Setting/Preferences → Plug-in Manager** menu item — the **Plug-in Manager** dialog box will be displayed.



Plug-in Manager dialog box

- Select the **Loaded** (to load the plug-in for the current session) and **Auto Load** (to load it automatically on startup of future sessions) check boxes.
- Click the **i** button — the **Plug-in Information** dialog box will be displayed.

The bigworld/tools/exporter/maya2011/visual.mll file should be listed.



Plug-in Information dialog box

- e. Click the **Close** button to return to the **Plug-in Manager** dialog box.
- f. Click the **Close** button to return to Maya.

After carrying out these steps, you are ready to export your objects and animations to the .visual and .animation formats used by BigWorld.

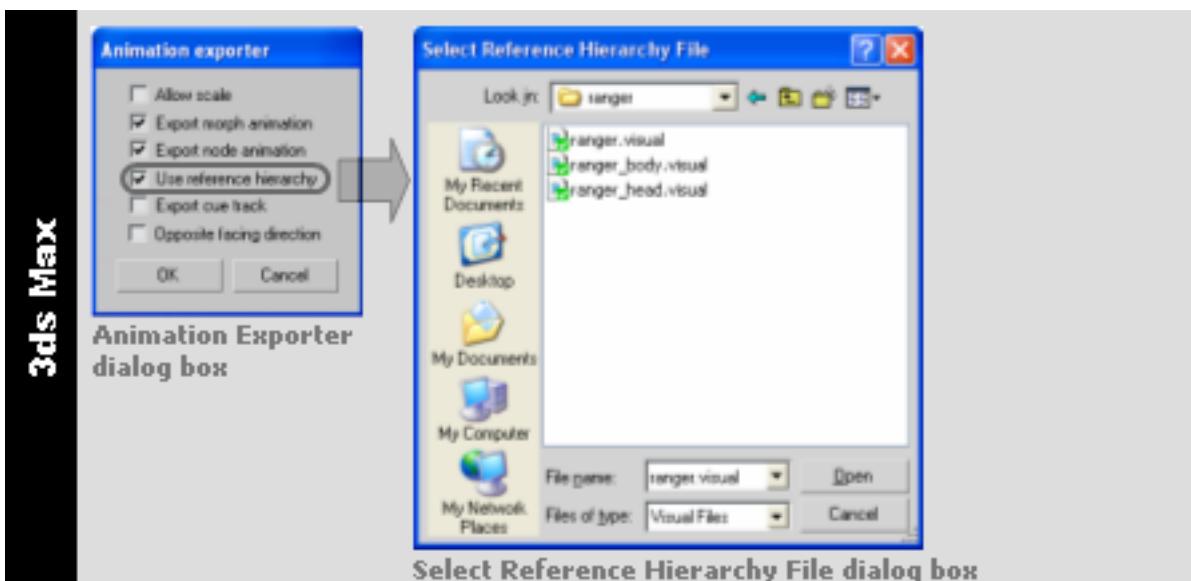
### 11.3. Exporting custom node hierarchy

Sometimes it is useful to create an animation where the node hierarchy in the scene is different from the one that the model was exported with. This usually occurs when there are two elements in the scene, and you want to link them, then move them together.

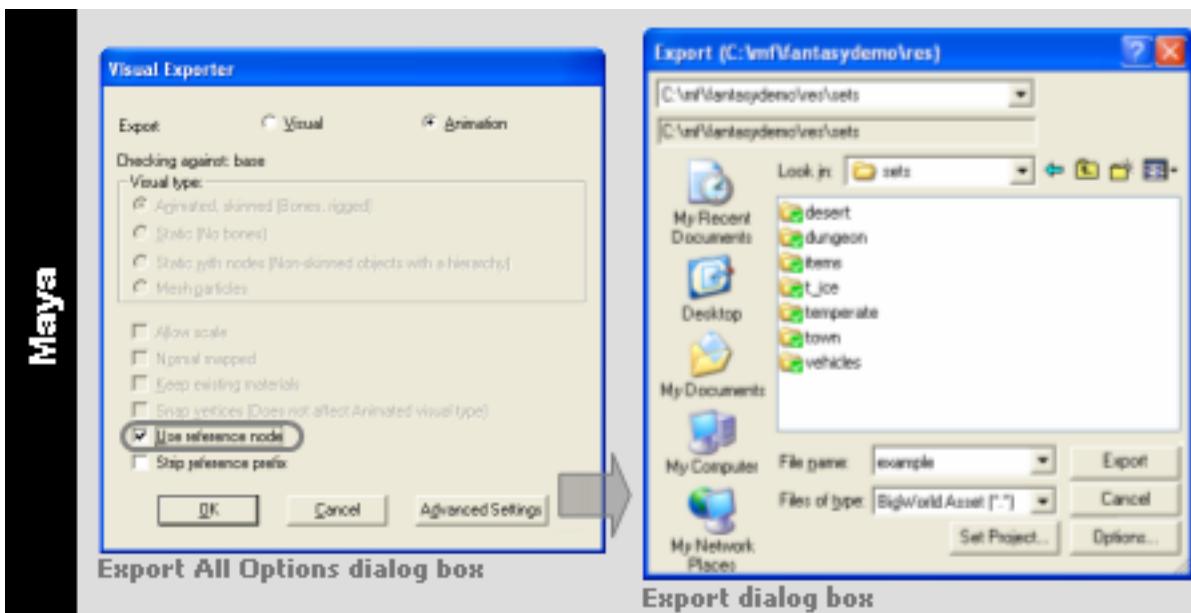
The example below illustrates such a scenario:

- When a character steps onto a little boat, you want both the character and the whole boat to dip down where the character's foot steps on.
- To accomplish this, the character is linked to a rotating box used as a handle to rotate the whole boat, since this is easy to animate in 3ds Max.
- But if this animation were exported with the node hierarchy in the current 3ds Max file, then the rotation would be lost, since that node is not normally in the hierarchy of the visual.

By exporting the model using the node hierarchy specified in a visual file, the resulting animation will look the same in the game engine as it does in 3ds Max or Maya.



3ds Max



Maya

## 11.4. Validation rules

Before exporting the visual, the **Visual Exporter** plug-in validates it according to a set of rules defined in the `bigworld/tools/res/visual_rules.xml` file.

The format of the `visual_rules.xml` file is as follows:

```
<visual_rules.xml>

*<rule>
  <identifier>                                id
  ?<parent>                                     parent_id
  ?<exportAs>                                    [normal|static|static with nodes]
  ?<path>                                       folder
                                              </identifier>
                                              </parent>
                                              </exportAs>
                                              </path>
```

```

?<filespec>           file_matching_criteria      </filespec>
?<minSize>             .f .f .f                  </minSize>
?<maxSize>             .f .f .f                  </maxSize>
?<maxNodesPerRenderSet> integer
</maxNodesPerRenderSet>
?<maxTriangles>        integer
</maxTriangles>
?<minTriangles>        integer
</minTriangles>
?<portals>              true|false
?<portalSnap>           .f .f .f
?<portalDistance>      .f
</portalDistance>
?<portalOffset>         .f
</portalOffset>
*<hardPoint>            hard_point_name
?<checkUnknownHardPoints> [true|false]
</checkUnknownHardPoints>
</rule>

</visual_rules.xml >

```

bigworld/tools/res/visual\_rules.xml file format

The plug-in determines which rule to use based on the visual's target path and file name — it will search through all matching rules (ordering the rules based on the length of the value for the path tag — from the longest to the shortest), and use the first matching one (with either no filespec tag, or with one that matches the filename using standard wildcard matching).

The list below describes the tags in the `visual_rules.xml` file:

- **checkUnknownHardPoints**

Specified if hard points not specified in the set of `hardPoint` tags should be flagged as error.

- **exportAs**

Specifies how to save the visual.

Can have the following values: `normal`, `static`, or `static with nodes`.

- **fileSpec**

Matching criteria (using wildcards) specifying the visuals for which this rule applies to.

This option is not inherited via the parent tag.

- **hardPoint**

Name of the hard point that the visual must have.

The set of hard points to check against is the one formed by all hard points mentioned in all parents.

This tag may be defined multiple times for the same rule.

- **identifier**

Name of the rule.

- **maxNodesPerRenderSet<sup>A</sup>**

Maximum nodes allowed per renderset, *i.e.*, how many bones each geometric element is allowed to use for skinning.

- **maxSize<sup>A</sup>**

Maximum size of the visual in metres.

- **maxTriangles<sup>A</sup>**

Maximum number of triangles in the visual.

- **minSize<sup>A</sup>**

Minimum size of the visual in metres.

- **minTriangles<sup>A</sup>**

Minimum number of triangles in the visual.

- **parent**

Name of the rule from which to inherit options.

For each option, the plug-in will search up the hierarchy until it finds a match for it.

The path and fileSpec options are not inherited.

- **path**

Resource folder which visualizes this rule applies to.

This option is not inherited via parent tag.

- **portalDistance<sup>A</sup>**

Number of which the distance between the origin and the portal must be a multiple of.

- **portalOffset<sup>A</sup>**

Number of which the centre of the portal must be a multiple of on the portal plane.

- **portals**

Determines if the visual may have portals.

- **portalsnap<sup>A</sup>**

Number of which the bounding box of the portal must be a multiple of.

A value must be specified for each dimension.

*A — A value of zero indicates that the option should not be checked.*

# Chapter 12. Lock Server (BWLokD)

When creating large worlds in a multi-user environment, it is necessary to have a mechanism in place that controls the access by multiple world builders to the same space at the same time.

WorldEditor has built-in support for concurrent access, provided by its lock server `bwlockd`. It allows various users to edit the same space simultaneously, without conflicts.

When using the lock server, you will need to lock the regions of the world that you want to edit, so you have exclusive access to it

## 12.1. Installation and configuration

To use the Lock Server (also called BWLockD) in WorldEditor, some steps must be followed both on the server and on the client machines.

The following sub-sections describe these steps.

### 12.1.1. Server

To enable concurrent editing of the world without conflicts, the BWLockD service (the Lock Server) has to be running. It should be run on a Linux server.

#### 12.1.1.1. Installing and configuring the Lock Server service

There is a script at `bigworld/tools/server/install/bwlockd.sh` that can be used to install the BWLockD service. Run the following command as root in the `bigworld/tools/server/install` directory.

```
# ./bwlockd.sh install
```

This will install the lock server init-script into `/etc/init.d/bw_lockd` and install symlinks for the `/etc/rc*.d` directories, such that the lock server starts up at boot.

By default, the log file is at `/var/log/bigworld/bwlockd.log`. Check the log for a text message saying the daemon is listening on port 8168.

You can edit the installed `/etc/init.d/bw_lockd` to tune the behaviour of the lock server. In particular, useful variables to change are:

- `BIND_IP`: the interface address the lock server binds to
- `PORT`: the port the lock server listens on
- `LOG_OUTPUT_PATH`: the output path for the log, by default this is set to `/var/log/bigworld/bwlockd.log`

As a system service, you can query the running state of the Lock Server.

```
# /etc/init.d/bw_lockd status
```

#### 12.1.1.2. Running from the command-line

You can also run the lock server from the command line in the foreground. There are various command-line options as the `--help` output shows:

```
usage: bwlockd.py [options]
```

```

options:

-h, --help                  show this help message and exit
--daemon                   run process in the background (daemon mode)
-I BIND_IP, --bind-ip=BIND_IP
                           IP/hostname of interface to bind to (default all
                           interfaces)
-p BIND_PORT, --port=BIND_PORT
                           port to listen on (default 8168)
--pid=PID_FILE
                           default daemon PID file (default "bwlockd.pid")
-o OUT_FILE, --output=OUT_FILE
                           default daemon output file (only applies to non-daemon
                           mode, default "bwlockd.log")
-v, --verbose
                           verbose output (only applies to non-daemon output,
                           daemon output is always verbose)
--history=HISTORYPATH
                           output a history file that contains recent lock server
                           operations in XML format

```

### 12.1.1.2.1. History File

If you run the Lock Server from the command-line, you can pass the --history option for the daemon to output a history file, which contains a list of recent operations that the Lock Server has processed. This is useful for debugging in conjunction with the logging output. By default, no history file is created.

### 12.1.1.3. Keeping the Lock Server up-to-date

In the event that you remove a space and recreate it before all clients have relinquished their locks on the old space, you may need to clear the locks and restart the lock server.

BWLokD maintains its state in files with the .computer suffix for each workstation that has ever created a lock. Each .computer file is an XML file, such as the one below.

```

<?xml version="1.0"?>
<hostname>
  <space>
    <name> space_name1 </name>
    <lock>
      <rect> left top right bottom2 </rect>
      <username> username3 </username>
      <desc> lock_description 4</desc>
      <time> timestamp 5</time>
    </lock>
    <lock>
      ...
    </lock>
    ...
  </space>
  <space>
    ...
  </space>
  ...
</hostname>

```

<sup>1</sup> space\_name: the name of the space for this space element.

<sup>2</sup> left, top, right, bottom: the coordinates of the lock rectangle

- 3 username: the name of the user who made the lock
- 4 desc: the description entered by the user at the time of the lock creation
- 5 timestamp: a timestamp (seconds after the Epoch) of the lock creation

For each space the given host has ever locked, there is a space element that contains a name element for the space, and multiple lock elements that describe the locks that the workstation has currently acquired. Each lock element has a rect element describing the lock rectangle, who locked the region described by the username element, the lock description entered when the lock was made in the desc element, and the lock time in the time element.

It may be necessary to clear locks manually by remove sections from the .computer state files. For example, if a space is removed and a new space is recreated with the same name, any existing locks on the old space will be applied incorrectly to the new space. If modifying the state files is required, you should shut down the lock server, make your changes, and restart the server.

#### 12.1.1.4. Removing the BWLockD service

You can run the BWLockD init-script with the remove command line option:

```
/etc/init.d/bwlockd remove
```

This will stop any running BWLockD service and remove the startup symlinks so that the service is no longer started on boot.

### 12.1.2. Subversion Revision Control Requirements

When using Subversion, there are some requirements that need to be met before using Lock Server to manage world building.

#### 12.1.2.1. Command line client configuration

You will need to install the Subversion command line client. Note that TortoiseSVN does not ship with one.

By default, the Subversion stub assumes that you are running the Subversion client from C:\Program Files (x86)\CollabNet\Subversion Client\svn.exe. If this is not correct, this can be adjusted by editing the bigworld/tools/worldeditor/scripts svn\_stub.py and then recompiling the stub executable using py2exe (see below in "Using a version control system stub" on page 337 ).

Also keep in mind that Subversion working copies are potentially not backwards-compatible between different versions. Ensure that the Subversion command line client is compatible with whichever tool is used to check out the working copy, such as TortoiseSVN.

#### 12.1.2.2. Setting up the svn+ssh scheme

There is some additional configuration when using Subversion server hosted using the svn+ssh scheme. This is not required for the svn, http or the https schemes. As an example of this, you may have a Subversion URL svn+ssh://developer@repository/srv/repos/your\_game/trunk. In this case, there is a user called developer with an account accessible by SSH on machine called repository, and the repository is located at /srv/repos/your\_game, and the trunk branch is at the top-level called trunk.

The Subversion version control stub uses the command line Subversion client, but by default, the client has no way of authenticating automatically with your server over SSH. We supply the authentication mechanism by using PuTTY and its associated utilities PuTTYgen and PLink. To download these tools, go to <http://www.chiark.greenend.org.uk/~sgtatham/putty>. The documentation for PuTTY can be found on that site as well.

Use PuTTYgen to generate a key-pair to use when authenticating to a Subversion server hosted over SSH. This key-pair can be saved away on the client machine somewhere memorable (it will be saved into a file with a .PPK extension by default). Part of the output of the key-pair generation will be a string that can be used

in a SSH authorized\_keys file. This string will need to be added to the user's .ssh/authorized\_keys on the machine hosting the repository.

PuTTY can also protect the key-pair so that a passphrase is needed to use it. It also comes with a authentication agent called Pageant that you can use to keep decoded keys in memory so that key-pairs that are protected can be used after only unlocking them once per session. Refer to the PuTTY documentation for more details.

Subversion has a per-user config file that can usually be located in the user's directory under Application Data\Subversion\config. A new option needs to be added to the [ tunnels ] section that calls the PLINK executable with the key file that you created in PuTTYgen. For example:

```
[tunnels]
ssh=C:\Program Files\PuTTY\plink -i C:\...\keypair_file.ppk
```

The link can be tested by running a command such as svn update on a working copy already checked out (using TortoiseSVN, for example) using the svn+ssh scheme.

### 12.1.3. Perforce Revision Control Requirements

The path to the Perforce command line client is specified in the P4\_PATH module variable in bigworld/tools/worldeditor/resources/scripts/p4\_stub.py.

### 12.1.4. WorldEditor

WorldEditor can be configured to use BWLockD server as follows:

1. Open WorldEditor's options file - bigworld/tools/worldeditor/options.xml (for details on this file's grammar, see the document File Grammar Guide's section *options.xml* → "WorldEditor").
2. Update / add the following section as a child to the root node:

```
<bwlockd>
  <use> true </use>
  <host> server_name:server_port </host>
</bwlockd>
```

The *server\_name* is the name of the computer running BWLockD server, and *server\_port* is an optional extension used to specify a particular port, which defaults to 8168. For additional information on changing the port BWLockD server listens on, see above in "Server" on page 333 .

### 12.1.5. NavGen

NavGen can be configured to use BWLockD server as follows:

1. Open NavGen's options file bigworld/tools/misc/navgen\_settings.xml (for details on this file's grammar, see the document File Grammar Guide's section *navgen\_settings.xml*).
2. Update / add the following section as a child to the root node:

```
<bwlockd> server_name:server_port </bwlockd>
```

The *server\_name* is the name of the computer running BWLockD server, and *server\_port* is an optional extension used to specify a particular port, which defaults to 8168. For additional information on changing the port BWLockD server listens on, see above in "Server" on page 333 .

3. Update / add the following section as a child to the root node:

```
<standalone> false </standalone>
```

Use of the BWLockD server can be temporarily disabled by setting this tag to true.

## 12.2. Using a version control system stub

The Lock Server supports the use of stubs for version control systems, which can be defined in WorldEditor's configuration file `options.xml`(for details on this file's grammar, see the document File Grammar Guide's section `options.xml` → "WorldEditor").

If no version control system stub is defined, then WorldEditor will use the default `resources/scripts/svn_stub.exe` for Subversion support. We also provide a `p4_stub.exe` script for Perforce.

**Important Note:** You can use any executable file or any file that has an associated default program as a stub. The provided stub exe files are compiled from python files in the same folder with same name by using `py2exe`. For more details visit `py2exe`'s website at [www.py2exe.org](http://www.py2exe.org). If you want to use .py file directly, you have to ensure that .py file is associated with a Python interpreter. The Python installer on Windows will do that automatically.

A stub must support following commands:

- **addfile**

Syntax: `<stubname> addfile <filename>A`

Adds the text file to the repository.

- **addbinaryfile**

Syntax: `<stubname> addbinaryfile <filename>A`

Adds the binary file to the repository.

- **removefile**

Syntax: `<stubname> removefile <filename>A`

Removes the file from repository.

- **commitfile**

Syntax: `<stubname> commitfile msg <filename>[,<filename>]*A`

Commits the files to the repository (the commit operation is recursive).

- **updatefile**

Syntax: `<stubname> updatefile <filename>[,<filename>]*A`

Updates all indicated files.

- **updatefolder**

Syntax: `<stubname> updatefolder <foldername>`

Recursively updates all files in the indicated folder.

- **refreshfolder**

**Syntax:** <*stubname*> refreshfolder <*foldername*><sup>A</sup>

Recursively refreshes the status of all files in the indicated folder.

- **managed**

**Syntax:** <*stubname*> managed <*file\_or\_folder\_name*><sup>A</sup>

Returns 1 if the file or folder is managed by the repository, or 0 otherwise.

*A – filename may include the wildcard character \* (asterisk).*

## 12.3. Enabling spaces for collaborative editing

In order to be able to share your spaces with other world builders, you need to follow a few simple steps. If the new space is created while WorldEditor is connected to bwlockd, the whole space will be locked for editing automatically, but if the space is created while WorldEditor is disconnected, the whole space will not be locked for editing.

When you create a new space while connected to the lock server, you need to follow these steps in order to share the space:

- 1.



Go to *Project* mode, by clicking the **Project Tool** toolbar button — — (for details, see “Toolbar” on page 17 ).

2. Make sure that WorldEditor has successfully connected to the Lock Server.
3. Click anywhere on the space.
4. Enter a commit message and click on *Save and Commit*, and wait for the source control operation to complete.

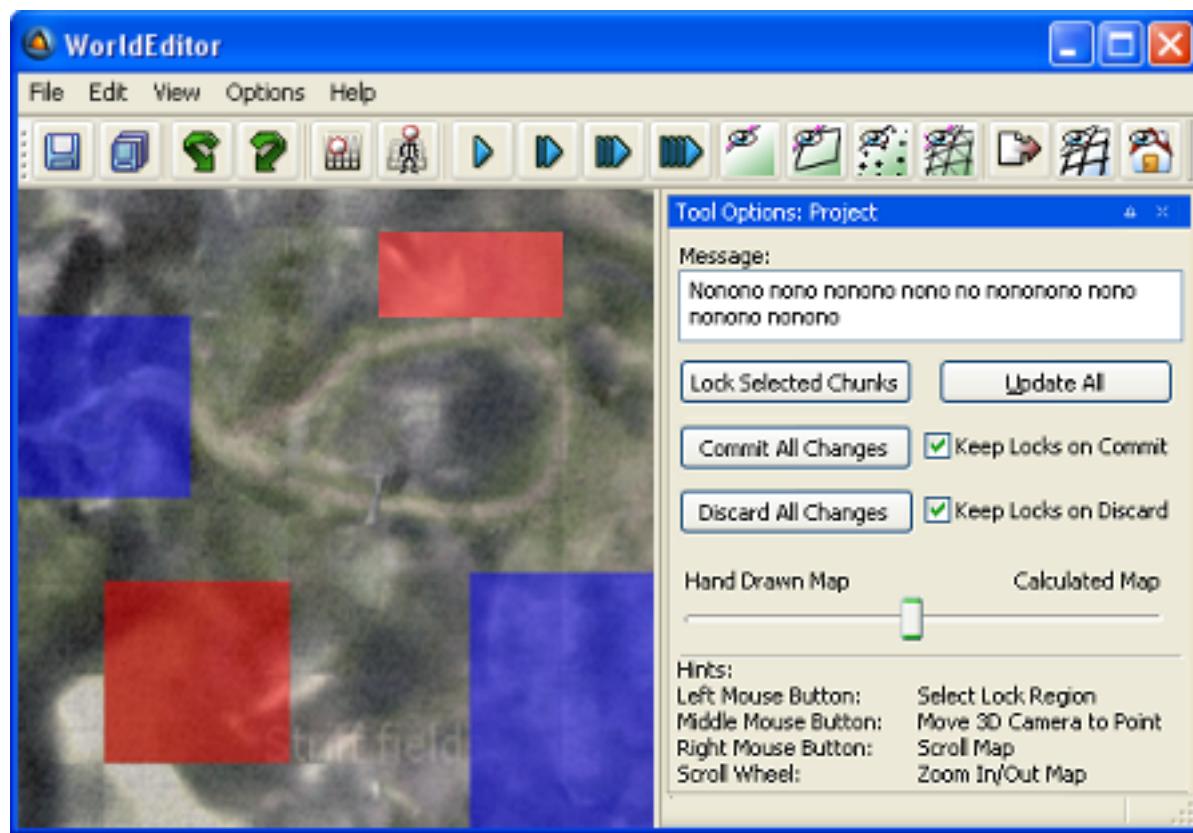
On the other hand, if the space was created before connecting to the lock server, you will need to follow these steps:

1. Go to *Project* mode, make sure that WorldEditor has successfully connected to the Lock Server.
2. Select any area inside the space using click-and-drag.
3. Enter a descriptive message and click the *Lock Selected Chunks* button. Note that even if you select only one chunk, the whole space will be locked because it hasn't been committed yet.
4. Finally, if the space is not under source control, enter a commit message and click on *Save and Commit*, and wait for the source control operation to complete.

Once these steps have been completed, it will be possible for other world builders to get the space using the source control tools and then lock/unlock areas of the space to work on it simultaneously. For more details please refer to “Locking an area” on page 338 .

## 12.4. Locking an area

While in *Project* mode, you can see the locked regions of the space. The red regions correspond to chunks locked by other world builders, while the blue indicates editable regions.

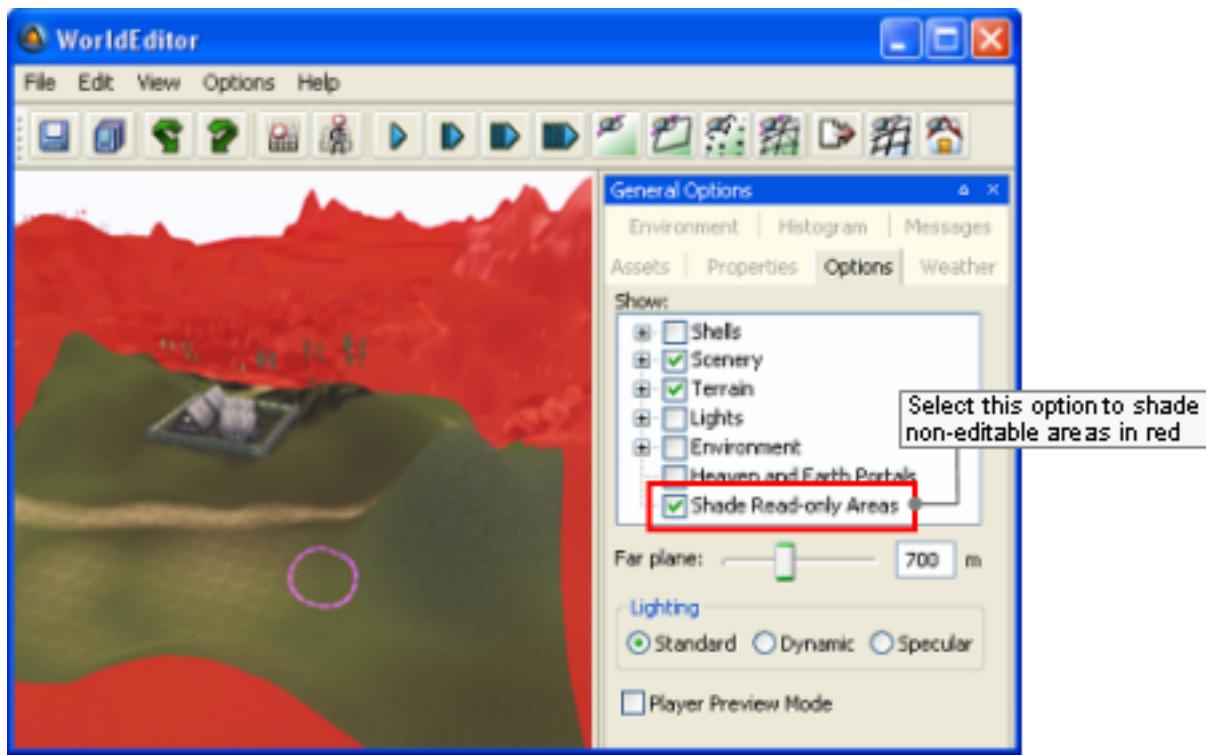


WorldEditor displaying editable regions in blue and non-editable regions in red

### Note

As the mouse is hovered over a locked region, a tooltip is displayed with information on that lock, such as user, machine, date/time, chunk ID and lock message.

To enable or disable displaying non-editable areas shaded in red, select the **General Options** panel's **Shade Read-Only Areas** check box (for details, see "General Options panel" on page 111 ).



Non-editable areas shaded in red

To lock an area for editing, follow the steps below:

1.



Click the **Project Tool** toolbar button — — to activate the *Project* mode.

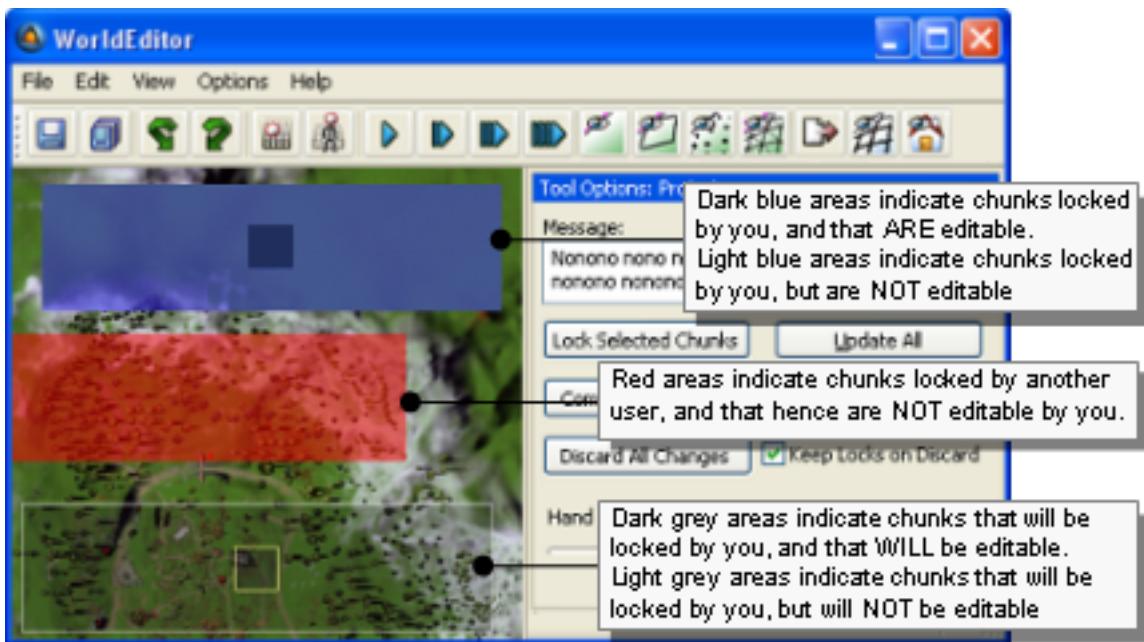
2. Make sure that WorldEditor has successfully connected to the Lock Server.

WorldEditor tries to connect to bwlockd upon startup, using the settings specified in `bigworld/tools/worldeditor/options.xml`. (for details on this file's grammar, see the document File Grammar Guide's section `options.xml` → "WorldEditor").

If it did not connect successfully, then the **Message** field will contain the text "failed to connect to bwlock, you cannot use the related functionality", and the **Lock Selected Chunks**, **Commit All Changes** and **Discard All Changes** buttons will be disabled.

3. Click-and-drag over the area that you want to lock for editing.

The selected area will be shaded, indicating the chunks that will be locked *and* editable. Around that area, an area shaded in light grey will be displayed, indicating an area that will be locked but non-editable.



WorldEditor displaying information about chunks' lock and edit status

The actual editable area of a locked region is smaller by 1 chunk around the border. This is necessary to prevent tearing in the terrain that may occur if two people edit adjacent terrain chunks to different heights.

4. In the **Message** field, type a text indicating the reason for the lock.

This message will be displayed on a tooltip when other users hover over the locked area in WorldEditor while in *Project* mode.

5. Press the **Lock Selected Chunks** button.

The selected chunks and the ones surrounding it will be shaded in blue, to indicate the success of the operation.

This process can be repeated many times if you want to lock an irregular area.

Once the world is complete, you will have to perform a pass over it to fill in the details in between previously locked sections.