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User Manual

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Software Version
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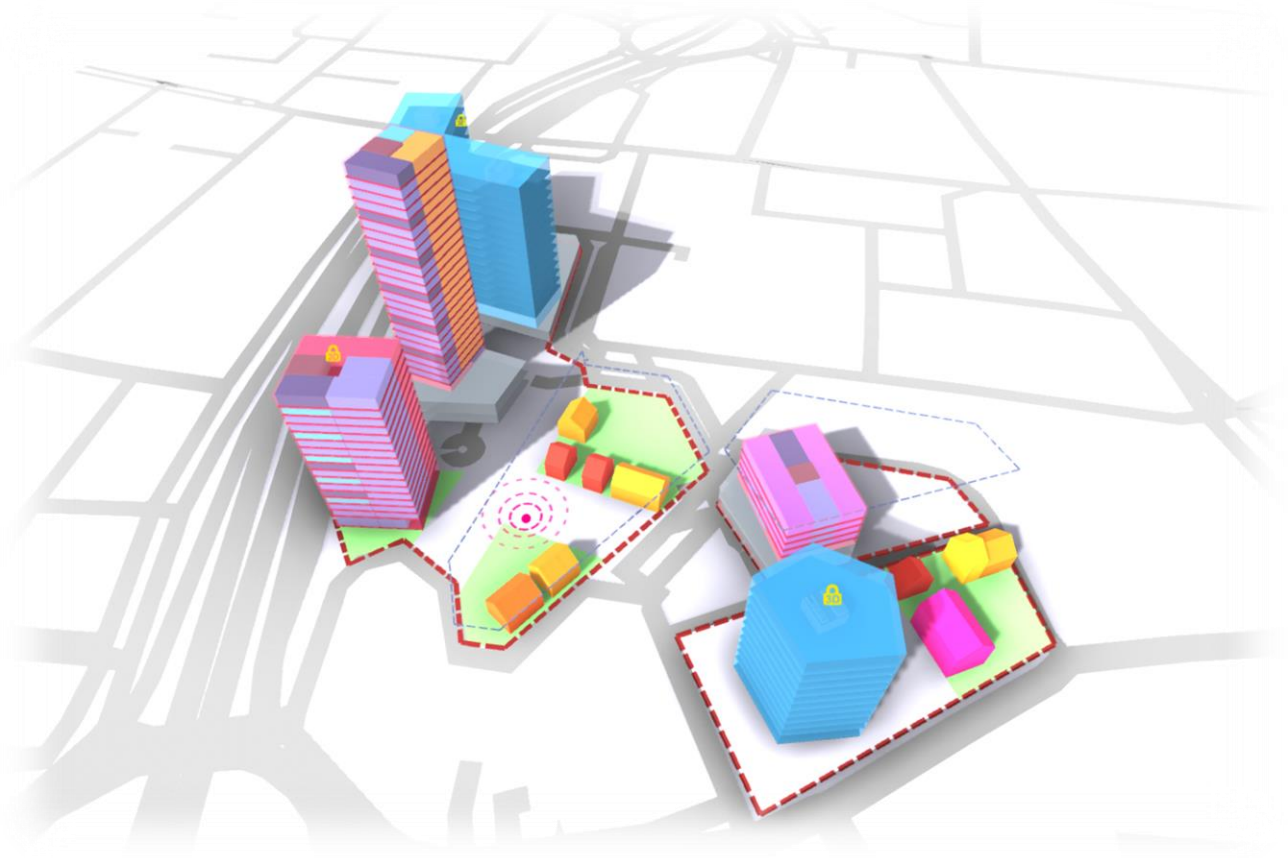
SITESOLVE
USER MANUAL



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SITESOLVE
USER MANUAL

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CONTENTS

1. ABOUT SITESOLVE

SiteSolve is a software platform for early stage viability assessment and generative design of residential and commercial building projects. It may be used to generatively explore and optimise potential arrangements of block and housing massing within the particular constraints of a prospective development site.

This user guide gives an overview of the program’s features and provides step-by-step guidance to accomplishing many common tasks within the software.

2. INSTALLING AND RUNNING THE SOFTWARE

2.1 Software Requirements

Please ensure that your computer meets or exceeds the following system requirements before installing the software:

- Operating System: Windows 7 or Windows 10, 64-bit versions only.
- CPU: x86, x64 architecture with SSE2 instruction set support
- Graphics API: DX10, DX11, DX12 Capable.

2.2 Installation

To install the software, download the and run the install file 'SiteSolve.Setup.v2.9.exe'. Follow the step-by-step instructions to install SiteSolve onto your computer. Note that installation of SiteSolve is likely to require administrative privileges.

2.2.1 Data Storage Locations and Requirements

By default, the SiteSolve install directory will be *C:\Program Files\SiteSolve*, though this may be changed by the user during installation. Desktop and Start Menu shortcuts may optionally be created. Basic file type and icon associations only will be written to the registry during installation.

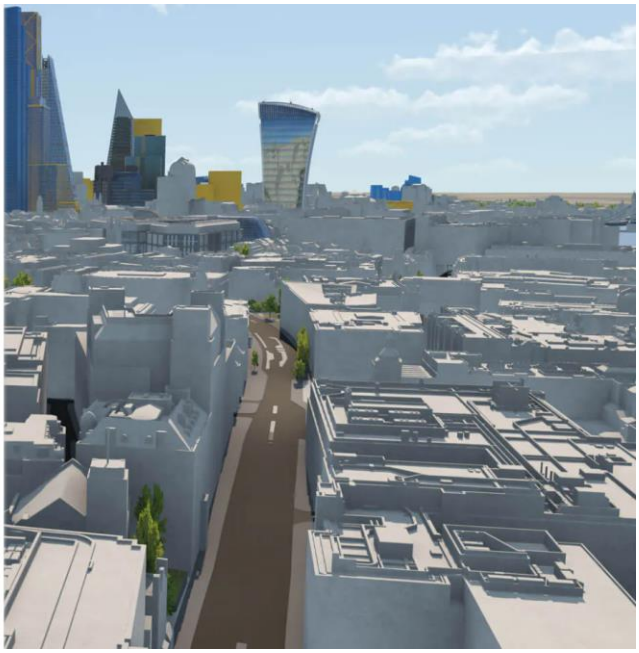
During operation of the software some temporary data may be stored under the user account's *…\AppData\LocalLow* folder. Other data files written by SiteSolve (such as the native-format *.sslv* project files, exported images, tables, CAD files etc.) may be saved to locations of the user's choosing.

2.3 Running the Software

Once installed, SiteSolve may be run by double-clicking 'SiteSolve.exe' or using the desktop or Start Menu shortcuts.

2.4 Logging In

When the software is first opened you will see the account log-in screen:

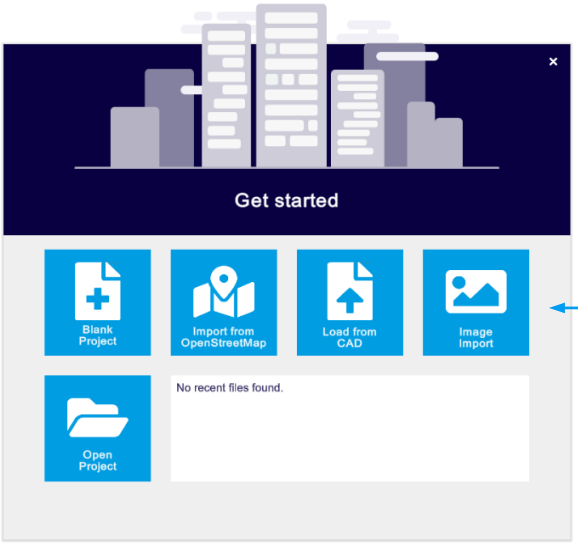


Sign-up and therefore enter the e-mail address to which your account is linked and the password which you set up for it. If you do not have a valid license to access SiteSolve or the one you had requires renewal, please contact Vu.City support.

3. STARTING A PROJECT

3.1 Getting Started

After signing in the Get Started window will appear. Choose whether you would like to start a new project or open an existing project. Start a new project by importing map data, image files, 3D models or CAD drawings to define the context for your site (see 3.3 - 3.5). You can also skip importing data and go directly to defining a site boundary (see 4.2.1)

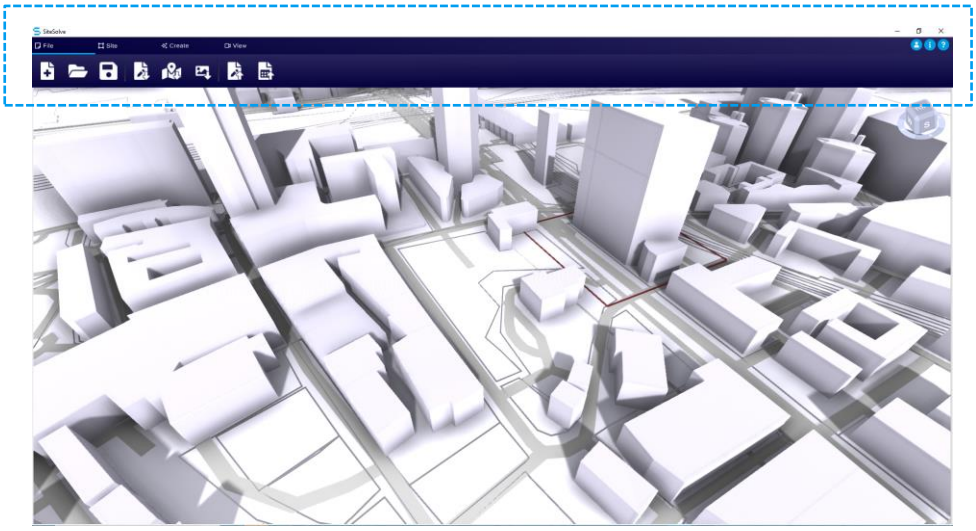


These controls are also accessible from the main interface on the File toolbar.

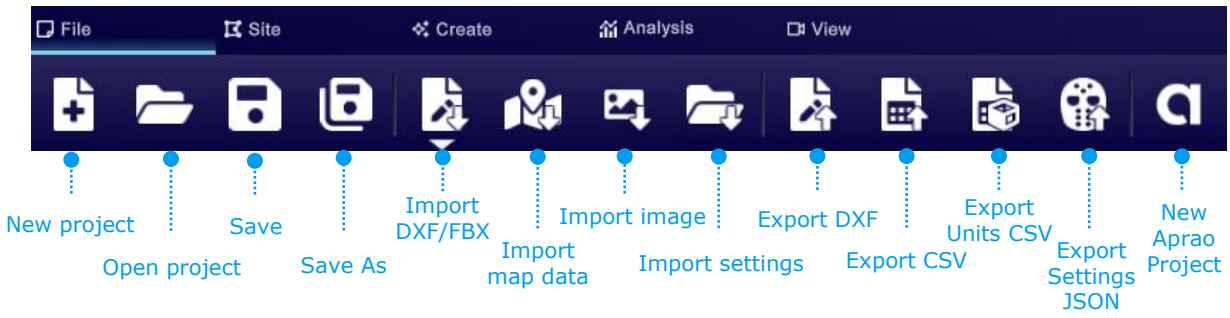
After the Get Started window closes, the main interface is displayed. The main interface consists of a 3D viewport with a toolbar at the top which can be switched between four different modes:

- File – Import and export files (see this section below and section 8.18)
- Site – Define the site constraints (see section 4)
- Create – Generate design options (see section 5)
- Analysis – Define the analysis inputs for design option (see section 7)
- View – Adjust the model display and interface settings (see section 9)

The toolbar is organised to guide the user through the design process, starting on the left and stepping through to the right. As you step through the workflow, the appropriate sidebars will appear.



File toolbar

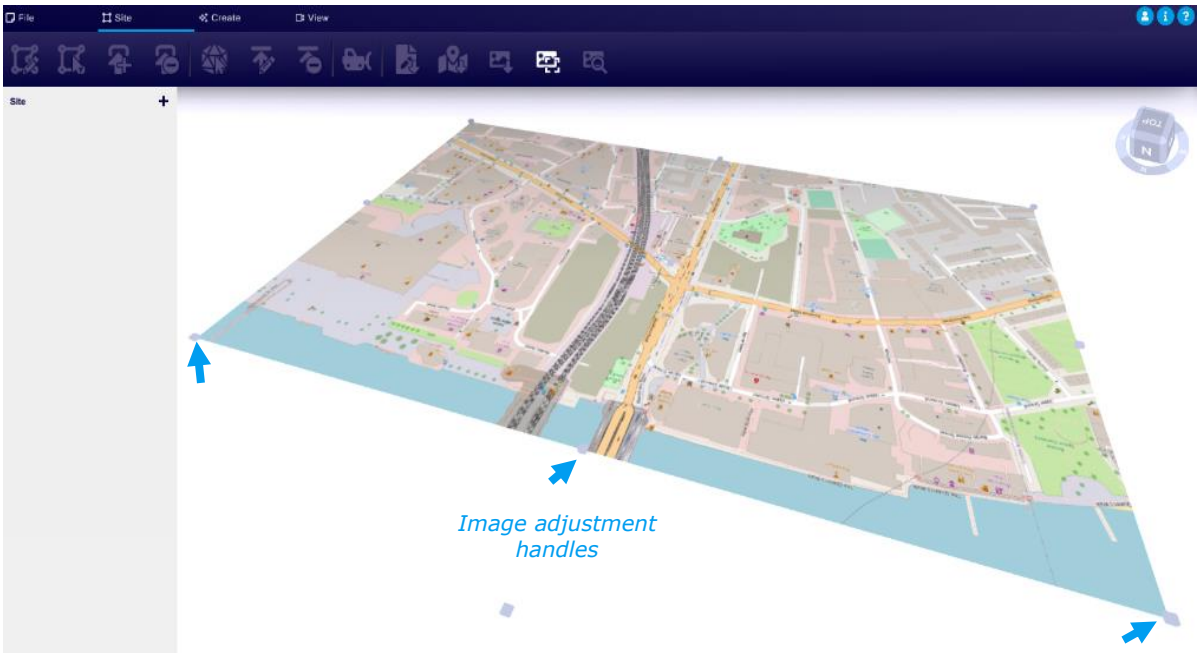


3.2 Loading a Project

- Click 'Load Project' on the File toolbar.
- Browse to a SiteSolve project file (*.sslv).
- Open the file.

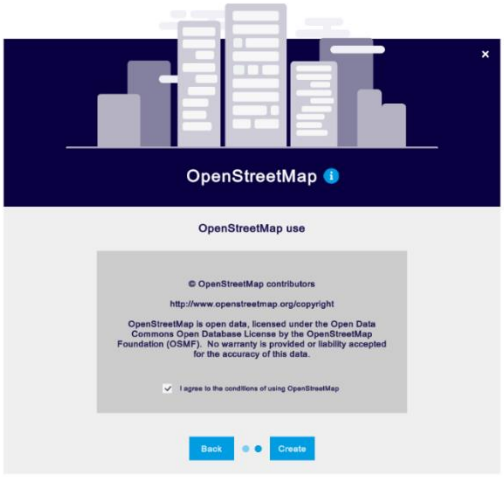
3.3 Importing an Image

- Click 'Import Image' on the File or Site toolbar.
- Browse to a JPG or PNG image and open it.
- Images can be rotated and scaled with the Adjust Image  and Scale Image tools 



3.4 Importing Map Data from OpenStreetMap

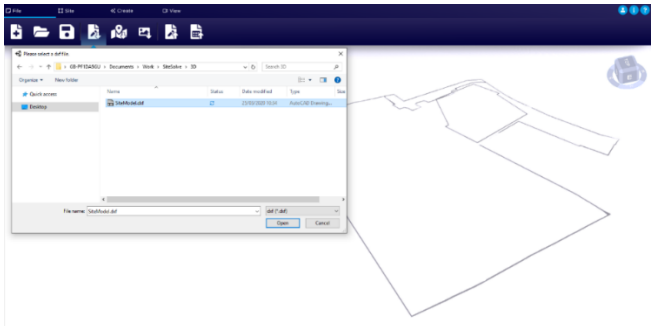
- Click ‘Import from OpenStreetMap’ on the File or Site toolbar.
- Enter an address or postcode in the address search box or enter location coordinates in the latitude and longitude boxes.
- Optionally click the preview button to confirm whether the location is correct.
- Set a default height value to be used for surrounding buildings where height information is not available from OpenStreetMap.
- Click next.
- Check the box to agree with OpenStreetMap’s terms and conditions.
- Click create to import the map data into SiteSolve.
- If your selected location contains enough mapping data then SiteSolve will automatically generate 3D volumes of the surrounding buildings.

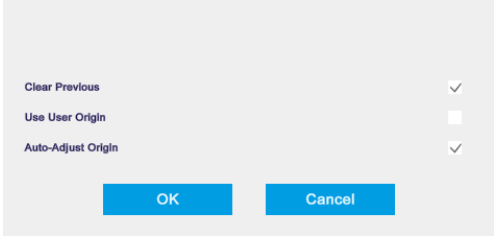


3.5 Importing a DXF or FBX File

This tool allows importing 3D models and CAD drawings in DXF or FBX format. DXF and FBX files can be exported from almost any CAD or 3D modelling software.

- Click ‘Import DXF’/‘Import FBX’ from the breakdown menu on the File toolbar.
- Browse to a DXF/FBX file and open it.
- On import, you have the options to auto-adjust the origin if the model does not appear in the viewport or use the current one, as well as clear any existing surroundings context.





4. SETTING UP YOUR SITE

Site toolbar

Site Boundary

1. Draw Site Boundary
2. Create Site Boundary from Curves
3. Create Site Boundary from Surfaces
4. Edit Site Boundary
5. Set Sit Elevation
6. Delete Site Boundary

Site Access

7. Add Site Access Point
8. Delete Site Access Points

Height Limit Mesh

9. Select Height Limit Mesh
10. Select Height Limit Mesh Faces
11. Delete Height Limit Mesh

Height Limit Zone

12. Draw Height Limit Zone
13. Edit Height Limit Zone
14. Edit Height Limit Elevation
15. Delete Height Limit Zone

Surroundings

16. Delete Surroundings Geometry
17. Hide Surroundings Geometry
18. Reset Surroundings Geometry

4.1 Removing & Hiding Geometry from the Model

[a] [b] [c]

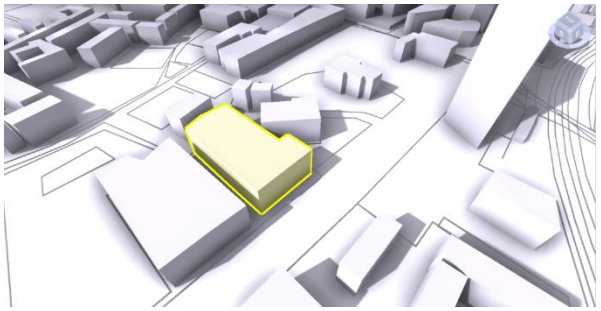
[a] This tool can be used to permanently delete any geometry imported from a DXF file or OpenStreetMap

[b] This tool will enable to temporarily hide surroundings geometry for the current active phase

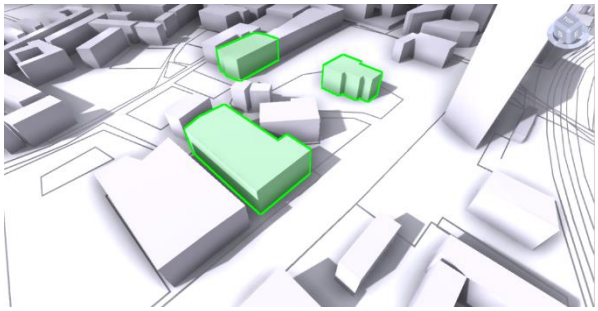
[c] This tool will revert the state of any hidden surroundings geometry back to normal

- Click the Delete [a] or Hide [b] tool on the Site toolbar
- Hover the mouse over any object you would like to remove or hide
- The object will be highlighted with a yellow selection preview
- Click the object to add it to your selection. Selected objects are highlighted in green
- Select any other objects you would like to remove
- To deselect an object simply click on it again
- When you are happy with your selection, hit enter
- You can also press the escape key at any stage before hitting enter, to cancel all your selections and exit the tool
- If you used the [b] tool you can reset the hidden objects by using the Reset tool [c].

Selection preview



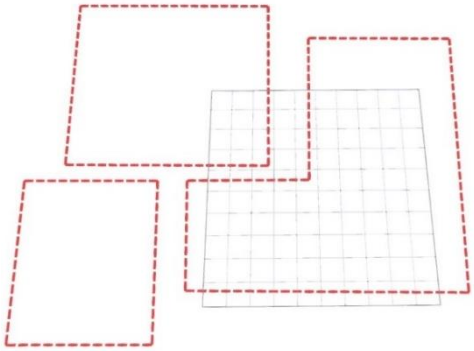
Objects selected for removal



4.2 Setting Site Constraints

4.2.1 Site Boundary

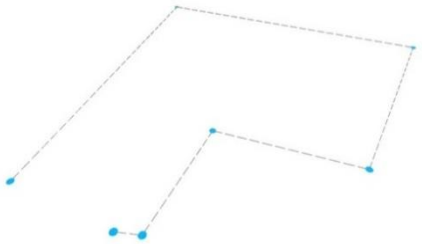
Each design can include multiple site boundaries but at least one boundary is required before any buildings can be created. SiteSolve has the following two methods for defining site boundaries.



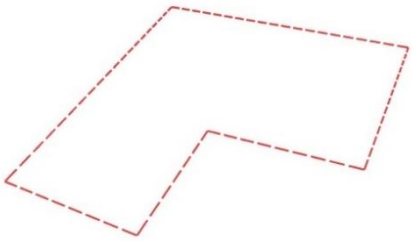
4.2.1.1 Draw a Site Boundary

- Click 'Draw Site Boundary' on the Site toolbar.
- Draw your site boundary point by point in the viewport.
- Enter the length of a boundary edge using the keyboard
- Press the space key to confirm and move on to the next point.
- Alternatively, simply click in the viewport to set a point.
- Press Ctrl-Z to undo a point.
- Hit enter or click on the first point to complete your boundary drawing.
- The boundary is set and displayed as a dashed red line.

Drawing the site boundary

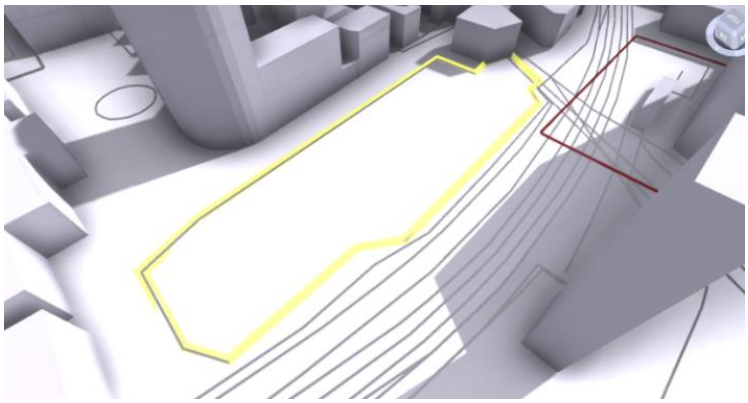


Completed boundary line



4.2.1.2 Create a Site Boundary from Curves

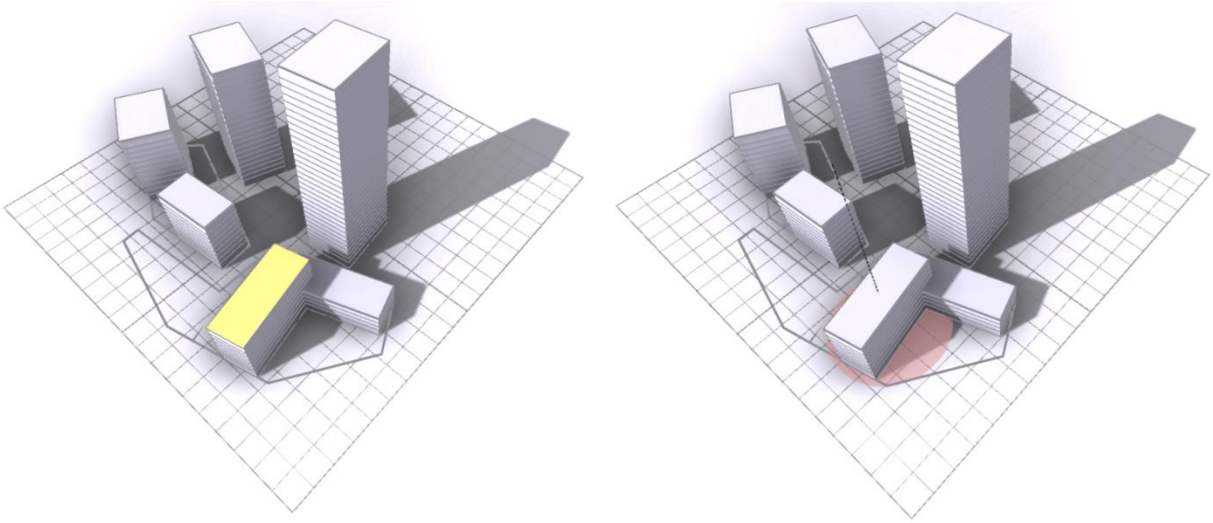
- Import a map from OpenStreetMap (see 3.4) or a DXF/FBX file (see 3.5)
- Click 'Create Site Boundary from Curves' on the Site toolbar.
- Hover the mouse over your required boundary line and click to select.
- Hit enter to confirm your selection.
- The boundary is set and displayed as a dashed red line.
- Only lines that form a closed loop can be selected as site boundaries.



4.2.1.3 Create a Site Boundary from Surfaces

- Import a map from either OpenStreetMap or a DXF/ FBX file (see 3.5)
- Click 'Create Site Boundary from Surfaces' on the Site toolbar.
- Hover the mouse over the required surface, this will be highlighted in yellow and click to select.
- A pink circle along with a vertical dashed line are guides which specify the height you want this site to be located. As you move the mouse up or down this will adjust, with exact numeric value shown on the side menu on your left.

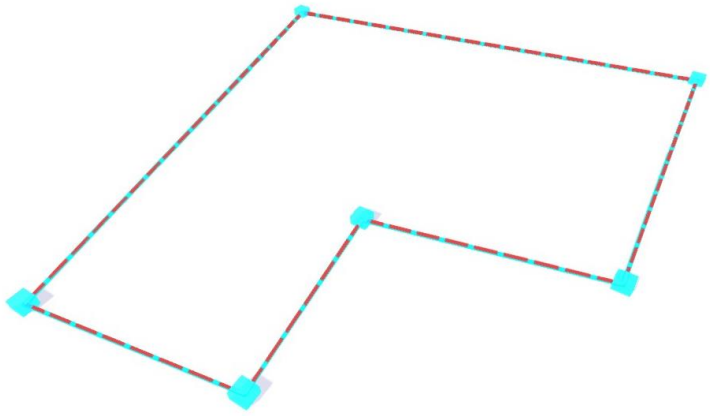
- Click when appropriate and the boundary is set and displayed as a dashed red polygon.



4.2.1.4 Editing Site Boundaries

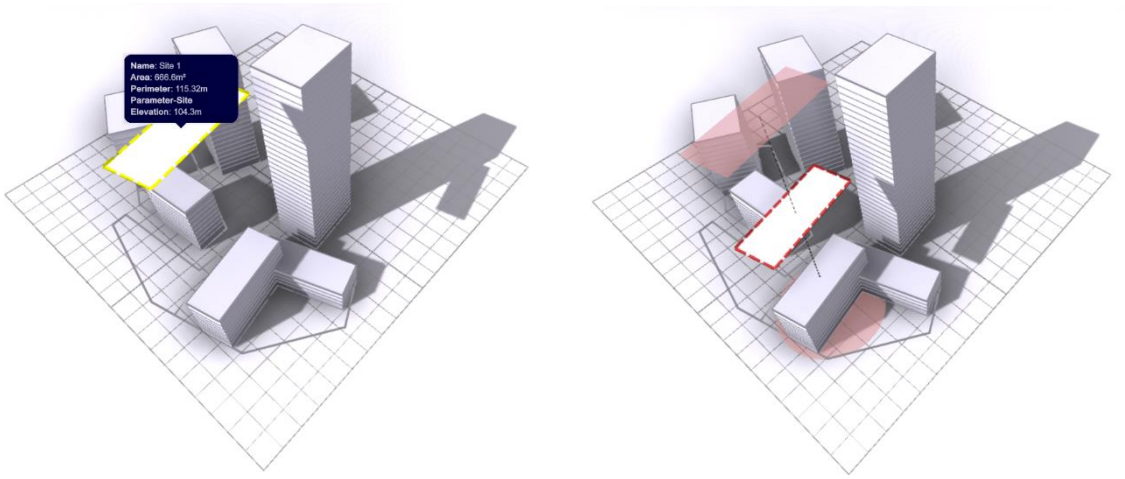
- Click 'Edit Site Boundary' on the Site toolbar.
- A bright blue box is displayed at each editable point of the boundaries.
- Click and drag any blue box to adjust the position of that point.
- Adjust all points as necessary then hit enter to close the tool.

Editable points indicated by blue boxes



4.2.1.5 Set Site Elevation

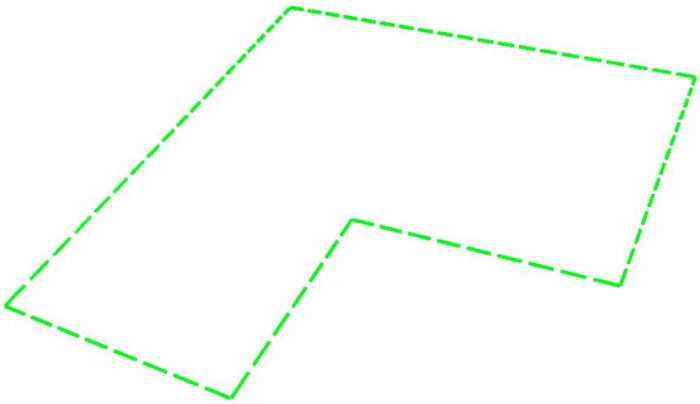
- Click 'Set Site Elevation' on the Site toolbar.
- You will then be able to hover over the site boundary you want to amend; this will be highlighted in yellow
- Hit enter or left mouse click and move the mouse to specify the correct elevation
- Hit enter to complete



4.2.1.6 Deleting Site Boundaries

- Click 'Delete Site Boundaries' on the Site toolbar.
- Select all the sites that you would like to delete. A site can be selected by clicking anywhere inside its boundary. The site boundary will turn green when selected.
- Hit enter to delete all the selected site boundaries.

Selected boundary highlighted in green



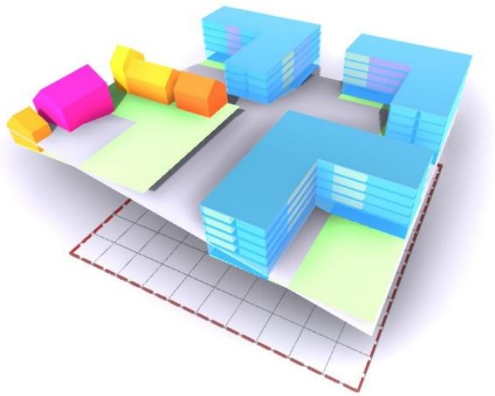
4.2.2 Site Topology

The default topology is a flat ground plane. Generating on more complex topology is possible although this feature is still in the experimental phase and may not always work as expected.

4.2.2.1 Adding a Topology Mesh

- Import a mesh using the Import DXF tool (see 3.5)
- Click 'Select Mesh Topology' on the Site toolbar
- Select the mesh that you have just imported. The mesh is outlined in green when selected

- Hit enter to finish selecting.
- A topology mesh will then be generated from your selected mesh.
- Run the generator (see section 5) to create a new massing which uses your imported topology.



4.2.3 Site Access Points

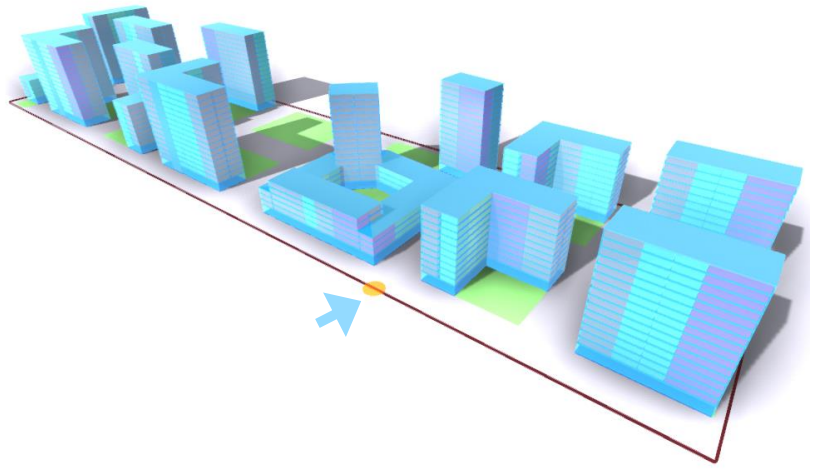
Potential access points can be marked on a site boundary. If no access points are added then the whole site boundary is assumed as accessible. If multiple access points are added, the generator might not utilise all of them.

4.2.3.1 Adding Access Points

- Click 'Add Access Point' on the Site toolbar.
- Click anywhere on the site boundary to mark an access point.
- Restart the generator or generate a quick idea to see the change (see 5.1)

Note: The generator will respect a at least one of the specified access points but not necessarily all of them, depending on other design conditions. This is especially noticeable when using access routes together with access points, since the routes will tend to override the points.

Site access point



4.2.3.2 Deleting Access Points

- Click 'Delete Access Points' on the Site toolbar
- Click to select any access points which are to be removed
- Access points are outlined in red when selected
- Hit enter to complete the tool and remove all selected access points

4.2.4 Height Limits

Height limits can be controlled by drawing height limit zones in the viewport or by setting an imported mesh as the height limit envelope. A global height limit can also be set in the input parameters sidebar (see 5.2). When multiple height controls are applied together, the generator will take the lowest limit for each area of the site.

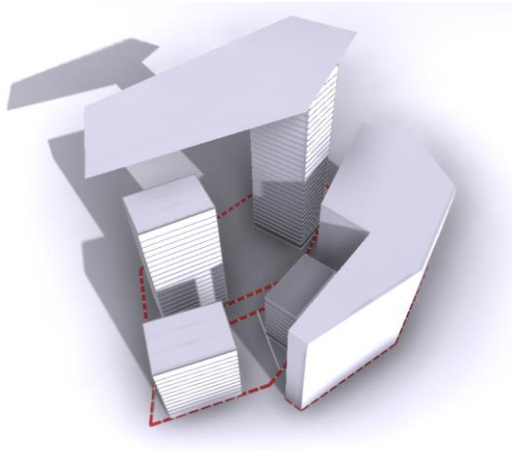
4.2.4.1 Select Height Limit Meshes

[a]

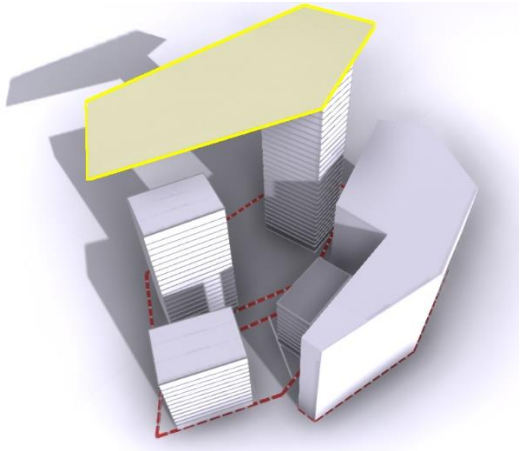
[b]

- Import a mesh using the 'Import DXF/ FBX' tools (see 3.5)
- There are two options to define a height limit mesh. Either you select a whole block using the first tool [a] or a part of it using the second one [b].
- Select the geometry. If this is a whole mesh, this needs to be hollow at the bottom so it can allow geometry to be generated inside the envelope.
- The height limit envelope will be displayed as a purple transparent mesh.
- Your imported mesh will also still be visible but can optionally be deleted using the 'Remove Geometry' tool (see 4.1)
- Click 'Apply Input Changes' to apply the new height limit to your model (see 5.2.4)

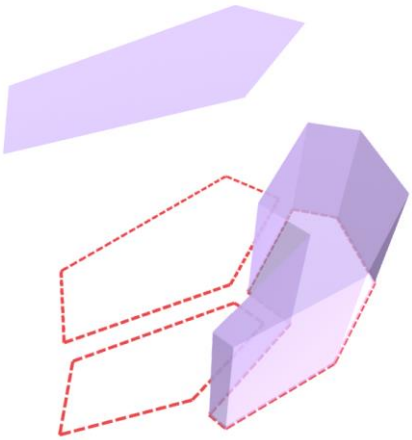
1 - Import mesh



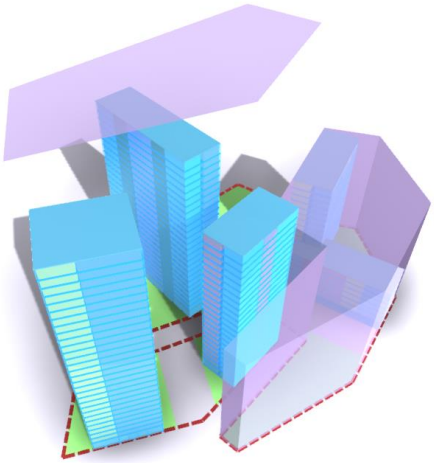
2 - Select mesh with height limit mesh tool



3 – Height limit applied to the model



4 – Generate geometry within the new constraints



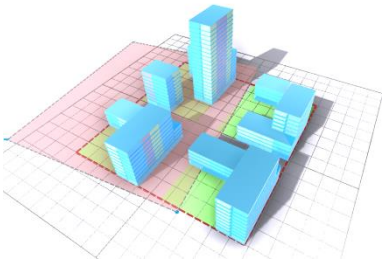
4.2.4.2 Delete Height Limit Mesh

- Click 'Delete Height Limit Mesh' on the Site toolbar
- Hover over the height limit mesh you want to delete
- Press return to complete

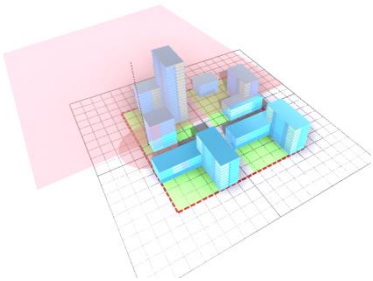
4.2.4.3 Drawing Height Limit Zones

- Click 'Draw Height Limit Zone' on the Site toolbar.
- Draw the shape of your height limit zone in plan.
- Hit enter or click on the first point to complete the drawing.
- Enter the height for this zone in the input box and click OK.
- The height limit zone will be displayed as a purple transparent plane.
- This tool can be used multiple times to create multiple height limit zones.
- Click 'Apply Input Changes' to apply the new height limit to your model (see 5.2.4)

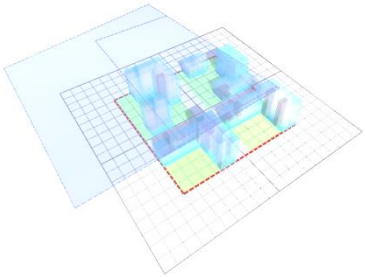
1 – Draw Height Limit Zone



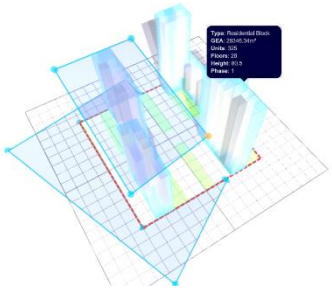
2 – Set the elevation



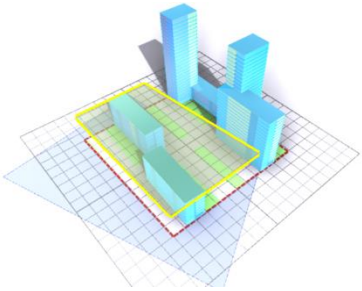
3 – The Height Limit Zone is set



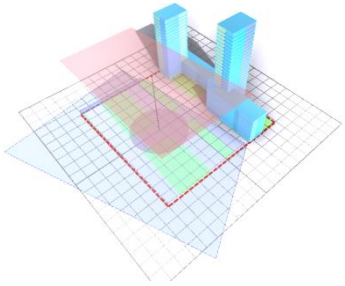
4 – Edit the shape



5 – Select to modify the elevation



6 – Adjust elevation to the right point



4.2.4.4 Editing Height Limit Zones

- Click 'Edit Height Limit Zones' on the Site toolbar
- This will reveal the control points of the geometry
- Click and drag to adjust the position of each point
- Adjust all points as necessary then hit enter or click the tool button to complete

4.2.4.5 Editing Height Limit Elevation

- Click 'Edit Height Limit Elevation on the Site toolbar
- Hover over an object and you will see them highlighted in yellow
- Select an object and start dragging to adjust to the right point
- Click enter or left mouse button to complete

4.2.4.6 Delete Height Limit Zone

- Click 'Delete Height Limit Zone on the Site toolbar
- Hover over the height limit zone you want to delete
- Press return to complete

4.2.4.7 Removing Height Limits

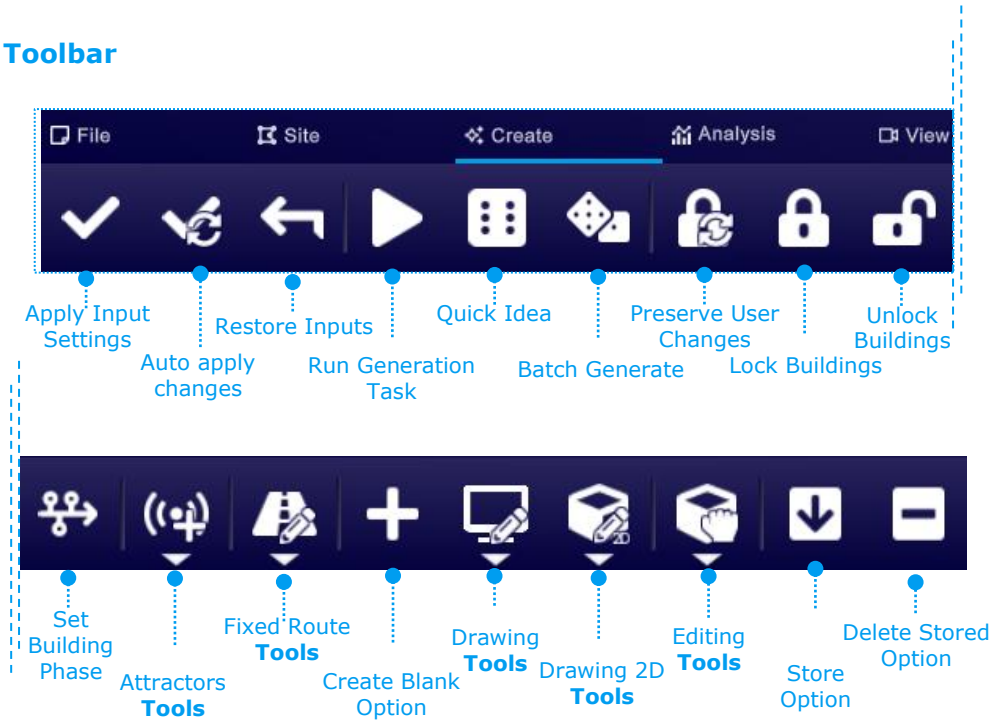
- Click 'Clear Height Limit Zones' on the Site toolbar.
- All height limit zones and meshes will be removed.

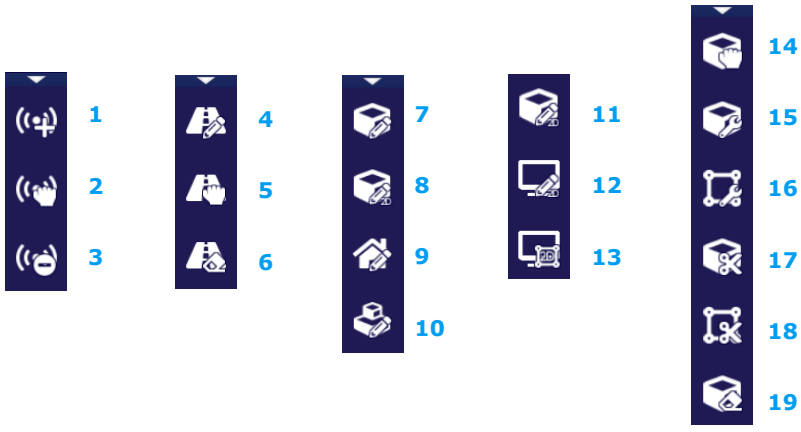
5. GENERATING BUILDING GEOMETRY

5.1 Generating Your First Model

To start generating design options, first switch to the Create toolbar

Create Toolbar





Attractor Points
1. Add Attractor
2. Edit Attractors
3. Clear Attractors

Fixed Routes
4. Draw Fixed Route
5. Edit Fixed Routes
6. Delete Fixed Routes

Drawing Tools
7. Draw Apartment Block
8. Draw Apartment Block 2D
9. Draw Housing Row
10. Draw Podium

Drawing Tools 2D
11. Draw Apartment Block 2D
12. Draw Office Linear 2D
13. Draw Office Boundary 2D

Editing Tools
14. Edit Blocks
15. Edit Block Spines
16. Edit Block Boundaries
17. Divide Apartment Block
18. Add Boundary Block Vertex Point
19. Delete Blocks

5.1.1 Quick Idea Generator

- Generate a randomised massing with minimal optimisation.
- This will generate a massing almost instantly to quickly start testing a site.

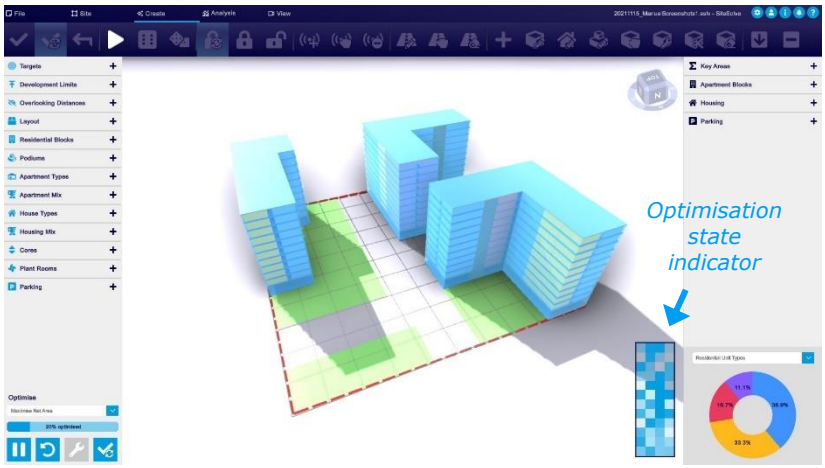
5.1.2 Batch Generate

- Generate a set of ten randomised massing models with minimal optimisation.
- Each massing will be automatically stored before the next one is generated.

Press escape or click the tool button again to interrupt batch generation.

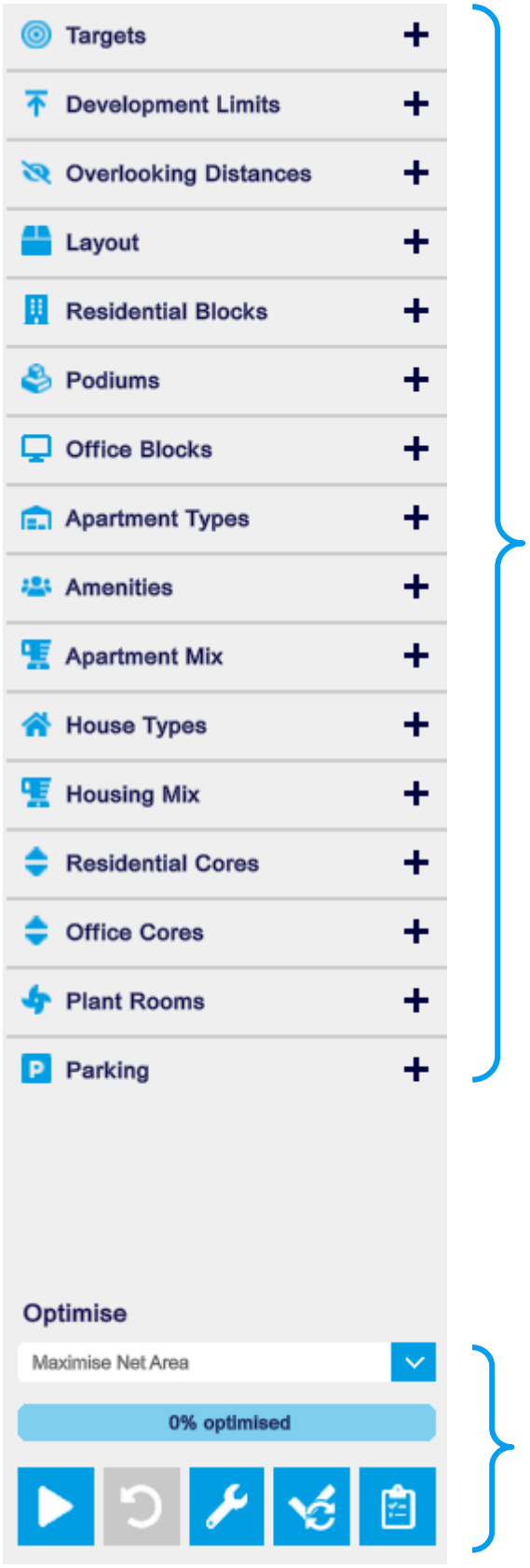
5.1.3 Design Optimising Generator

- Click 'Run Generation Task' on the Create toolbar to start an automatic design task.
- This will run through several design iterations to optimise the massing for the currently selected objective.



5.2 Generator Inputs

The inputs sidebar is displayed when the Create toolbar is selected:



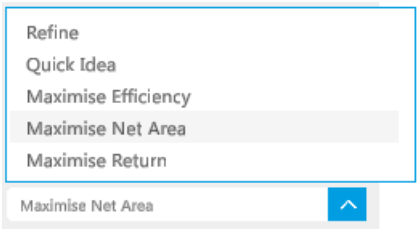
Optimisation Control Panel

- Design objectives selection.
- Create and edit the design objectives.
- Start, stop, restart optimisation runs.
- Enable/disable the auto-applying of input setting changes
- Create override settings

5.2.1 Importing Input Settings

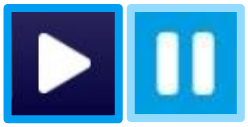
- Use this tool to import settings from another SiteSolve .sslv file.
- Click 'Import Input Settings' on the File toolbar.
- Select a SiteSolve .sslv file in the file dialog and click OK.

5.2.2 Auto Design Objectives



- Use the 'Auto Design' dropdown list to select one of the available design objectives.
- These objectives control which aspect of the design will be prioritised during optimisation.

5.2.3 Pausing an Optimisation Run



- To pause an optimisation run you can either click the 'Run Generation Task' button again or click the pause button in the optimisation control panel.
- Optimisation runs will automatically be paused whenever a change in the input settings is detected.

5.2.4 Applying Input Setting Changes

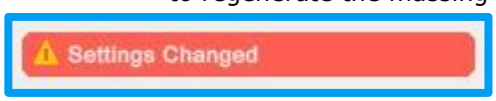
To see the effect of any input changes, those changes must be applied to a massing by regenerating it. This regeneration can be triggered manually or can be set to run automatically, after every input change. When applying changes, SiteSolve will produce a massing as close to the previous one as possible but may produce a very different result if major changes have been made to the inputs.

5.2.4.1 Auto Applying Changes

- Click the 'Auto Apply Changes' button in the optimisation controls or on the Create toolbar to toggle Auto Apply on or off.
- When auto-apply is enabled, any changes to the input settings will immediately be applied by regenerating the current massing.

5.2.4.2 Manually Applying Changes

- When Auto Apply is disabled an alert will be shown next to the optimisation controls when any settings have been changed but not yet applied.
- Click either the alert message or the 'Apply Changes' button on the Create toolbar, to regenerate the massing and apply the input changes.

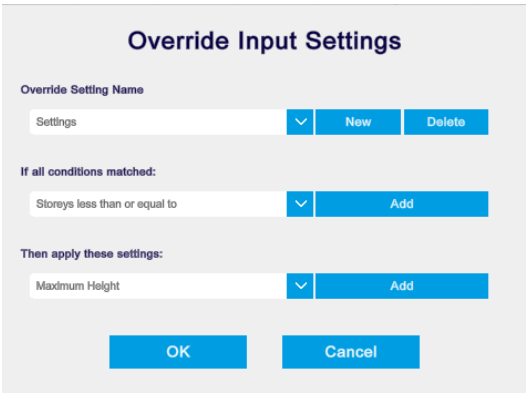


5.2.5 Restart the Current Optimisation Run

- Click the restart button in the optimisation control panel to restart the current optimisation process.
- This can be used to try optimising with the same input settings but from a new random starting point.

5.2.6 Create Override Settings

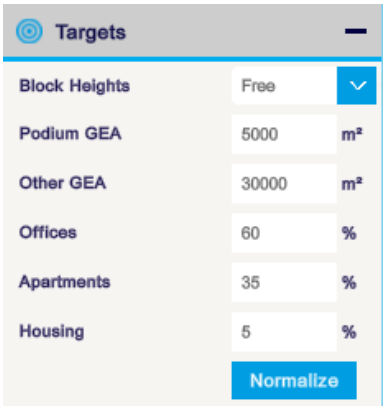
- Click the override input settings button at the optimisation control panel to create custom overrides when specific conditions are matched.



5.2.7 Restoring Input Changes

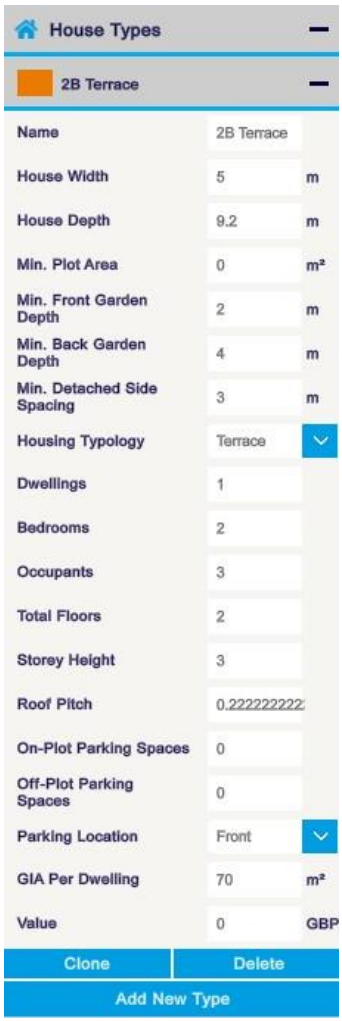
- Click 'Restore Inputs' on the Create toolbar to restore the input settings which were used to create the currently selected massing arrangement.

5.2.8 Set the Target Mix for building usage



SiteSolve has the ability to generate blocks assigned to different uses - Office, Residential & Housing.
Click the targets menu to set the proportional target mixture for the different building usage types, by floor area.
Click normalize to adjust the entries to total 100%.
Here, you can define the total target floor area for all types, as well as account for podium area.

5.2.9 Creating Housing and Apartment Types

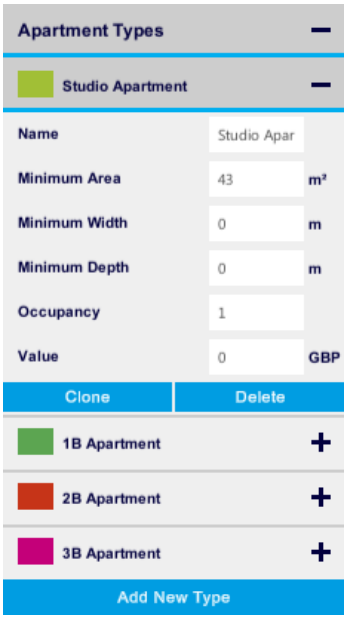


The House and Apartment Types can be edited via the inputs sidebar.

To add a new unit type use the 'Add New Type' button at the bottom of each house and apartment type list.

To edit the properties of a unit type, click the type name to expand the list of properties and controls.

To clone or delete a unit type, expand the properties list and click the relevant button at the bottom of the list.



5.2.10 Creating Housing and Apartment Mixes

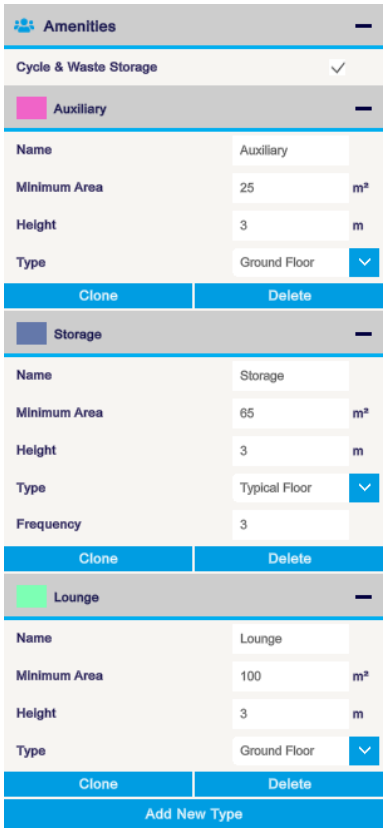
The mixes of housing and apartment types can each be adjusted via the inputs sidebar.

After entering your mix values you can click the percentage adjustment button [%] to adjust the total to 100%.

Unit types can be added to the mix by selecting them in the dropdown list and clicking 'Add'.

Types can be removed from the list by setting their percentage to zero and then clicking the percentage adjustment button.

5.2.11 Creating Amenity Types



- In a similar way as creating apartment and house types, custom amenity types can be set-up and then populated within apartment blocks
- Amenity types can be cloned or deleted, and new types can be further added by the user
- The amenity space is mainly an auxiliary space of any use that should be added through the generation either on ground floor or at a certain frequency across typical floors
- Cycle & Waste storage amenities are by default added as amenities on the ground floor of the apartment blocks. In case these are not needed there is a toggle to switch them on and off
- The properties each amenity type may carry are the following
    - *a name which identifies the space*
    - *a distinct colour*
    - *a minimum area per floor*
    - *a minimum height*

5.2.12 Attractor Points

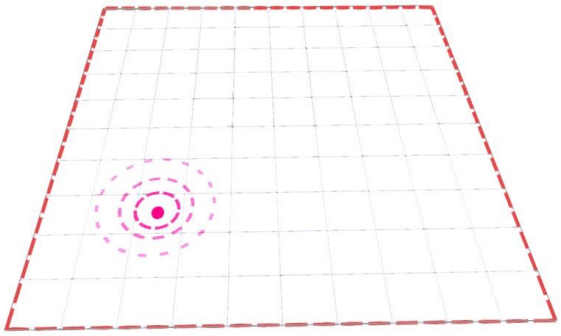
Attractor points can be used to define locations within a site where a particular input should be given a higher importance or weighting. For example, attractor points can be used to tell the generator at which points in a site it should favour creating housing rather than apartment blocks.

5.2.12.1 Adding Attractor Points

- Click 'Add Attractors' on the Create toolbar.
- Click in the viewport to set the position of your new attractor point.
- Select a type for the new attractor, from the Attractor Function dropdown menu.
- Click the OK button and your attractor point will now be displayed in the viewport.

Select attractor point function

Attractor point added to site



5.2.12.2 Removing Attractor Points

- To remove all attractor points, click ‘Clear Attractors’ on the Create toolbar.

5.2.12.3 Moving Attractor Points

- Click ‘Edit Attractors’ on the Create toolbar.
- A bright blue box is displayed at the centre of each attractor point.
- Click and drag a blue box to move an attractor point.

Hit enter to finish editing.

5.2.13 Fixed Site Routes

The following tools allow defining fixed routes through a site which SiteSolve will then include as an input when generating a massing.

5.2.13.1 Adding Fixed Routes

- Click ‘Draw Fixed Route’ on the Create toolbar.
- Click in the viewport to set the start point of your route.
- Click again to set any further points along the route.
- Hit enter to finish drawing.
- A line will be displayed to indicate the route you have added.

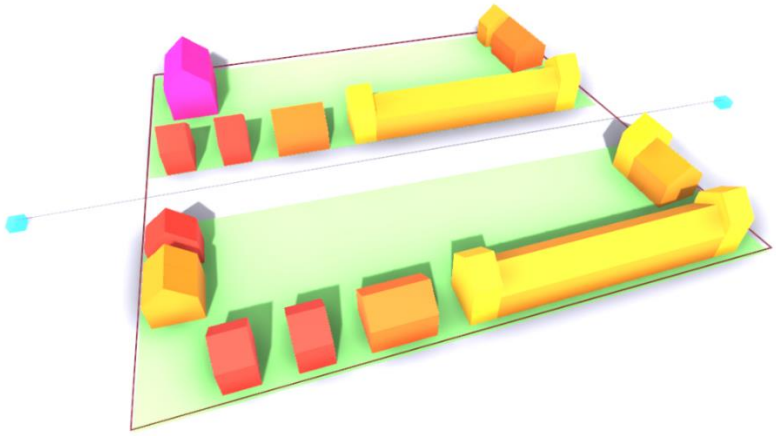
5.2.13.2 Deleting Fixed Routes

- To delete a route, click ‘Delete Fixed Routes’ on the Create toolbar.
- Click to select any routes which are to be removed.
- A route will be highlighted in green when selected.
- Hit enter to complete the tool and remove all selected routes.

5.2.13.3 Editing Fixed Routes

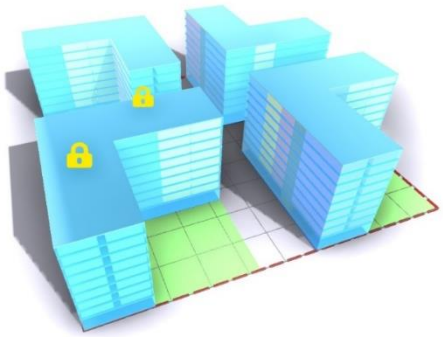
- Click 'Edit Fixed Route' on the Create toolbar.
- A bright blue box is displayed at each end of the route.
- Click and drag the blue box at either end to adjust the route.
- Hit enter to close the tool when done adjusting.

Adjustable route points indicated by blue boxes



5.3 Locking Buildings

The building locking feature allows you to specify parts of a massing to be preserved while SiteSolve continues to optimise the rest of the massing.



5.3.1.1 Lock

- Click the 'Lock Buildings' button on the Create toolbar.
- Click to select the buildings you would like to lock.
- Hit enter to finish selecting.
- Each selected building block should now have a lock icon displayed above it.

5.3.1.2 Unlock

- Click the 'Unlock Buildings' button on the Create toolbar.
- Click to select the buildings you would like to unlock.
- Hit enter to finish selecting.
- Each selected building should now have no lock icon displayed above it.

5.3.1.3 Toggle All Locks

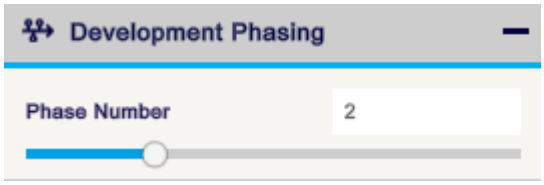
- Click 'Preserve User Changes' button on the Create toolbar to toggle building locks.
- When toggled on, SiteSolve will preserve any locked buildings during optimisation.
- When toggled off, all buildings will be treated as unlocked.

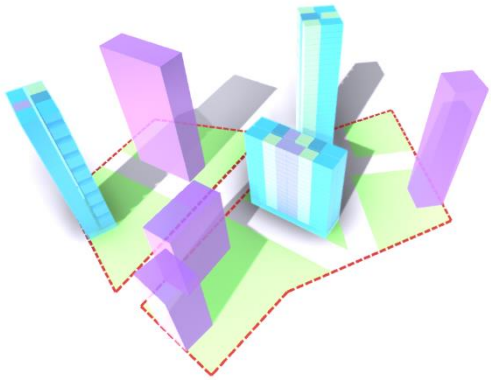
5.4 Set building development phases

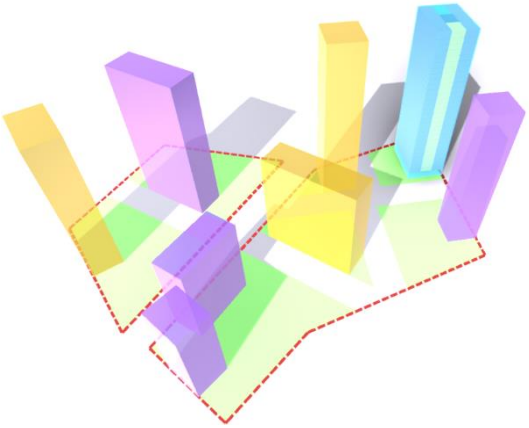
- Click 'Select building phase' on the Create toolbar.
- You will be asked to select buildings, hit enter and then a menu will show asking which phase these buildings belong to.

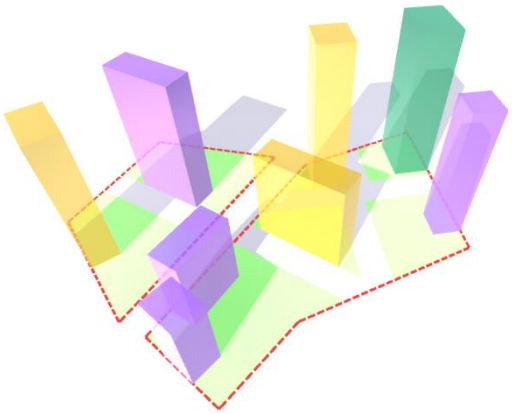
Set the development phase of the selection of buildings. Any blocks connected to the selection will also be set to the same phase.

- After assigning all the blocks you are now able to visualise the different development steps through the development phasing scroll bar on the output sidebar on your right









5.5 Outputs Sidebar

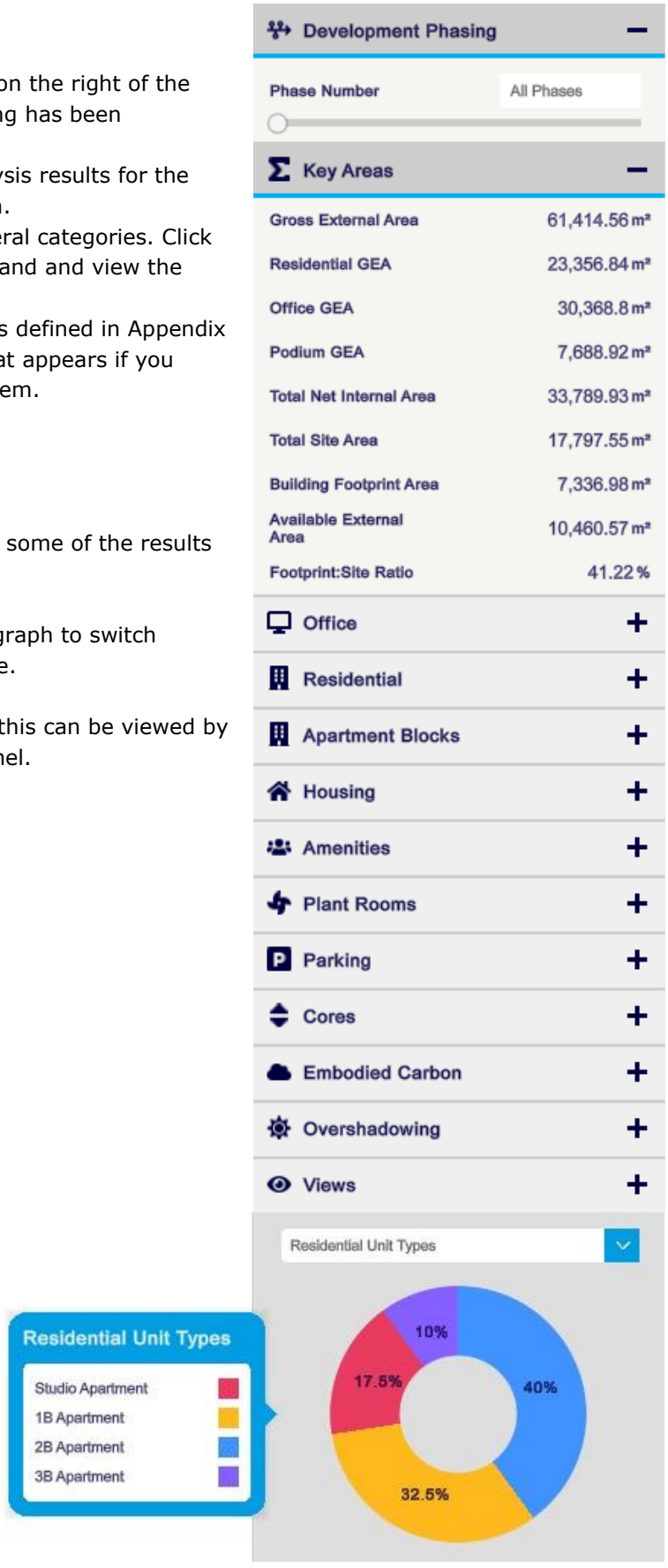
- The outputs sidebar is displayed on the right of the main screen after the first massing has been generated.
- It displays all the numerical analysis results for the currently selected massing option.
- The results are grouped into several categories. Click any of the group headings to expand and view the individual data items.
- A full description of each output is defined in Appendix 2 or can be seen in the tooltip that appears if you hover over the heading of each item.

5.5.1 Analysis Results Graph

The outputs sidebar can also display some of the results in a graph.

Use the dropdown menu above the graph to switch between the various graphs available.

Where the graph requires a legend, this can be viewed by hovering anywhere on the graph panel.



6. DRAWING & EDITING BUILDING GEOMETRY

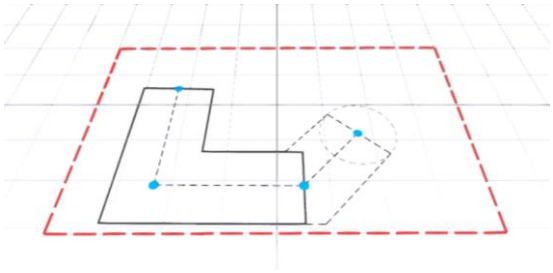
6.1 Create a Blank Massing Option

- Click 'Create Blank Option' on the Create toolbar to clear everything in the viewport as well as any stored design options. All input settings in the sidebar will be retained.

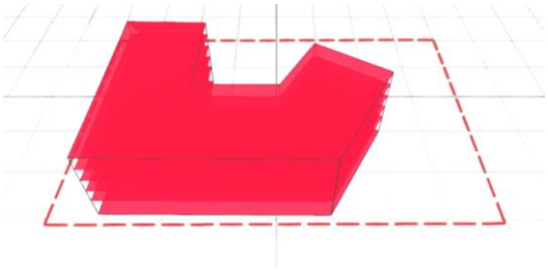
6.2 Drawing Apartment Blocks in 3D

- Click 'Draw Apartment Block' on the Create toolbar.
- Click in the viewport to set the starting point of a linear apartment building.
- Click at least once more in the viewport to draw the middle and end points of the building.
- Alternatively, you can type in a length for the current building segment and press space.
- Press Ctrl-Z to undo any points.
- Double-click or hit enter to finish drawing the building footprint.
- Move the mouse or type a number to set the number of floors in the new building.
- Click or hit enter to confirm the building height and complete the drawing.
- Extra settings such as corridor layout can be changed in the tool sidebar.

Draw the apartment building footprint

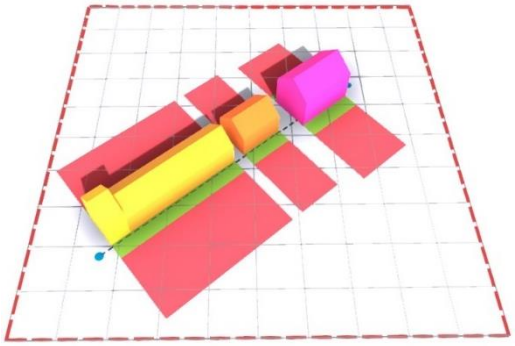


Set the building height



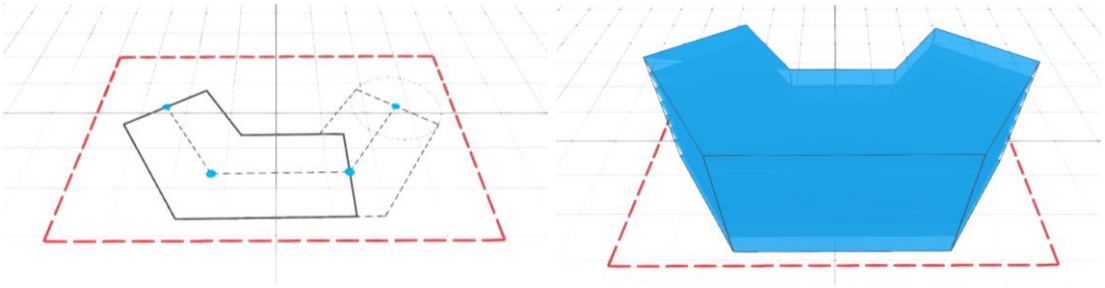
6.3 Drawing Housing Rows

- Click 'Draw Housing Row' on the Create toolbar.
- Click in the viewport to set the starting point of the housing row.
- Click again in the viewport to draw the end point of the row.
- Alternatively, you can use the keyboard to type in a length and hit enter.



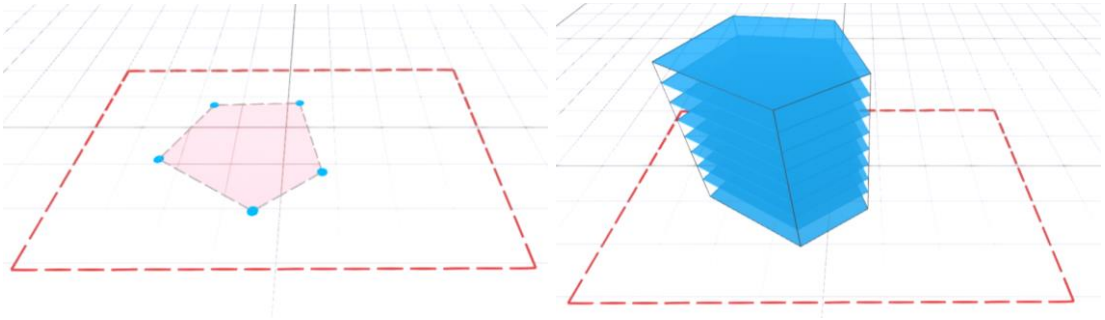
6.4 Drawing Office-Linear in 3D

- Click ‘Draw Linear Office Block’ on the Create toolbar.
- Draw the middle axis of the block as indicated in the preview.
- Double-click or hit enter to finish drawing the building footprint.
- Move the mouse or type a number to set the floors.
- Click or hit enter to confirm the building height and complete the drawing.
- Extra settings such as distance & number of levels can be changed in the tool sidebar.



6.5 Drawing Office-Perimeter in 3D

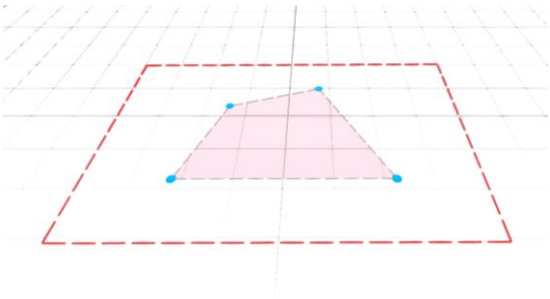
- Click ‘Draw Office Block Perimeter’ on the Create toolbar.
- You can draw a free shape to define the external façade line of the perimeter.
- Double-click or hit enter to finish drawing the building footprint.
- Move the mouse or type a number to set the floors.
- Click or hit enter to confirm the building height and complete the drawing.



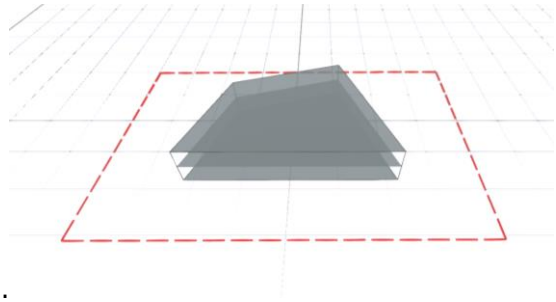
6.6 Drawing Podium Blocks

- Click ‘Draw Podium’ on the Create toolbar.
- Click in the viewport to draw the footprint shape of the new podium.
- Alternatively, you can type in the length of a podium edge and press space.
- Press Ctrl-Z to undo any points in your drawing.
- Complete the footprint by pressing enter or adding a final point at the drawing start point.
- Move the mouse or type a number to set the number of floors in the new podium.
- Click or hit enter to confirm the building height and complete the drawing.

Draw the footprint of the podium



Set the height of the podium



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6.7 Drawing Apartment Block in 2D

- Click 'Draw Apartment Block 2D' on the Create toolbar.
- Draw the footprint of the block through the axis-line in the middle
- Define any settings on the left sidebar
- Double-click or hit enter to complete.
- The generator will use this footprint to generate an apartment block in 3D.

6.8 Drawing Office-Linear in 2D

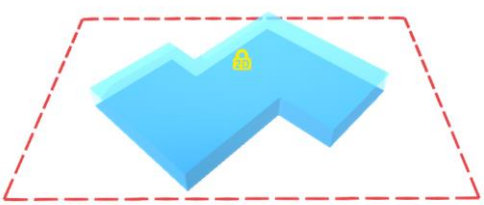
- Click 'Draw Office Linear 2D' on the Create toolbar.
- Draw the footprint of the block through the axis-line in the middle
- Define any settings on the left sidebar
- Double-click or hit enter to complete.
- The generator will use this footprint to generate an office block in 3D.

6.9 Drawing Office-Perimeter in 2D

- Click 'Draw Office Perimeter 2D' on the Create toolbar.
- Draw the footprint of the block by defining the boundary points.
- Define any settings on the left sidebar
- Double-click or hit enter to complete.
- The generator will use this footprint to generate an office block in 3D.

Drawing an apartment block in 2D

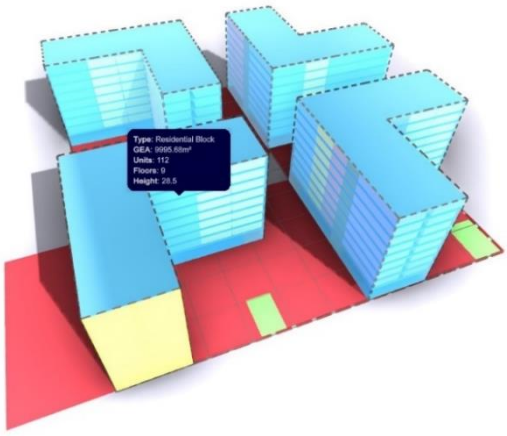
Drawing an office block in 2D

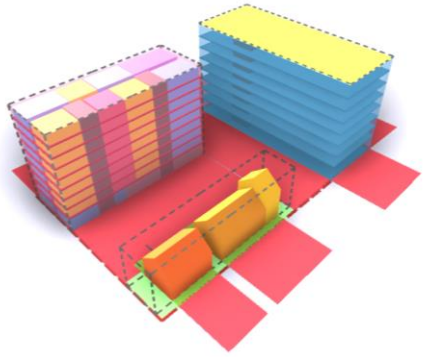


6.10 Editing Blocks

- Click 'Edit Blocks' on the Create toolbar to edit a building by pushing and pulling surfaces.
- A dashed outline will appear around any editable surfaces in the massing and these surfaces be highlighted in yellow when hovered.
- Click and hold any editable surface.

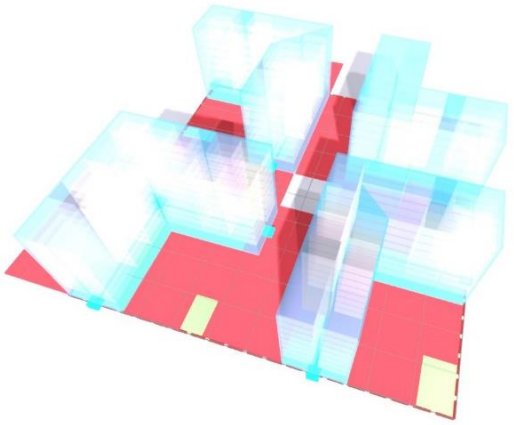
- Drag the mouse and release when the surface has been moved to the required position.
- Adjust all surfaces as needed then hit enter to finish editing.
- Hit the escape key at any time while editing to abort the tool and revert all changes.





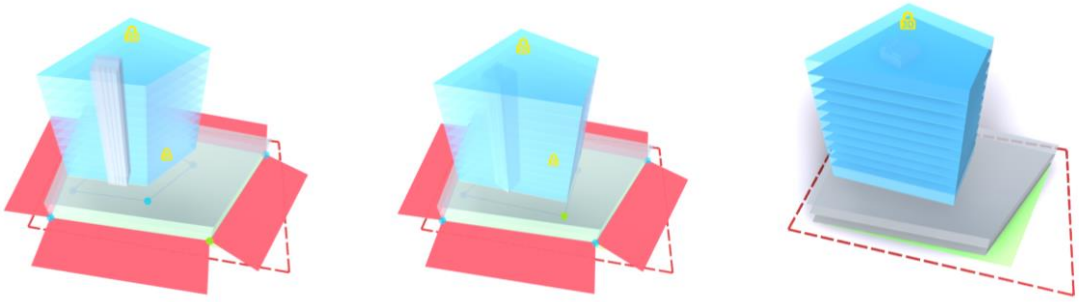
6.11 Editing Block Spines

- Click 'Edit Block Spines' on the Create toolbar to edit a building by adjusting its centre line.
- A bright blue box is displayed at each point along the building spine.
- Click and drag any of the blue boxes to adjust the spine.
- Hit enter to finish editing.



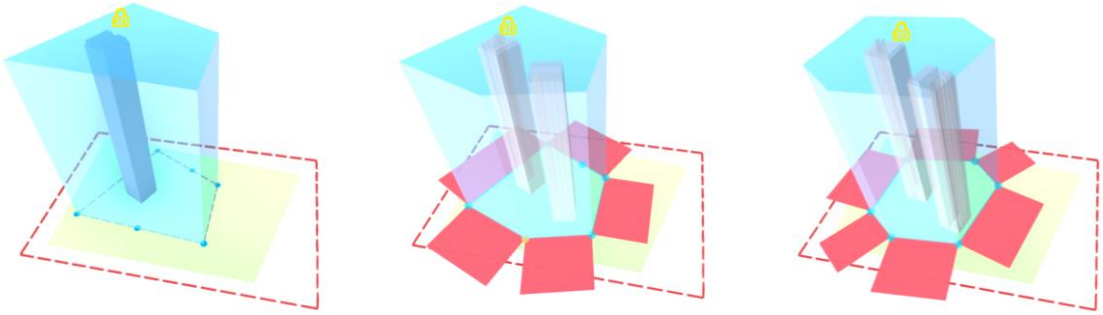
6.12 Editing Block Boundaries

- Click 'Edit Block Boundaries on the Create toolbar.
- The blocks which are defined through their perimeter shape, such as Office blocks and Podiums, can be edited through this tool by selecting and dragging the control points which define the boundary.
- Hit enter to accept any changed and finish editing.



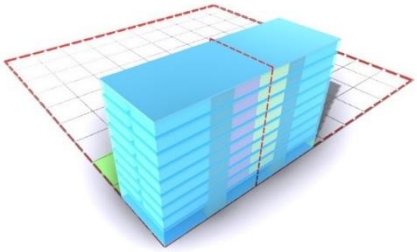
6.13 Add Boundary Block Vertex Point

- Click ‘Add Boundary Block Vertex Point’ on the Create toolbar.
- The blocks which are defined through their perimeter shape, such as Perimeter Office blocks and Podiums, can be edited through this tool by adding extra control points to define the boundary.
- Hit enter to accept any changed and finish editing.
- You can edit the boundary through the ‘Edit Boundary’ tool by modifying the positions of the points



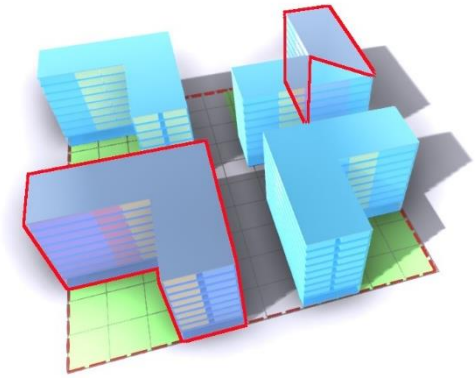
6.14 Splitting Apartment Blocks

- Click ‘Divide Apartment Block’ on the Create toolbar.
- Move the mouse over any apartment block until the dashed red line is at the point where you would like to split the block.
- Click the mouse or hit enter to complete the tool and apply the split to the block.



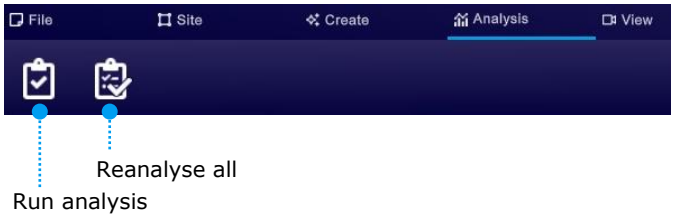
6.15 Deleting Building Blocks

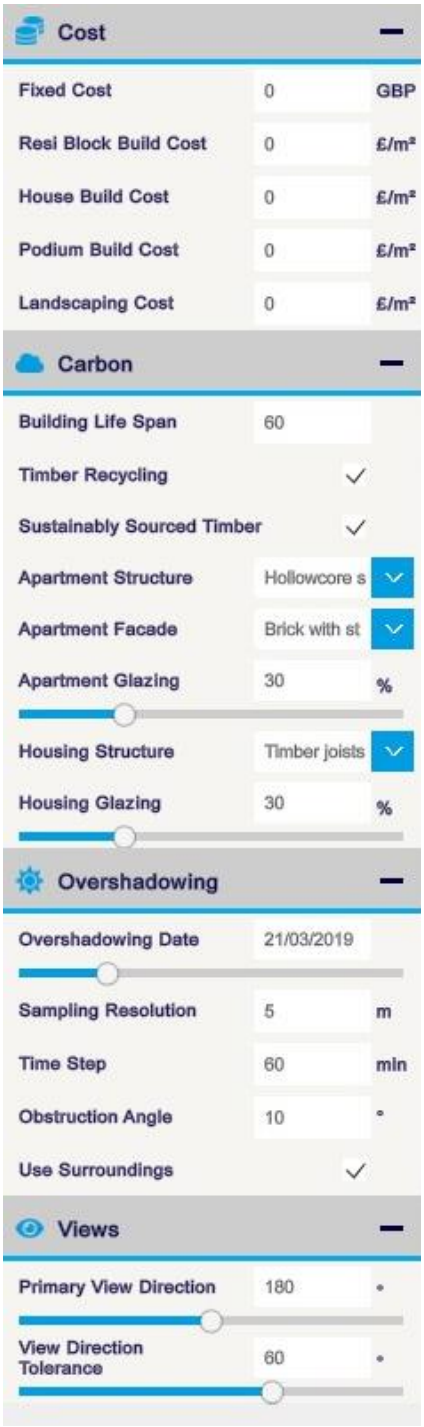
- To delete a block, click ‘Delete Blocks’ on the Create toolbar.
- Click to select any blocks which are to be removed.
- A block will be highlighted in red when selected.
- Hit enter to complete the tool and remove all selected blocks.



7. ANALYSIS OF MASSING OPTIONS

7.1 Analysis Toolbar





7.2 Analysis Settings Sidebar

The analysis settings sidebar is displayed when the Analysis toolbar is selected. It allows setting the input parameters for the various analyses that can be applied to each design options.

7.3 Run Analysis

Click the 'Run Analysis' button on the Analysis toolbar to refresh the analysis results for the currently selected design option.

7.4 Reanalyse All

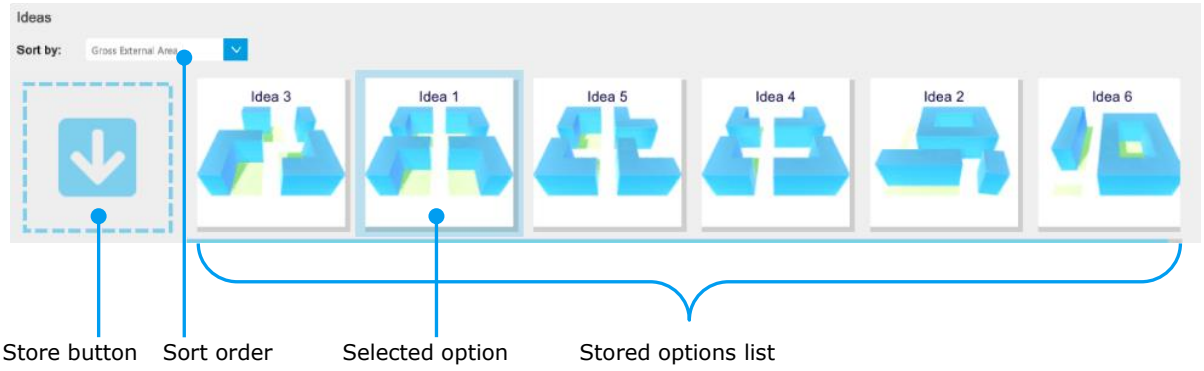
Click the 'Reanalyse All' button on the Analysis toolbar to refresh the analysis results for all design options in the current document.

8. STORING AND EXPORTING DATA

8.1 The Stored Options Toolbar

- The Stored Options toolbar allows storing a set of generated design options within each SiteSolve project, enabling you to quickly test different options and revert to previous ones.
- The Stored Options toolbar is displayed after the first option has been stored.

8.1.1 Storing Design Options



- After generating a design, click 'Store Option' on the Create toolbar.
- Alternatively, click the large Store button on the Stored Options toolbar.
- An icon of each stored option is displayed in a row on the toolbar.
- Click any stored option's icon to switch to that option.
- On switching to another option, any unstored changes in the current massing will be lost.

The stored options list can be sorted according to different priorities by selecting from the 'Sort by' dropdown list.

8.1.2 Deleting Design Options

- Select a stored option in the Stored Options bar.
- Click 'Delete Saved Options' on the Create toolbar.
- The selected option will be deleted.

-

8.2 Exporting Data

Alongside saving SiteSolve files, you can currently export 3D geometry of your generated design options in .dxf format, as well as the associated numerical data in .csv format. The export tools are found on the File toolbar.

8.2.1 Saving and Saving As

- To save your whole project as an *.sslv file, click either 'Save ' or 'Save As' tools on the File toolbar.
- Save tool will save the current state of the project in the existing file, overriding the previous state.
- Save As tool will always save the current project in a new file.
- Only **stored** design options and their settings will be saved.

If no design option has been stored yet, the current massing will be saved.

8.2.2 Exporting to DXF or FBX

- Click 'Export DXF' or 'Export FBX' on the File toolbar.
- Choose a location and click save.
- A DXF/ FBX file containing the current displayed massing will be exported.
- DXF/ FBX files can be imported by many CAD and BIM packages.

8.2.3 Exporting Key Design Data to CSV

Export a table in CSV format, containing key numerical data for each stored option in the current document.
Click 'Export CSV' on the File toolbar.
Choose a location and click save.
Import the saved CSV file into any spreadsheet software.

8.2.4 Exporting Dwelling Unit Data to CSV

- Export a table in CSV format, containing data on each individual dwelling unit in the currently selected design option.
- Click 'Export Units CSV' on the File toolbar.

Choose a location and click save.

- Import the saved CSV file into any spreadsheet software.

8.2.5 Exporting Import Settings to JSON

- Export the current input settings in a JSON format.

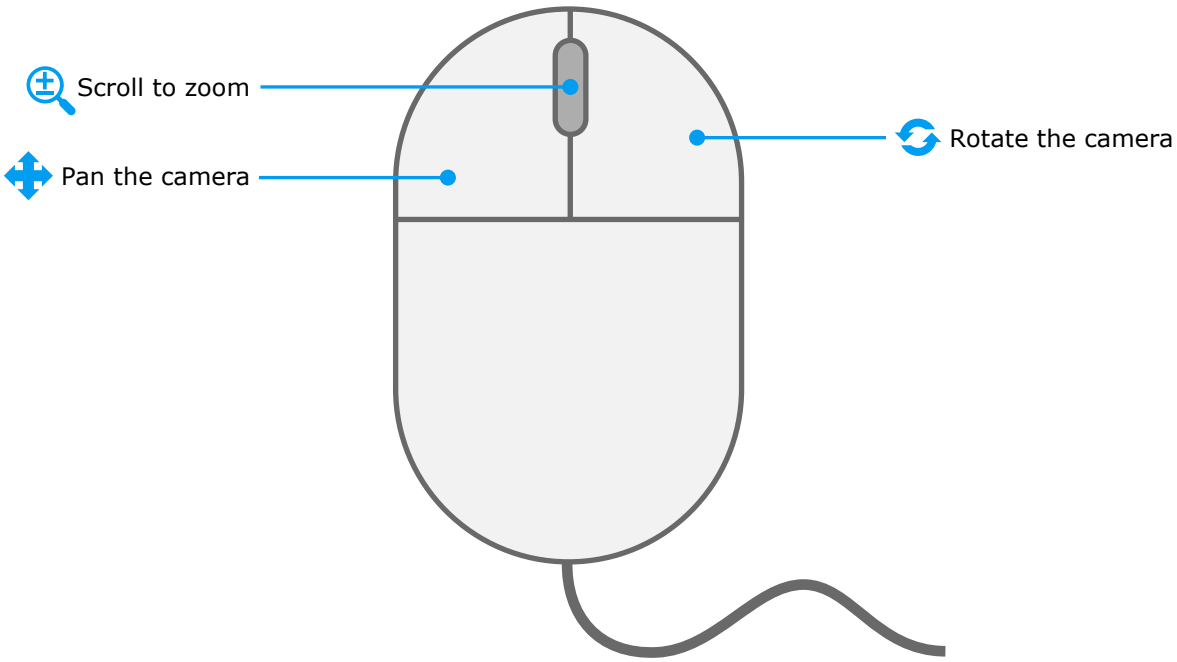
8.2.6 Exporting Data to Aprao

- Click 'Create a New Aprao Project'

A new browser window will open automatically, allowing you to log in to Aprao and view the new project which is created through data from you current project in SiteSolve.

9. VIEW CONTROLS

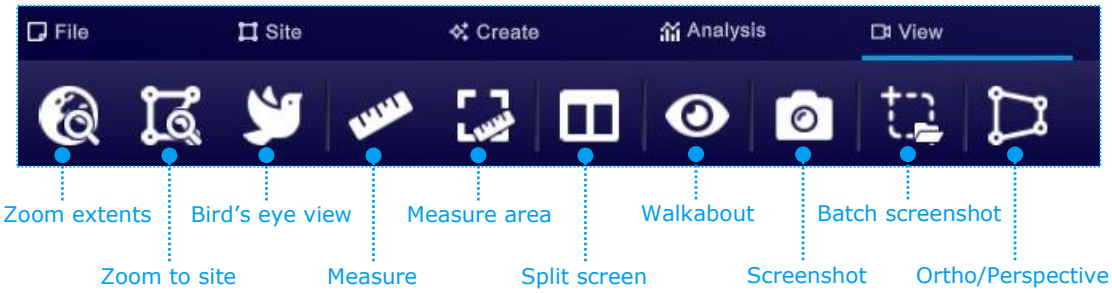
9.1 Basic Camera Controls



9.2 The View Cube

- The view cube provides a visual cue for the view orientation.
- It also provides a quick way to change the viewing angle.
- Clicking on any segment of the cube will align the view with that segment.

9.3 View Toolbar



9.3.1 Zoom Extents

Zoom extents will centre the camera on the site and zoom to fit the whole model in the viewport, including surrounding buildings.

9.3.2 Zoom to Site

Zoom to site will centre the camera on the site and zoom to fit the site boundary within the viewport.

9.3.3 Bird's Eye View

The bird's eye view tool will set the camera to a top/plan view.

9.3.4 Distance Measuring Tool

The distance measuring tool allows measuring the distance between 2 points on the ground plane by clicking in the viewport.

9.3.5 Area Measuring Tool

The area measuring tool allows measuring the area of a space by drawing around that space on the ground plane in the viewport.

9.3.6 Split Screen View

Split screen view allows viewing the model with 2 viewports side by side.

9.3.7 Walkabout mode

Walkabout mode allows you to view the model at eye level and to walk around the model using the arrow keys. Press the escape key to exit walkabout mode.

9.3.8 Single Screenshot

The screenshot tool captures an image of the viewport and then opens a file dialog, allowing you to choose a save location for the screenshot image. The screenshot is saved as a PNG file.

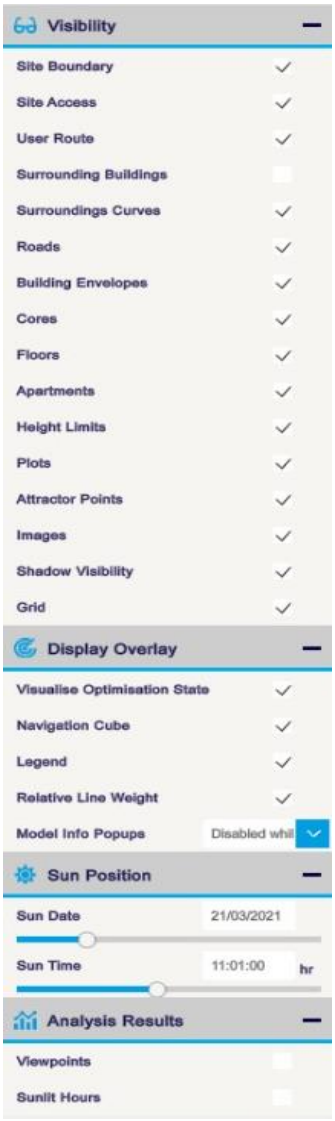
9.3.9 Batch Screenshot

The batch screenshot tool allows you to select a folder and to generate a screenshot for each SiteSolve SSLV file that is located in that folder. Each screenshot is saved as a PNG image file.

9.3.10 Orthographic and Perspective View

The Ortho/Perspective button allows toggling the viewport between perspective view and orthographic projection.

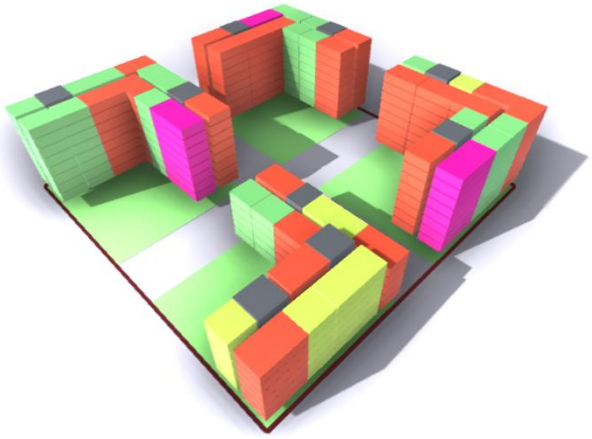
9.4 View Settings Sidebar



- The View sidebar is displayed when the View toolbar is selected.
- View settings are grouped into Visibility, HUD and Sun Position.
- Click each group heading to expand and view the options.

9.4.1 Visibility Settings

Control the visibility of each component of the massing model. For example, hide the building floors and envelopes to get a clear view of the apartment units:



9.4.2 HUD Settings

Control the visibility of the user interface components.

9.4.3 Sun Position

Control the sun position by setting the date and time.

9.4.4 Analysis Results

Show or hide the analysis results displayed in the viewport.

APPENDIX 1
INPUT PARAMETER DESCRIPTIONS

Targets

Block Heights
Select the approach taken to determining the heights of block building typologies

Other GEA
The total target floor area for all building types other than podiums, enclosed by the outermost façade line. Used only when the Block Heights approach is Target, Limit or Free Under Limit

Podium GEA
The total floor area of all podiums enclosed by the outermost façade line.

Offices
The proportional target mixture for offices, by floor area.

Apartments
The proportional target mixture for residential apartment blocks, by floor area.

Housing
The proportional target mixture for housing, by floor area.
Click 'Normalise' to adjust all entries to total 100%.

Development Limits

Maximum Height
The maximum height of building allowed across any of the sites.

Maximum Storeys
The maximum allowable number of storeys.

External Space Requirement
The proportion of the site (as a percentage) which should be reserved as external space and may not have buildings placed upon it.

Overlooking Distances

Front Spacing
The minimum spacing between block 'fronts' over publicly accessible areas. Used to determine the spacing between blocks on different sub-plots.

Back Spacing
The minimum spacing between block 'backs' over private areas. Used to determine the spacing between blocks on the same sub-plot.

Overlooking Tolerance
Adjoining blocks are permitted to intrude within overlooking zones provided the surface tangent is within this angle of the window normal. This models the fact that there are unlikely to be privacy concerns if facing windows are at an oblique enough angle and allows for complete blocks that are not perfectly orthogonal. Set to 0 to disable.

Layout

Maximum Plot Edge Length
The maximum length of a contiguous side of a subplot.
Limits the length of a contiguous block. Used during secondary site sub-division.

Site Edge Set-back
The minimum distance on plan to set-back buildings from the site boundary.

Maximum Block Count
The maximum number of blocks the generator is allowed to place.

Road Width
The minimum width of access roads. The spacing between block fronts will be the greater of this and the overlooking distance.

Residential Blocks
Allowable Block Typologies
Select which block plan typologies should be included and which should be filtered from the generated massing.

Aspect Ratio
The maximum allowable ratio of building height to building depth. This limit only applies to linear apartment buildings and not to residential towers. Set to 0 to disable.

Free Ground Floor Space
The free space required per core on the ground floor to accommodate other uses.

Storey Height
The typical floor-floor storey height.

First Storey Height
The floor-floor height of the storey at ground floor.

Last Storey Height
The floor-floor height of the last storey of the building.

Minimum Storeys
The minimum number of storeys that should typically be generated. Note that fewer storeys than this may be generated where the height limit does not allow for taller buildings.

Apartment Depth
The typical apartment depth

Use Type Depths
If checked, the depths set in each apartment type will be used as the target depths, rather than the global apartment depth setting.

Facade Zone Depth
The assumed depth of the facade zone.

Corridor Width
The clear width of corridors within residential blocks.

Corridor Wall Thickness

The thickness of the walls between corridors and apartments.

Partition Wall Thickness
The thickness of partition walls between different apartments.

Corridor Loading
Controls the permissible arrangements for residential blocks, and whether corridors may be doubleloaded (apartments on both sides), singleloaded (apartments on only one side) or both (in which case double-loaded arrangements will be preferred and single-loaded blocks produced only where these will not fit).

Allow Over-Sized Apartments
If checked, apartments are allowed to expand beyond their minimum required dimensions to fill any extra available space.

Exclude Apartments from Ground Floor
If checked, the ground floor of residential buildings will be kept clear of apartments to leave space for access lobbys, plant rooms, cycle and bin storage, etc. It is not recommended to allow apartments on ground floor unless you are certain these requirements can be provided for elsewhere.

Podiums
Podium Storey Height
The height of each storey in a podium block.

Max Podium Storeys
The maximum number of floors allowed in each podium.

Office Blocks
Allowable Block Typologies
Select which block plan typologies should be included and which should be filtered from the generated massing.

Office Façade zone depth
The assumed depth of the façade zone.

Office Minimum Width
The minimum width of an office block. This will be used as the width for offices drawn by their spine.

First Floor Height
The floor-floor height of the storey at ground floor.

Last Floor Height
The floor-floor height of the last storey of the building.

Floor Height
The typical floor-floor storey height.

Net To Gross Percentage
The net to gross factor to calculate NIA.

Utilisation Factor
Various studies have shown that in many office buildings it is unlikely that all the total population is present on any one day. Where this is known to be the case the building population to be used in a design can be reduced by 10–20% (utilisation of 80–90%) to account for persons working at home; on holiday; sickness; persons away on company business; vacant posts; hot-desking, etc.

Occupancy Density
The workplace density to be assumed for the target office layout.

Exclude Office Space from Ground Floor
If checked, the ground floor of office buildings will be reserved to allow space for access lobbys, plant rooms, cycle and bin storage, etc.

Price per m^2(NIA)
The value per sqm of Net Internal Area for office blocks.

Residential Cores
Core-End Distance Option
The way in which the distance should be measured from the core to the end of blocks. Used to adapt core spacing logic to the requirements of different fire codes.

Core-End Spacing
The maximum distance between a core and the end of a block along a corridor.
This is typically driven by fire safety requirements and it is recommended to consult with a fire safety expert before adjusting this value.

Core-Core Spacing
The maximum distance between two cores along a corridor. This is typically driven by fire safety r equirements and it is recommended to consult with a fire safety expert before adjusting this value.

Maximum # Apartments Per Core
The maximum number of apartments typically allowed to be served by a single core.

Min Apts Per Core
The minimum number of apartments typically allowed to be served by a single core.

Stair Width
The width of the stair flight.

Stair Riser
The required step height.

Stair Going
The required tread depth.

Lift Lobby Width
The width of the lift lobby.

Office Cores

Max travel distance in one direction
The maximum allowed escape-distance for one direction.

Max travel distance in more than one direction
The maximum allowed escape-distance when there is more than one route.

Stair Width
The width of the stair flight.

Stair Riser
The required step height.

Stair Going
The required tread depth.

Lift Lobby Width
The width of the lift lobby.

Plant Rooms

Ground-Floor plant rooms toggle
SiteSolve by default calculates and reserves space for all necessary MEP spaces on the ground floor of the residential blocks. These include intake auxiliary rooms, water tank-rooms, electric and heating substations. The user has the ability to toggle this feature off.

Centralised Heating
The option of a centralised heating strategy calculates one space to accommodate multiple buildings.

Individual Sprinkler Tank
The option of an individual sprinkler tank reserves separate space for the fire strategy. If this toggle is off the amount of water needed for sprinkler use is stored in a mixed-use tank.

Heating Type
Energy requirements and the allocation of the necessary MEP space are dependent on the heating strategy. This could vary; it could be exclusively electric, use boilers or a combination of boilers and air-source heat pumps.

Parking

Spaces per Apartment
The number of parking spaces required for each apartment. This may be less than 1 (i.e. 0.1 equates to 1 space for every 10 apartments).

Additional Spaces Required
The number of parking spaces required regardless of numbers of apartments.

Parking Space Area
The area allowed for each parking space. Note that this should include an allowance for access circulation to reach the space as well as the dimensions of the space itself.

APPENDIX 2
ANALYSIS PARAMETER DESCRIPTIONS

Cost

Fixed Cost
The overall fixed costs of the development.

Resi Block Build Cost
The build cost per m² for residential blocks.

House Build Cost
The build cost per m² for housing.

Office Block Build Cost
The build cost per m² for offices.

Podium Build Cost
The build cost per m² for podiums.

Landscaping Cost
The cost per m² for external landscaping.

Carbon

Building Life Span
Total life span of the development in years. This is used to estimate operational carbon emissions.

Apartment Structure
The primary superstructure type for apartment blocks.

Apartment Facade
The solid façade type for apartment blocks.

Apartment Glazing Percentage
The amount of transparent glazed apartment façade as a percentage of the whole façade.

Housing Structure
The primary superstructure type for housing.

Housing Glazing Percentage
The amount of transparent glazed housing façade as a percentage of the whole façade.

Overshadowing

Overshadowing Date
The day of the year for which overshadowing of external areas should be checked. For the UK, BRE209 specifies 21st March be used, however different dates may be applicable in different regions and under different guidance.

Sampling Resolution
The distance between adjacent sample points when measuring external overshadowing. A smaller distance will give more accurate results but cause the analysis to take longer.

Time Step

The time-step between overshadowing measurements. A smaller time-step will produce more accurate results, however the analysis will take longer to perform.

Obstruction Angle
The minimum angle above the horizon below which the sun is considered to be obscured. Use to account for the obscuring effects of terrain and surrounding vegetation, buildings which are not explicitly modelled, etc.

Use Surroundings
If checked, imported 3D surrounding geometry will be considered to obscure sunlight. If the surrounding geometry contains 'heavy' overly detailed mesh geometry with lots of faces this may impact the speed of analysis significantly.

Views
Primary View Direction
The primary direction of desirable views for the site, expressed as a bearing angle clockwise from North.

View Direction Tolerance
The maximum allowable angle between the normal of an assumed window location and the target view direction.

APPENDIX 3
OUTPUT PARAMETER DESCRIPTIONS

Key Areas

Gross External Area
The total floor area of all buildings enclosed by the outermost facade line

Residential GEA
The Gross External Area for residential use

Office GEA
The Gross External Area for office use

Podium GEA
The Gross External Area for podium use

Total Net Internal Area
The total net internal area for apartment blocks, offices and housing.

Total Site Area
The total area on plan of all the regions enclosed by a site boundary.

Building Footprint Area
The total area on plan covered by building mass. Might also be taken as the total ground floor area or roof area.

Available External Area
The total area on plan within the site boundary which is not covered by building mass.

Footprint : Site Ratio
The ratio of the total plan area covered by building mass to the total plan area enclosed by the site boundary.

Office

Gross Internal Area
The total floor area of all office buildings enclosed by the innermost line of the facade zone

Net Internal Area
The total internal floor area of offices. This excludes cores, structure and toilets.

Façade Area
The total surface area of the vertical external faces of the buildings.

Available GF Area
The available internal area on the ground floor.

Total Headcount
The total number of people working in all office blocks at any given time.

Residential

Gross Internal Area
The total floor area of all residential buildings enclosed by the innermost line of the facade zone

Net Internal Area
The total internal floor area of apartments and houses.

Net-To-Gross
The overall ratio of Net Internal Area to Gross Internal Area. A measure of the spatial efficiency of the building. Podiums are included in the gross internal area in this ratio.

Total Residential Units
The total number of residential units in both apartment blocks and houses.

Apartment Blocks
Total Apartments
The total number of apartments of all types in all buildings

North-Facing
Number of apartments which have windows facing only to the north (i.e. in the Northern Hemisphere, facing away from the primary sun direction).

South-Facing
Number of apartments which have at least one possible window location facing south (i.e. in the Northern Hemisphere, facing towards the primary sun direction).

Dual-Aspect
Number of apartments which may potentially have windows on two or more walls, facing in different directions.

Total Population
The total number of people who may be accomodated within the residential buildings on site.

Net Area (Apartments)
The total internal floor area of all apartments, exluding common areas and party walls between apartments. Equates to the Net Internal Area for residential blocks.

Required Lettable Area
The floor area required to accomodate the current total number of apartments if all were at their minimum dimensions.

Excess Lettable Area
The total floor area of all apartments beyond that required by their minimum dimensions. Toggle off 'Allow OverSized Apartments' to force all apartments to conform to their minimum dimensions and reduce this to 0.

Net-To-Gross (Typical)
The ratio of Net Internal Area to Gross Internal Area on typical floors only. Excludes ground floors and floors with interstitial plant rooms.

Façade Area
The total surface area of the vertical external faces of all buildings.

Available GF Area
The available internal area on the ground floor.

Housing

Net Area (Houses)

"The total internal floor area of all houses.

Amenities

Total Area

The total area of amenities listed for each type

Plant Rooms

Assigned Area

The total area which is currently accommodated on the ground floor of the apartment blocks

Required Area

The ideal target total area needed for ground floor plant rooms. Following the integrated MEP analysis SiteSolve computes the estimated total area that is expected to be reserved for ground floor.

Water Tank Rooms/ Electric / Heating/ Auxiliary/ Supportive

The assigned designated total area per plantroom type

Interstitial Plants

The assigned designated total area for interstitial plants, located on intermediate floors across the building height.

Parking

Spaces Required

The total number of parking spaces required.

Parking Area Estimate

An estimate of the total area required to accomodate all necessary parking spaces on the site.

Cores

Number of Cores

The total number of separate cores in each building.

Total Core Area

The total plan area of all regions designated as cores.

Total Number of Lifts

The total number of lifts in all cores.

Unallocated area in office cores

The unallocated functional space to be assumed for auxiliary use.

Embodied Carbon

Upfront CO2e/m2

Embodied carbon emissions up to practical completion of construction (EN 15978 stages A1-A5). This figure does not include foundations. It does include estimates for superstructure, facade, MEP systems, internal walls and finishes.

Overshadowing

Suitable Amenity Area

External area of the site receiving the recommended sunlight exposure to be suitable for use as part of amenity areas such as gardens, parks, playgrounds etc. Note that this is the total area meeting this criteria and does not consider alternate uses of the space such as required roads or parking areas.

Average Exposure

The average daily sunlight exposure hours across the site.

Views

Units with Primary Views

The total number of apartments and housing units which have unobstructed views to the edge of the site in the designated primary view direction.

Financial Appraisal

Total Cost

The total cost of the development.

Residential Block Value

The total value of all apartments.

House Value

The total value of all houses.

Total Value

The total capitalised value of the development.

Total Return

The total return of the development.

APPENDIX 4
CARBON CALCULATOR LIMITATIONS

The carbon calculator is currently intended for comparing between design options to see the potential impact of design changes, rather than for precisely calculating the carbon footprint of a design.

The calculation covers embodied carbon emissions up to practical completion of construction (EN 15978 stages A1-A5). It does not include foundations but does include estimates for:

- Superstructure
  - Estimated by floor area based on LCA of existing structure designs up to 30 storeys
- MEP systems
  - Estimated by floor area based on LCA of existing designs
  - Includes heating, A/C, ventilation, electricals, water supply and sewage
- Façade
- Floor and ceiling finishes
- Internal party walls and doors

EN 15978 stages:

- Module A1-A3: Raw material supply, transport, processing and manufacturing
- Module A4: Transport from manufacturer to site
- Module A5: Construction process

Data sources:

- ICE database v3.0
- One Click LCA
- RICS whole life carbon assessment 2017
- IStructE - How to Calculate Embodied Carbon
- Wood for Good Lifecycle Database 2013
- BRE Meeting Construction 2025 Targets
- Rider Levett Bucknall - Riders Digest 2019
- ÖKOBAUDAT database