USER GUIDE

BRIGHTBOX SOFTWARE

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Introduction

MudShark is the next generation earthworks estimating software, that is simple enough for anyone to start using while including many powerful and purpose-driven features.

Using this Guide

The content of this guide has been designed so it can be read from cover to cover or skip to individual sections of interest.

After reading this guide, you should be able to:

- Understand the recommended workflow of using MudShark
- Confidently interact with the MudShark user interface
- Manage your MudShark projects and plans
- Takeoff contours, spot elevations, and structures quickly and accurately
- Manipulate and reuse materials
- Calculate and understand the results of a project
- Produce and interact with 3D and 4D models of your site
- Produce detailed reports of stripping, cut, fill, respread and structure volumes

Other ways to learn

Although the User Guide is a great source of information to use MudShark, we know everyone learns differently, and we have many methods to empowering our users.

Some of our other channels of learning and information include:

- Our YouTube channel
- Our Knowledge Centre
- Direct training

Sample Project

We provide a sample project for you to interact with, to help you get familiar with MudShark.

To open the sample project:

1. Click **Project**, at the top right of the ribbon.
2. Click **Import Project**
3. From the Import Project window, navigate to: **Program Files\BrightBox\MudShark x64\Samples**
4. Select **HillTopHouse.bbx**
5. Click **Open**

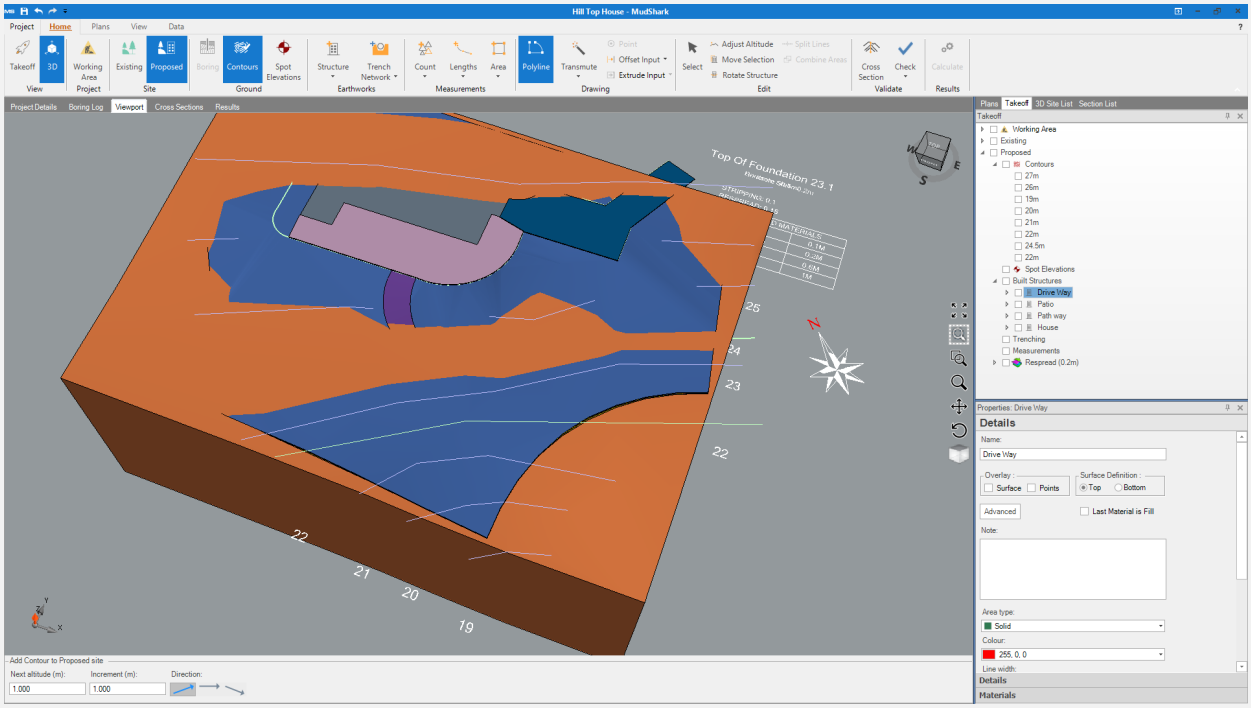


Figure 1. Example project in MudShark

Workflow

MudShark can be used in multiple ways, and can fit your existing workflow. However, for maximum efficiency we recommend using the following as a guide for completing a project in MudShark.

Recommended MudShark workflow:

Prepare Plans

Recommended steps for preparing your plans:

1. Insert and align your plans
2. Scale your plans
3. Define your working area

Perform Takeoff

Recommended steps for site takeoff:

1. Enter the surface elevations using contours and/or spot elevations for your **Existing** and **Proposed** Sites
2. Set the boundaries and materials of structures as required

Calculate Results

Recommended steps for calculating your results:

1. Configure ground settings
2. Generate Results
3. Validate your calculation by inspecting your 3D site and Results
4. Export your results data

Options

There are some options you can set for MudShark, including viewport style, ground settings, and where your data is saved and the default measurement units.

To access MudShark options:

1. Click **Project**, at the top right of the ribbon.
2. Click **Options…** at the bottom of the application menu.
3. The **MudShark Options** window will open, and you can navigate between the three option tabs: **Viewport Styles**, **Ground Settings**, **and Data**

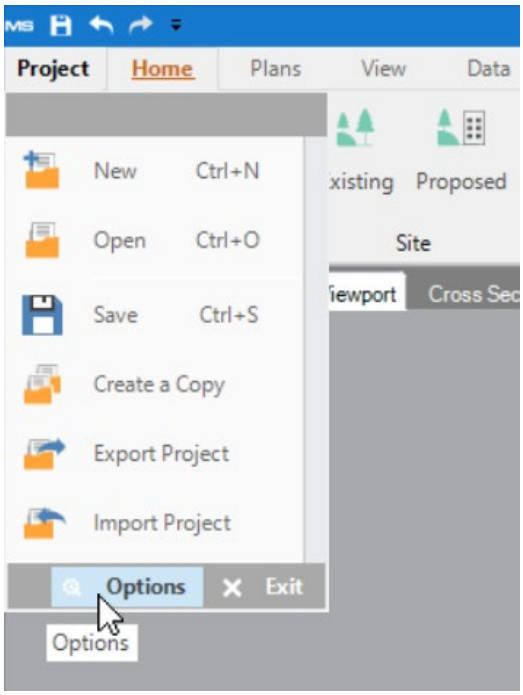


Figure 2. Options are accessed from the program menu

Viewport Style

From the **Viewport** tab you can affect how the Viewport displays some elements.

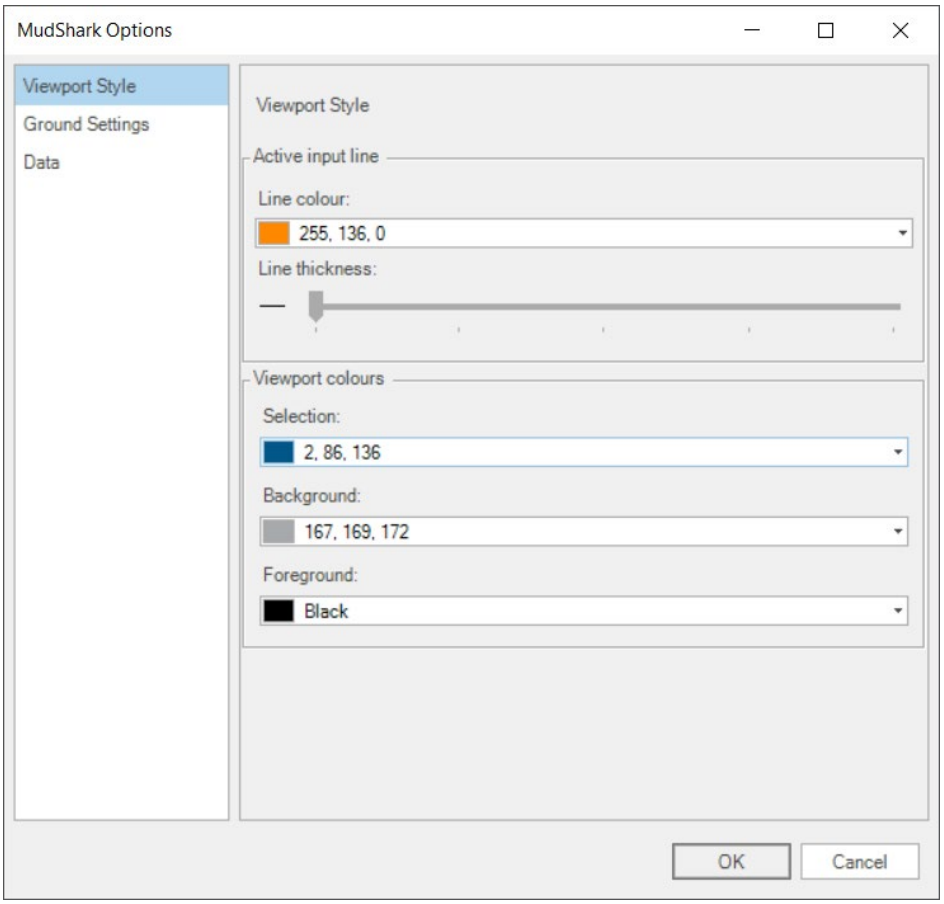


Figure 3. Viewport Style tab in Options

Active input line

You can change the colour for the current active input line and its line thickness. By default the **Line colour** is orange, and the **Line thickness** is thin.

Viewport colours

You can also change the colours that denote current **Selection**, the **Viewport Background** and the **Viewport Foreground**, By default, these are blue, grey and black, respectively.

Ground Settings

From the **Ground Settings** tab you can affect how MudShark manages your ground settings.

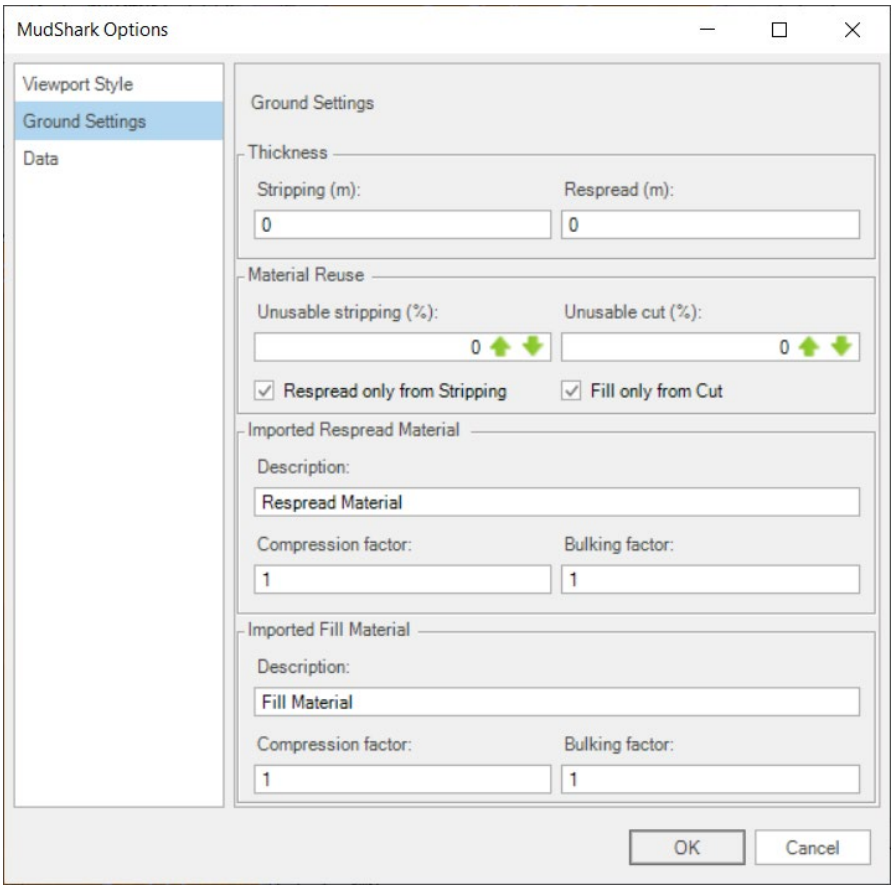


Figure 4. Ground Settings in Options

Thickness

You can set the default depth for **Stripping** and **Respread**, which will determine the defaults for ground stripped for an **Existing Site** and respread for a **Proposed Site**.

Material Reuse

You can set defaults for how material is reused through your project.

You enter a percentage for **Unusable stripping** which will set the default wastage percentage of stripped earth. Setting this percentage will limit how much material can be reused on the site. You can also enter a percentage for **Unusable cut** which will limit how much material can be reused on the site.

You can check **Respread only from stripping** , which when checked will only reuse the material that is stripped from the existing site in the respread.

> *TIP: If there is not enough stripped material to respread the required volume, the remaining volume will be considered as **Imported Material**.*

You can check **Fill only from cut**, which when checked will only reuse material that is taken from cut for fills.

> *TIP: If there is not enough cut material to fill the required volume, the remaining volume will be considered as **Imported Material**.*

Imported Respread Material

This is for setting up the default material to use if there is any imported respread required.

Imported Fill Material

This is for setting up the default material to use if there is any imported fill required.

Data

From the **Data** tab you can affect how MudShark manages your project data, licence and software.

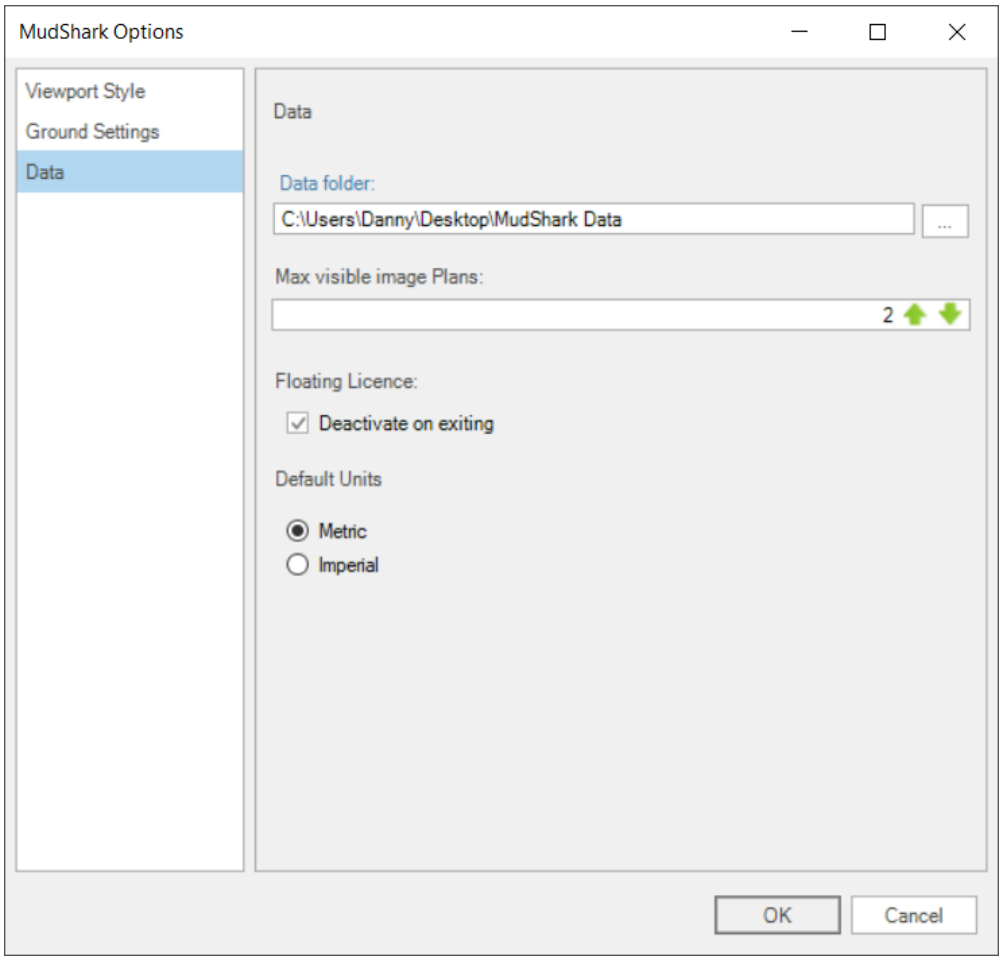


Figure 5. Data tab in Options

Data Folder

The data folder will be the location set during installation where your project data is saved. You can interact with your data folder in two ways: you can click **Data folder:** to open the location where your data folder is or you can click the **...** button to change your data folder.

Max visible image Plans

There is a default to the amount of image plans displayed in a project, this limit ensures computers processing power isn't dragged down. By default, this limit is set to two. You can adjust this by changing the number directly or using the arrow up, and arrow down buttons.

Deactivate on exit

By default, if you're using a floating licence, **Deactivate on exit** is checked. As long as this is checked, and you have an active internet connection when you close MudShark, your licence will be deactivated so you can open MudShark on another computer.

> ***TIP:*** *This option is only visible if your have a floating licence.*

Default Units

Your default units are set when installing MudShark for the first time. You can only use MudShark with one default at a time.

User Interface

MudShark's intuitive interface is designed to help you easily navigate the software. We've designed MudShark with a minimal learning curve and utilise modern design so you have flexibility in how you interact with the software.

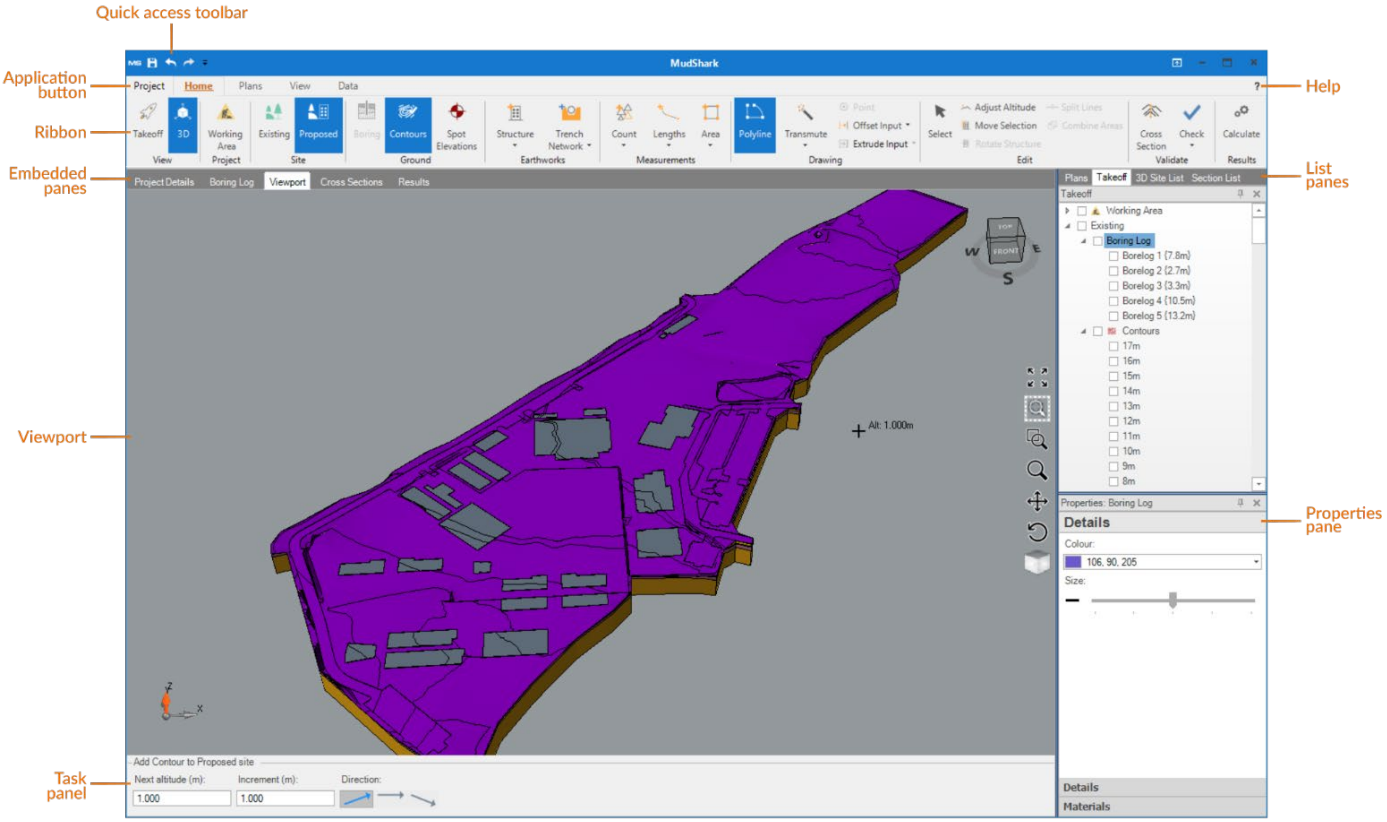


Figure 6. Understanding the user interface for MudShark

Application Button

You can access the application menu by clicking **Project**. From here you can open, save, copy or create a project. From this menu you can also import or export your project as a Brightbox file.

Quick Access Toolbar

By default, from the quick access toolbar, you can save your project and undo or redo actions you've taken.

Ribbon

You work through your project by using the ribbon, which is divided up into four distinctive tabs.

Home Tab

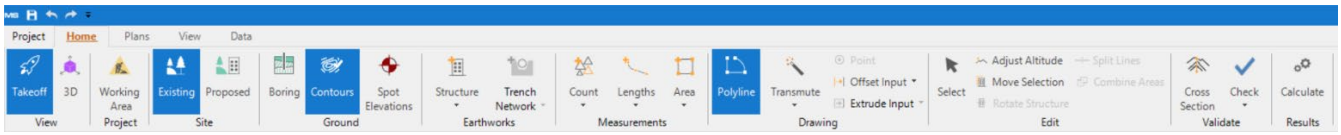


Figure 7. The **Home** tab in the ribbon

The **Home** tab will be shown when you first open MudShark, it is where your takeoff tools live and the tab you will likely use most. Notable features of the Home tab include changing between **Takeoff** and **3D** modes, choosing between **Existing** or **Proposed** for your Site, your **Drawing** tools and the **Calculate** button.

Plans Tab

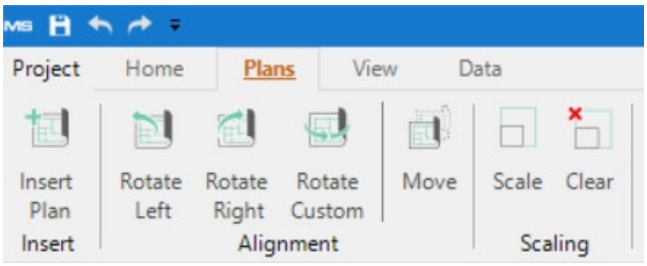


Figure 8. The **Plans** tab in the ribbon

The **Plans** tab is where you can insert plans for a project; and rotate, move, and scale your plans.

View Tab

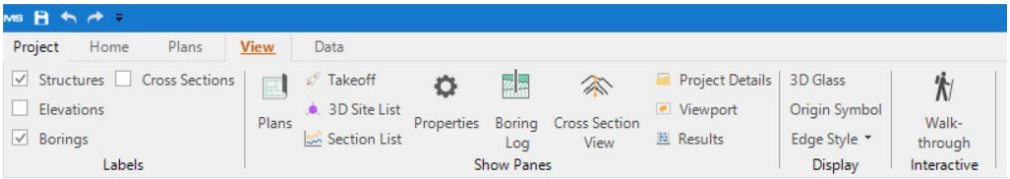


Figure 9. The **View** tab in the ribbon

You can control what's being displayed from the **View** tab, including labels in the Viewport and the different panes.

Data Tab

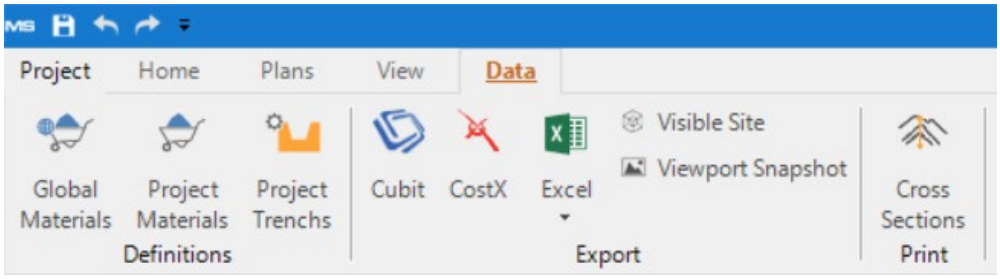


Figure 10. The **Data** tab in the ribbon

When you have completed your takeoff, you can use the **Data** tab to export your results into a Microsoft Excel file or for estimating software. From the **Data** tab you can also access your **Global Materials**, **Project Materials** and **Trench Definitions**.

Panes

MudShark is comprised of multiple panes which display your plans, takeoff, results and other details and data.

Although you can move and adjust the panes to suit your workflow, they are primarily divided up into two groups:

- The embedded panes – Project Details, Boring Log, Viewport, Cross-Sections, Results
- The list panes – Plans, Takeoff, 3d Site List, Section List, Properties

Embedded Panes

Project Details Pane

You can view and edit the details for a project, this information is further divided into groups for **Project**, **Client** and **Ground Settings**. Read Understanding Project Metadata for more information.

Boring Log Pane

You can define the default materials that make up the ground on your site either as single list thicknesses or a complex array of multiple soil borings.

Viewport Pane

The Viewport is one of the most important parts of MudShark, it's where you view your plans, takeoff, and results. All your takeoff is done from the Viewport. Read Viewport for more information.

Cross-Sections Pane

View and inspect your site with any cross-sections you have entered for your project.

Results Pane

You can explore any calculated data for your project. This information is further divided into groups for **Cut and Fill**, **Trench Measurements**, **Existing Site Measurements**, and **Final Site Measurements**.

List Panes

Plans Pane

You can manage your plans, and plan layers, for any file you've inserted into your project. You can rename plans and their layers, delete plans and control their visibility here.

Takeoff Pane

You can view and edit details for your takeoff from the **Takeoff** pane. You can delete takeoff, and select one or more items. The Takeoff pane works best with the **Properties** pane, where you can edit various takeoff details.

3D Site List Pane

From the **3D Site List** pane you can control the visibility of your 3D project in the viewport.

Section List

If you have input cross-sections they will be displayed in this list, you can select a cross-section to display it. The cross-section which will be displayed is for the currently active site stage, switch between site stages to display the different cross-sections.

Properties Pane

If you have one item selected, the **Properties** pane, you will display information about the item. If you have multiple items selected, it will show you the total selected items. If you select takeoff, from the Viewport or the **Takeoff** pane, you will be able to edit some parts of that takeoff, including elevation, overlay options, line widths, colours and more.

Utilising List Panes

Item Visibility

You can affect the visibility of plans, takeoff and 3D layers from the corresponding pane, although some of this is handled automatically (like changing between **Existing** and **Proposed** sites.)

There is a checkbox next to each item if there is a check in that box it denotes that that particular item is visible if the box is empty that item is currently hidden. Simply, click this box to change the items visibility.

> *TIP: Changing the visibility of a group or container, will also change the visibility of its sub-items.*

Selection

Items in the list panes can be selected by clicking on their names. When an item is selected in a list it is also shown as selected in the Viewport. If the item has sub-items, they too will be selected and highlighted.

Deleting

You can press **Delete** on your keyboard to delete a selected item. Some items in the list panes cannot be deleted, and instead its sub-items will be deleted.

> *TIP: If you delete something by mistake, click **Undo** to reverse it.*

Expansion

You can expand and collapse items in the list pane by clicking the arrow next to the item.

Adjusting Panes

The position and size of your panes can be adjusted.

Your panes can be in one of three states:

- **Docked** panes appear against an edge of MudShark, by default docked panes are on the right.
- **Embedded** panes appear in the centre workspace, where the Viewport is docked.
- **Floating** panes can appear anywhere on your screen.

If a pane has been closed, from the **View** tab you can click the pane from the **Show Panes** group, and that pane will appear where it was last visible.

> *TIP: If you close and reopen MudShark, all panes will appear in their default locations.*

Viewport

Although just a pane, the Viewport is one of the most important parts of MudShark, it's where you view your plans, takeoff, and results. All your takeoff is done from the Viewport.

From the viewport you can utilise the Viewport toolbar, the Viewcube and the Task panel.

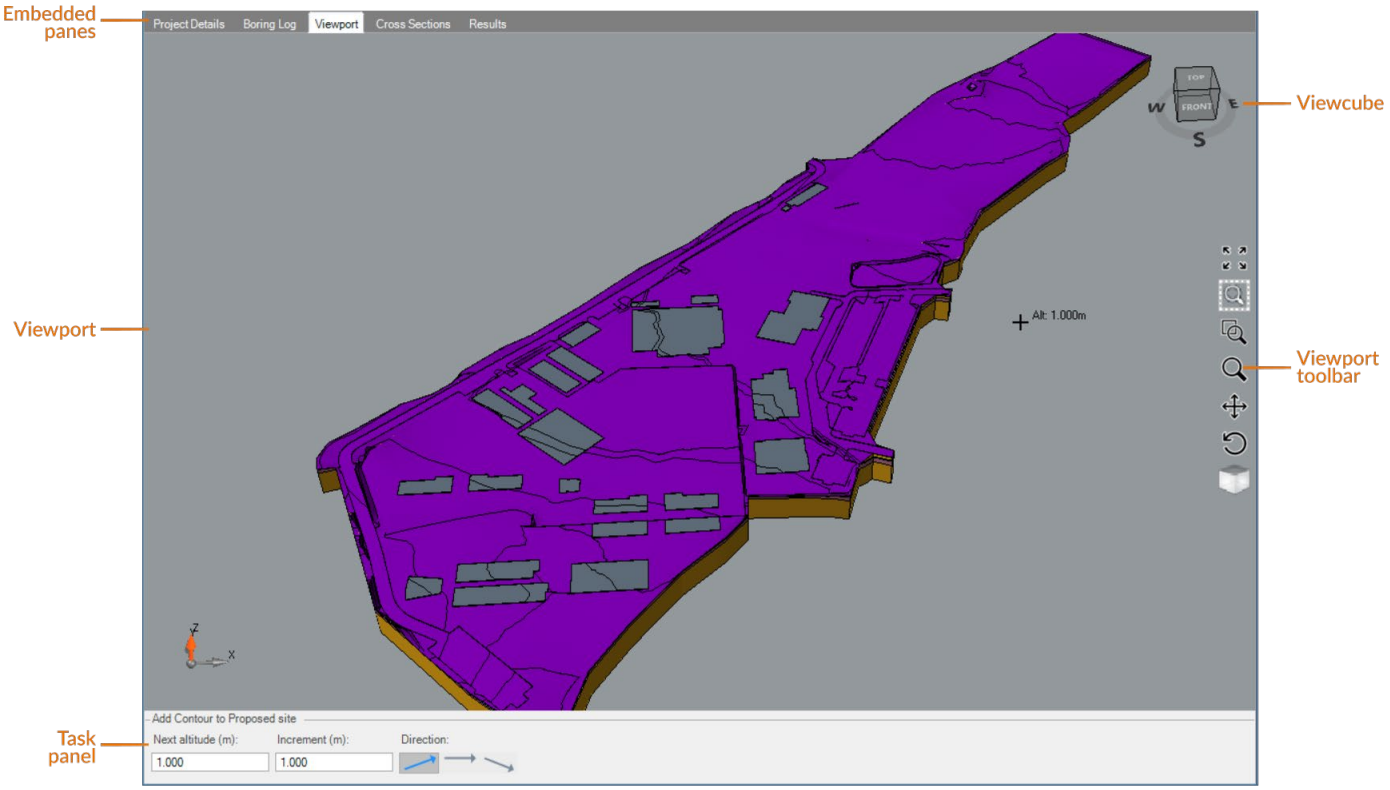


Figure 11. Understanding the **Viewport**

Navigating the Viewport

The most efficient way to navigate around the Viewport is with your mouse.

> *TIP:* To navigate the Viewport, you need to click into it to activate it. We recommend right-mouse button, or the mouse scroll button clicking to select the Viewport without initiating any takeoff.

Zoom Fit

Clicking **Zoom Fit** from the **Viewport Toolbar** will be reset your view so that all currently visible contents fit in the Viewport. This is often a great view of your site, and an easy way to reset the Viewport.

Zoom to Selected Items

Clicking **Zoom to Selected Items** in the **Viewport Toolbar** will fill the Viewport with the currently selected entities.

Zoom Window

Clicking Zoom Window will let you draw a rectangle that will zoom and fill your Viewport as best as it can.

Zoom

The best way to zoom in and out in the Viewport is just by scrolling your mouse wheel up or down, to zoom in or out, respectively. Alternatively, you can click **Zoom** from the **Viewport Toolbar** and click your mouse and move the cursor up or down to accomplish the same affect.

Pan

You can move the contents of your Viewport left, right, up, and down with **Pan**. Click and hold the mouse wheel button in the Viewport, and move your cursor in the direction you want to pan. You can also use the arrows on your keyboard to pan.

> *TIP:* ***Pan*** *will move visible and non-visible contents, and won't effect your takeoff or results.*

Rotate

You can change the perspective you're viewing by holding **Ctrl** and clicking and moving your mouse wheel button, like you would when panning. You can also click **Rotate** from the **Viewport Toolbar**.

Top Down

To move the camera to get a bird's eye view of your site from **Takeoff** or **3D**, click **Top Down** in the **Viewport Toolbar.**

> *TIP: Use Top Down to reset your view if you move or rotate your Viewport out of position.*

Viewcube

You can rotate around the **Viewport** with the **Viewcube**. You can click on a side or edge of the cube to change to that perspective, or click and hold down the mouse button, then the **Viewcube** will move in the direction you scroll, affecting your plan, takeoff or 3D in real-time.

Projects

A Project contains all of your plans, takeoff, and results relating to a site.

There are no limitations for the number of Projects you can save on your computer, but you can only open one at any given time.

> *TIP: It is important to regularly save your Project in MudShark so that you don't lose any data. We also recommend regularly backing up your Data Folder.*

Understanding Project Metadata

You can save metadata for a Project, this is broken into three categories: **Project**, **Client**, and **Ground Settings**.

> *TIP: While no fields are mandatory, we do recommend entering a Project Name.*

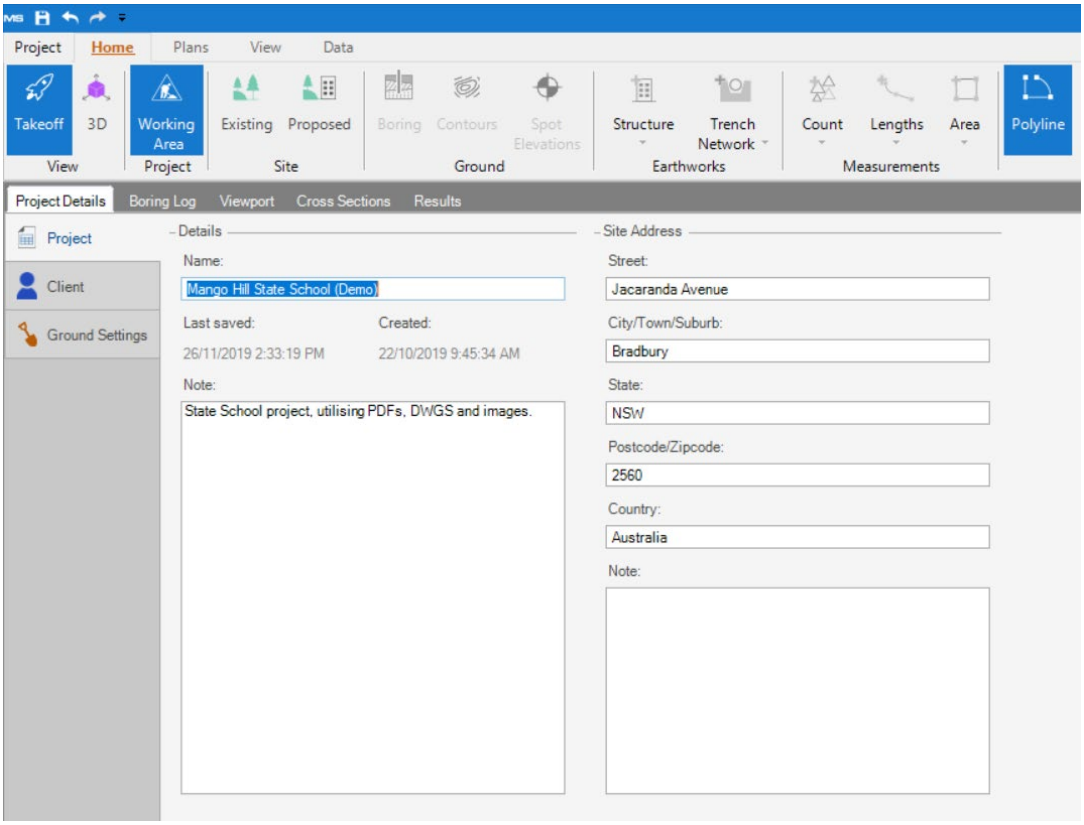


Figure 12. Details for a Project

Project Details

All fields will start empty, however by default the Project will be named *New Project [Creation Date] [Creation Time]*.

We advise changing the **Name** to better reflect the Project so you can identify it easier later. You can also add a **Note** for your Project.

You can enter a **Site Address** for a project, this is broken down into **Street**, **Suburb**, **State**, **Postcode** and **Country**. There is also a **Note** field for additional details about the **Site Address**.

Client Details

Client Details is broken down into three sections, **Contact**, **Company** and **Company Address**.

You can enter **First name**, **Last name**, **Email**, **Mobile** and **Phone** for a **Contact**.

> ***TIP:*** *You can only set one Contact per project, but you can use the Note field for additional contacts.*

You can enter **Name**, **Phone**, and **Fax** for **Company**, and also enter the **Company Address** broken down into parts.

Ground Settings

Entering **Ground Settings** will have impact on the calculations for a Project.

By default, **Strip by thickness** will be 0, unless you have set a default in **Options**. You can change this value or select **Strip Away** and select any Layers you want to strip from your Proposed Site.

By default, **Respread thickness** is also set to *0*, unless you have set a default in **Options**. This value is editable.

There are three other options available for you to check. By default **Calculate Open Ground Fill** is checked, which will calculate any fill without a structure on top.

You can check **Only Use Proposed Contours For Structures and Spots,** which will ignore contours and spots except for calculating structure surfaces if you're using **Overlay Options**. By default, this is unchecked.

You can check **Calculate Heat Map**, this will generate a Heat Map for your Site that will show you the cut and fill depths. By default, this option is unchecked; checking it may increase the time it takes for your calculation to complete

Create a New Project

By default, when you launch MudShark, a new project will be created for you.

If you want to create new project:

1. Click the application button, labelled **Project**, at the top right of the ribbon.
2. Click **New**.

*TIP: You can also use the keyboard shortcut **Ctrl** + **N** to create a new project.*

While there are no mandatory fields for your **Project Details**, we recommend at least entering a **Name**.

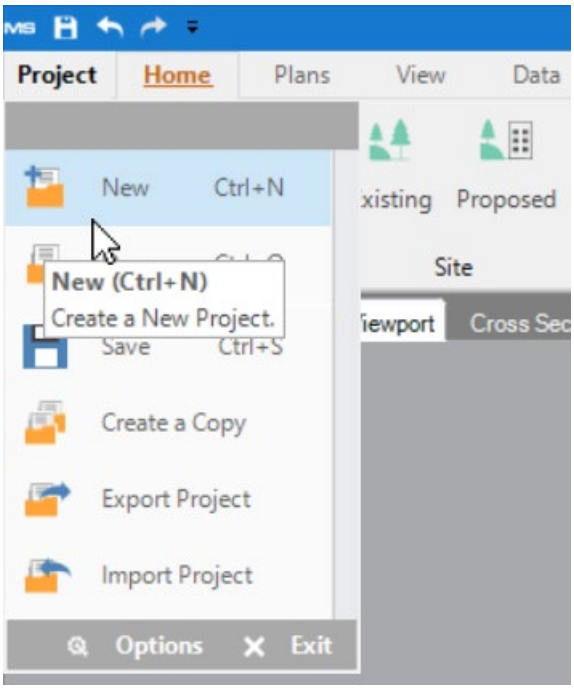


Figure 13. New Project

Open an Existing Project

By default, when you launch MudShark, a new project will be created for you.

To open an existing Project:

1. Click the application button, labelled **Project**, at the top right of the ribbon.
2. Click **Open**.
3. The **Open Project** window that will appear, where you can soft and filter your projects by various fields.
4. Find the project you want to open, then select it.
5. Click **Open**.

   *TIP: You can also use the keyboard shortcut **Ctrl** + **O** to open a Project.*

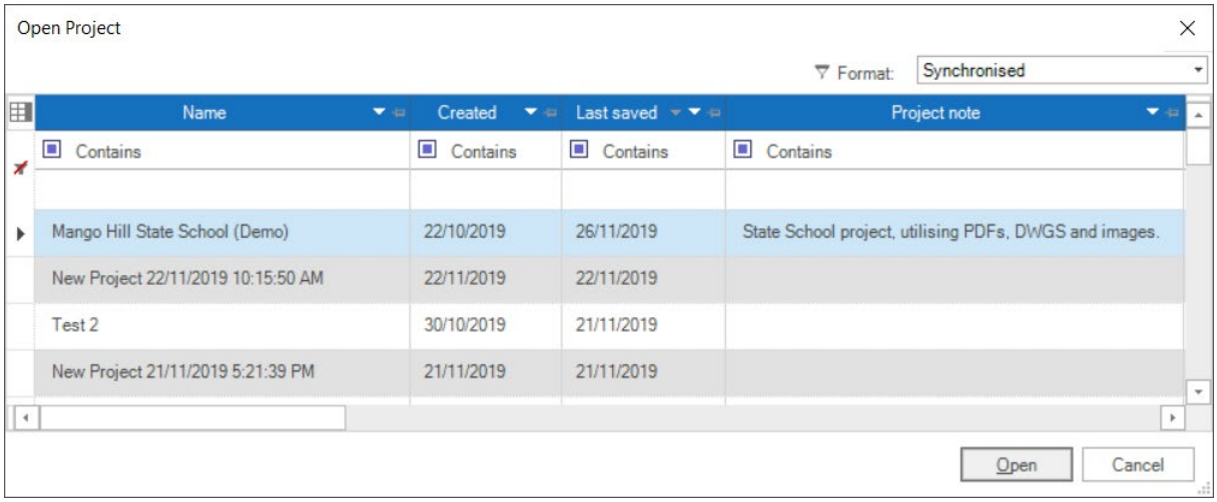


Figure 14. The **Open Project** window

Filtering Projects

From the **Open Project** window, you can filter your projects to better find the project you need. You can filter based on one, or more columns and any projects not matching your criteria will be hidden. Different filters can be combined and you can easily clear your filter to show all projects, again.

Simple Filtering

The default filtering option is **Contains**, so whatever you enter in the line underneath it will filter the projects that contain the entered characters. If you click **Contains**, you can change how that column is being filtered.

Clearing Filters

On the far left of the filter row you can click the **Clear Filter** icon to clear all filters and see all projects. You can also click this icon in any entered filter column.

Custom Filtering for a Column

Instead using just a single filter, if you click the empty field you can select **Custom** to create a custom filter. The **Custom Filter** window which will appear, and you can build up multiple criteria for a single column.

Filtering Project Displays

There are three ways your projects can be saved: **Synchronised**, **Data Folder**, and **Missing**.

The format you'll primarily use is **Synchronised**, which is also the default. Most of the time you won't need to change from this format because it will display all projects in your database.

If, at any point, you create a new database your **Synchronised p**rojects might be empty, and you might need to select **Data Folder** to see projects you have saved on your computer. Once you have opened and saved a project from the **Data Folder**, it will appear under **Synchronised**.

Projects would only appear in **Missing** if there are project files within the database, but not the project file directory, you shouldn't need to use this option.

Copy a Project

You can easily copy a Project at any time, as a means of saving a version or just as a means of experimenting with site balancing.

To copy an open Project:

1. Click the application button, labelled **Project**, at the top right of the ribbon.
2. Click **Create a Copy**.
3. Enter a **Name** for the new project from the **Create a Copy** window that appears.
4. Click **Create a Copy**.

After your project has been successfully copied, an alert will appear at the bottom right of your screen.

TIP: Click this alert to open the copied Project.

Your copied Project will appear in your Project list, where you can open it like any other Project.

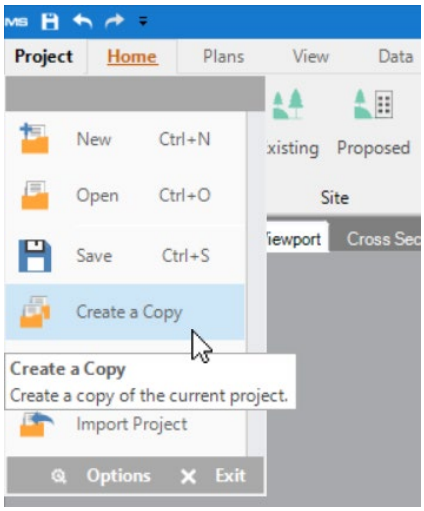


Figure 15. **Create a Copy** from the application menu

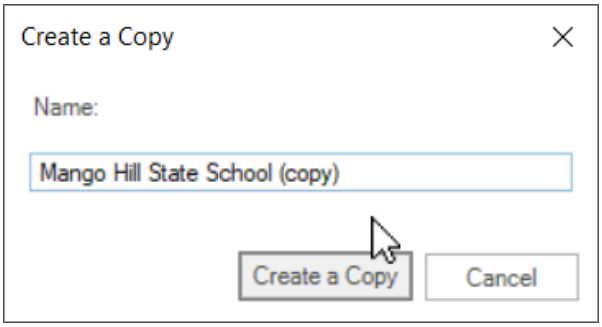


Figure 16. **Create a Copy** of the currently opened project

Export a Project

If you need to share a MudShark project with someone else or with another computer, you have to export the project as a BBX file.

To export a Project:

1. Click the application button, labelled **Project**, at the top right of the ribbon.
2. Click **Export Project**.
3. Enter a name for your BBX file, by default it will be the project name.
4. Browse your computer to the location you want the BBX file saved.
5. Click **Save**.

After your project has been successfully exported, an alert will appear at the bottom right of your screen.

TIP: Click this alert to be taken to the folder where you saved your BBX file..

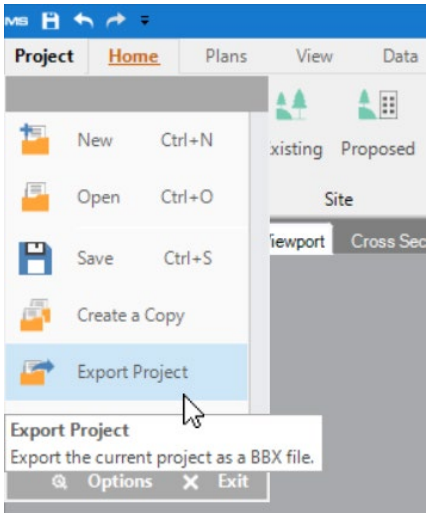


Figure 17. Export Project

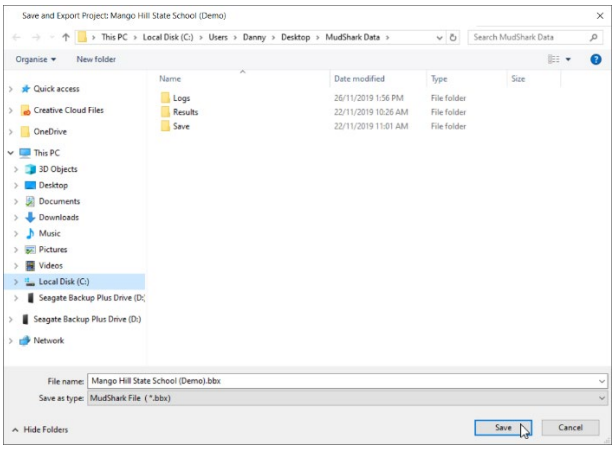


Figure 18. Export a project

Import a Project

If you need to accept a MudShark project from someone else or from another computer, the project must be exported as a BBX file. Once you have this BBX file, you can import it into MudShark.

To import a Project:

1. Click the application button, labelled **Project**, at the top right of the ribbon.
2. Click **Import Project**.
3. Browse your computer to the location the BBX file is saved, then select it.
4. Click **Open**.

TIP: Only folders and BBX files will be visible from the Import Project window.

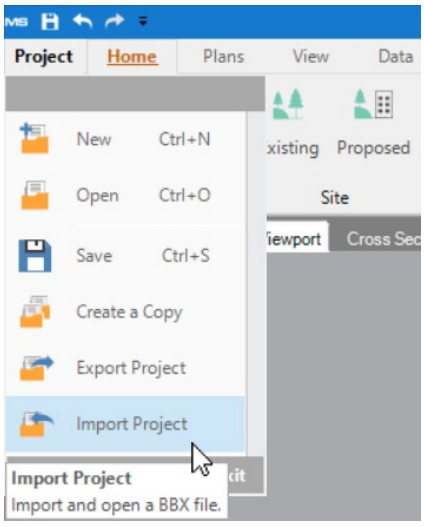


Figure 19. Import Project

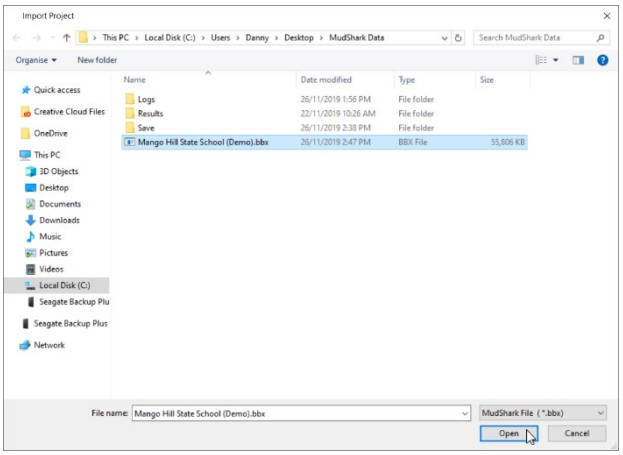


Figure 20. Import a project

Plans

MudShark has been designed so you can takeoff from plans as accurately and quickly as possible, and you can insert a wide variety of digital plans.

MudShark works best with vectorised plans, specifically DWGs, DXFs, and some PDFs. A vectorised format will include layer information, so you can use some of the automatic tools to speed up your takeoff. MudShark will still allow you to import BMPs, PNGs, JPGs, as well as non-vectorised PDFs and most common image formats.

To get your plans takeoff ready:

Plan List

You can inspect plans and, where applicable, their layers from the **Plan List** pane. From this pane you can select plans, or their layers, for the various features and use the checkboxes to show, or hide, plans or their layers.

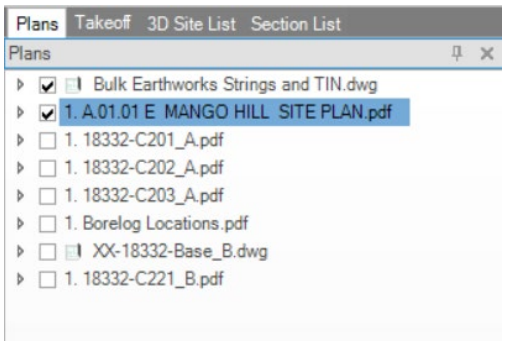


Figure 21. An example Plan displayed in the **Plan List** pane

TIP: *For PDF files with multiple pages, a Plan will be inserted for each page.*

Insert a Plan

The easiest way to insert a plan into MudShark is to drag and drop a plan from your computer, into the MudShark viewport. Doing this will automatically insert that plan into current Project.

Alternatively, you can find a plan from within MudShark.

To insert a plan:

1. From the **Plans** tab in the ribbon, click **Insert Plan.**
2. From the **Open** window, select one or more files you want to insert as Plans into your Project
3. Click **Open**.

   *TIP: By default only supported file formats will be displayed in the **Open** window.*

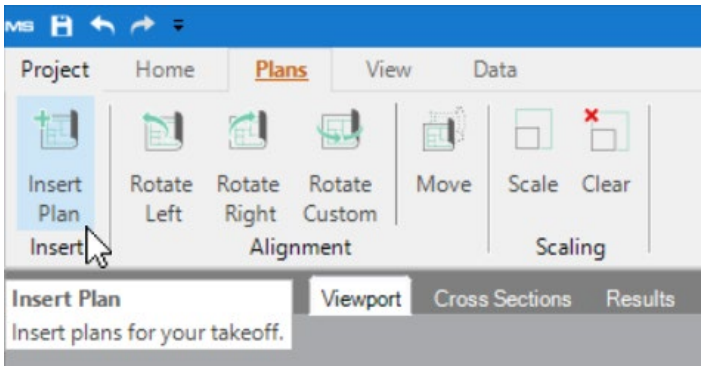


Figure 22 Insert Plan

Scale a Plan

You can scale a plan one at a time, or you can save time and scale multiple plans at once.

To scale a plan:

1. From the **Plan List** pane, select the plan or plans you want to scale. To select multiple plans, hold **Ctrl** as you select plans from the list.
2. From the **Plans** tab in the ribbon, click **Scale**.
3. Find a reference line that you want to use to scale your plan, the longer the line the better.
4. Use your mouse to click each end of the reference point.

   *TIP: If you're using a vector plan, hold **Shift** on your keyboard as you move your mouse to each reference point to enable snapping for a more accurate point*

5. Enter the **Line length** that you just clicked on inside the **Scale Plans** window.
6. Click **Scale**.

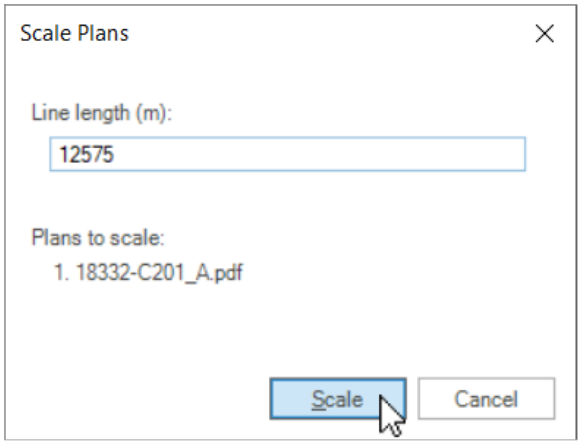


Figure 23 Scale a plan

Check the Scale of a Plan

Getting your scale right is critical for accurate results, always check your scale for each plan.

To check a scale:

1. From the **Plans** tab in the ribbon, click **Scale**.
2. Find any straight line on your plan with a clearly defined length, then click the beginning of this line.
3. Move your mouse to the end point, but do no click, a length will appear to the right of your mouse, this should be the same or very close to the length of the line.

Clear the Scaling from a Plan

You can rescale a plan at any point, and you can also clear the scale.

To clear the scale of a plan:.

1. From the **Plans List** pane, select the plan or plans you want to clear the scale from.
2. From the **Plans** tab in the ribbon, click **Clear Scale**.
3. Any selected plans will appear, to confirm clearing the scale for the selected plans click **Clear Anyway**.

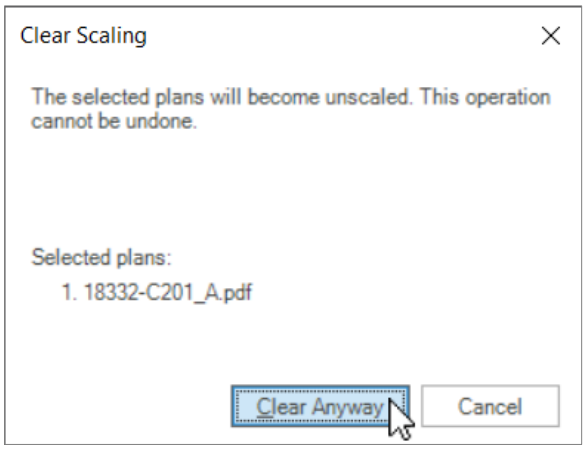


Figure 24 Clear a plan

Rescale a Plan

You can rescale a plan at any point; however rescaling incorrectly can invalidate existing takeoff.

The process of rescaling is the same as scaling a plan; however you will be presented with four options to how your rescaling is applied to the project.

Rescale all takeoff and altitudes

Not only will any selected plans be rescaled, but selecting this options will rescale all takeoff (contours, boring. Structures, etc) and all altitudes. If you use this option, ensure you inspect your site in 3d and check your results to ensure your project is correct.

Rescale all takeoff, ignoring altitudes

Not only will any selected plans be rescaled, but selecting this options will rescale all takeoff (contours, boring. Structures, etc). Any entered altitudes will remain the same, unchanged by rescaling. If you use this option, ensure you inspect your site in 3d and check your results to ensure your project is correct.

Rescale plan only, ignoring takeoff

Only selected plans will be rescaled, all takeoff and altitudes will remained unchanged.

Rescale plan and delete takeoff

Only selected plans will be rescaled, but all takeoff and altitudes will be deleted.

Align a Plan

You may need to align a plan before you begin your takeoff. You can rotate and move your plan to place it where you need it.

TIP: If you have inserted multiple plans, and they're different sizes, we recommend scaling your plans first.

Rotate a Plan

If you plan has been inserted upside down, or turned on a strange angle, you can rotate your plan so it displays correctly.

To rotate a plan by 90 degrees:

1. From the **Plan List** pane, select the plan you want to rotate.
2. From the **Plans** tab in the ribbon, click **Rotate Left** or **Rotate Right**.

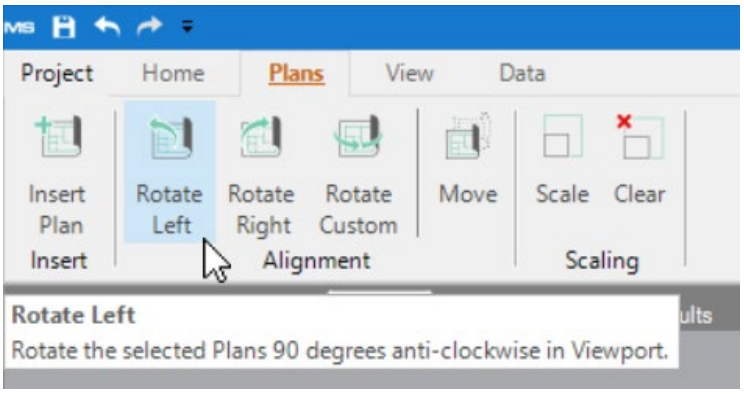


Figure 25 **Rotate Left** button

To rotate a plan by a custom degrees:

1. From the **Plan List**, select the plan you want to rotate.
2. From the **Plans** tab in the ribbon, click **Rotate Custom**.
3. The **Custom Rotate** window will open, enter the **Rotation angle**.
4. Click the direction button to determine the direction the angle rotation will be applied.
5. Click **OK** to rotate your plan.

   TIP: This is incremental, so you can move your plan in smaller angles to get it right.

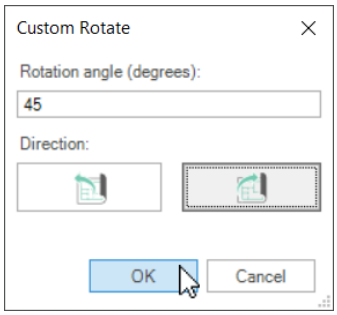


Figure 26 Custom Rotate window

Move a Plan

If you have plans that don't align, you can move your plans to align them.

To move a plan:

1. From the **Plan List** pane, select the plan you want to move.
2. From the **Plans** tab in the ribbon, click **Move**.
3. Click a point on the plan. This will be your first reference point, that will be moved.
4. Click a second point, you previous point will be moved to align to this point.

   TIP: You can select and move more than one plan at a time.

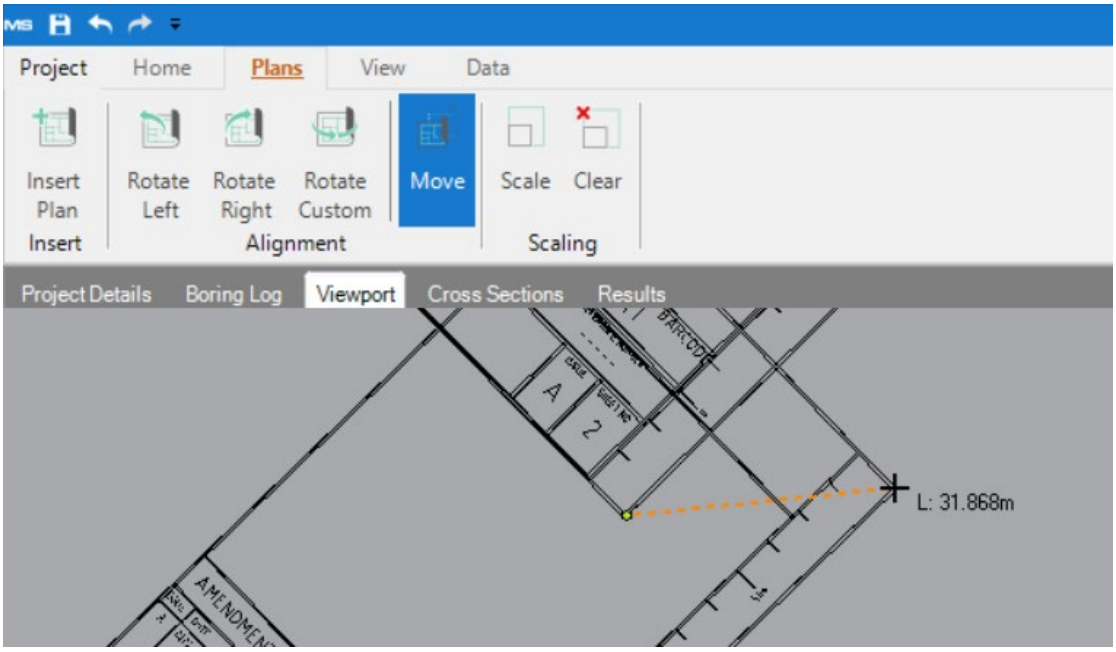


Figure 27 Move a plan

Takeoff

Understanding Working Areas

Before you begin your takeoff, you need to define the area where your results will be calculated for, this is your **Working Area**. Your **Working Area** can include multiple areas and exclusions.

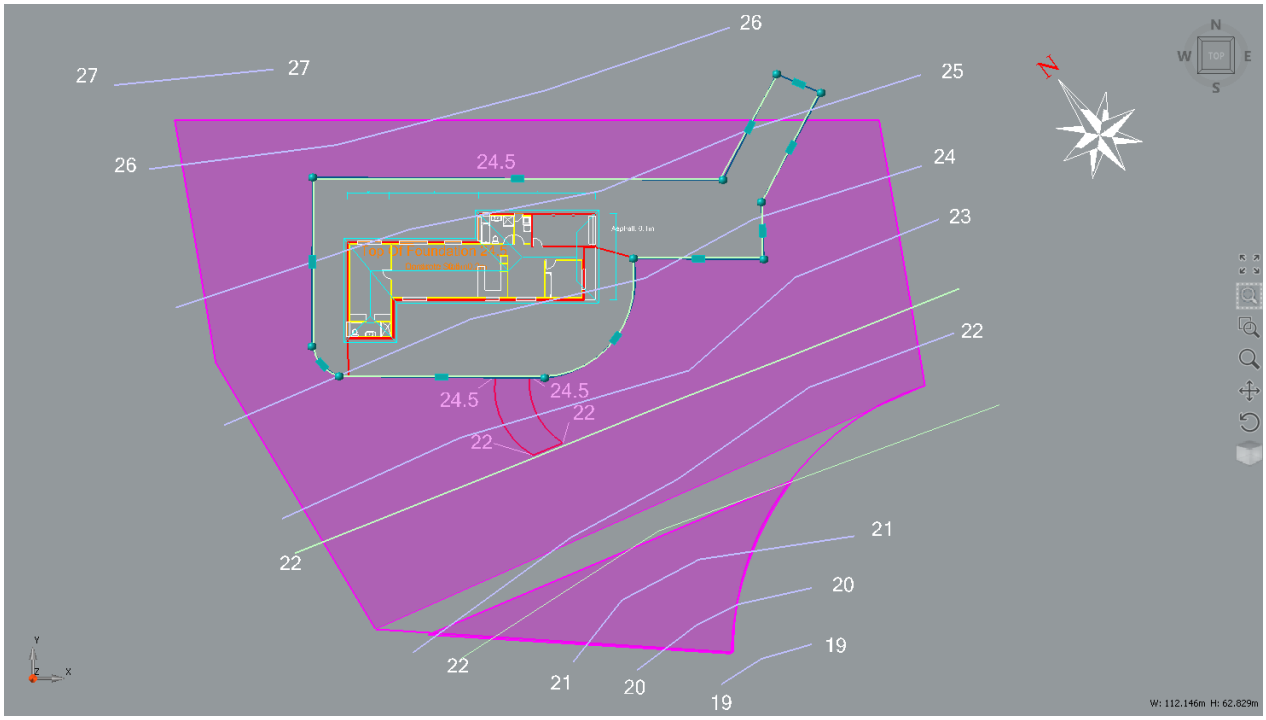


Figure 28. Example Working Areas

You only need a single **Working Area** for a project, although you can define multiple Working Areas for these sites.

> *Tip: Your **Existing** and **Proposed** sites will share the **Working Area**.*

You can redefine your **Working Area** at any point, either editing boundaries, adding additional areas or creating a new exclusion.

Define Your Working Area

Ensure you plans are scaled and aligned before you define you Working Area.

Define your Working Area:

1. From the **Home** tab in the ribbon, click **Working Area**.
2. From the **Drawing** group click **Polyline**.

   *TIP: You can also use **Transmute**, **Transmute Area**, **Offset**, and **Extrude** to takeoff your Working Area.*
3. Using your mouse, drawn the boundary of your **Working Area**, by clicking each corner.
4. After you have clicked on each corner, you can join the current line to the starting point with a right-mouse click.

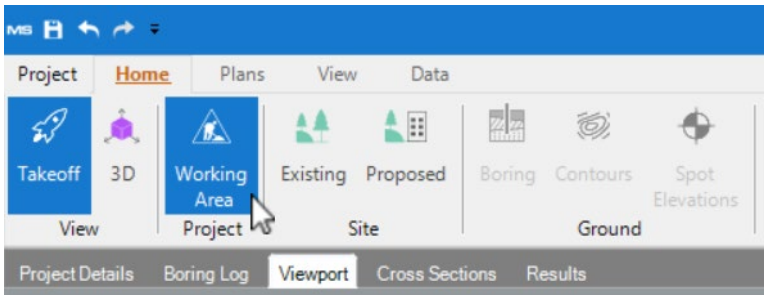


Figure 29. Ribbon configured to Add **Working Area** Boundaries to the **Project**.

With **Working Area** selected, if you takeoff another area within an existing working area, you will automatically create an exclusion. If you takeoff another area outside the existing one, you will create an additional working area.

Interactive View

You can view and interact with your Viewport in two ways:

- Select **Takeoff** to complete any takeoff for your project.
- Select **3D** to inspect a 3D model of your site.

By default, your project will be set to Takeoff.

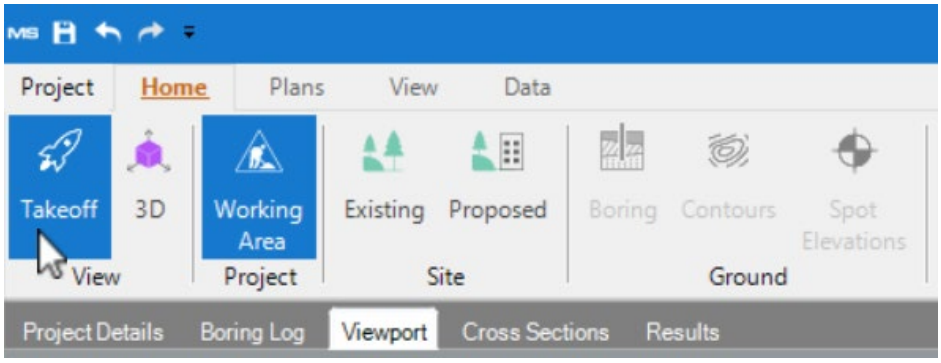


Figure 30.The **View** group in the **Home** tab

Active Site

Your takeoff will be performed for either the **Existing Site** or the **Proposed Site**.

The currently active site will be highlighted to make it clear which site you're contributing towards.

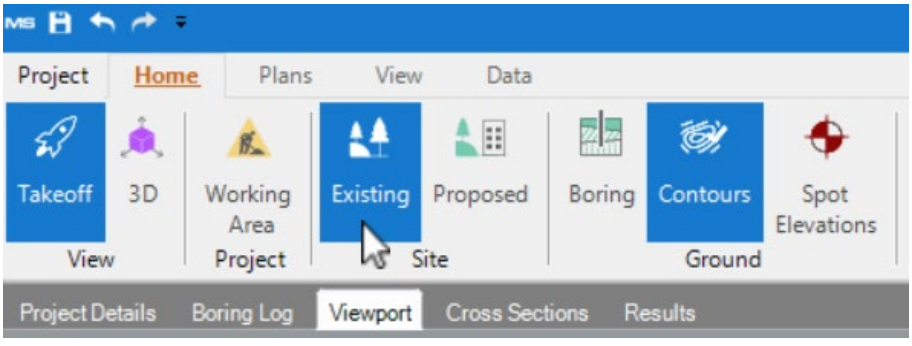


Figure 31. The **Site** group in the **Home** tab

Drawing Tools

There are a number of tools that are designed specifically to make your takeoff efficient and accurate. Not every tool is useful in every situation, but the right tool can make even the most difficult takeoff easy.

Depending on what you're attempting to takeoff, we will recommend different tools, but you can try different tools for different takeoff to find the fastest way for you.

> *Tip: If you takeoff incorrectly, you can use **Undo** to reverse your last action.*

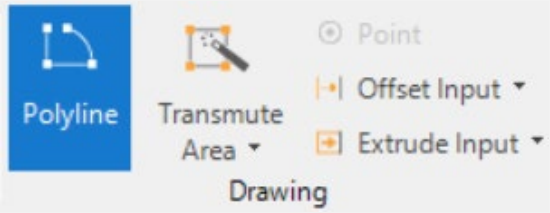


Figure 32. **Drawing** group in the **Home** tab

Polyline

A polyline is a sequence of one or more straight lines or curves. You can use the Polyline tool by clicking the corners or points of the shape you're tracing or drawing.

> *Tip: If you are using a vectorised plan, hold SHIFT to enable point snapping for better accuracy.*

To draw a curved line, click the start of the curve then click and hold the mouse button at the end of the curve, then drag your cursor towards to curve the line.

> *Tip: Sometimes to accurately trace a curve you might need a few smaller curves.*

Polyline is an intelligent tool, so depending on what your taking off, will determine how your Polyline finishes. If you're drawing a contour and right-mouse click, your line will complete on your previous mouse click. If you're drawing an area that requires to be closed, like a structure, the right-mouse-click will close the shape between the previous point and the starting point.

Transmute

Transmute is the most powerful tool in MudShark. **Transmute** has two main uses; with a 3D vector plan you can automatically takeoff an entire layer for contours or spots and you can automatically takeoff lines, curves, and various shapes from a plan in the **Viewport**.

To **Transmute** an entire contour layer or spot layer from a plan with 3D details, you click Transmute then select the layer from the **Plan** pane.

To **Transmute** from a plan in the **Viewport**, you can click the entity from the plan.

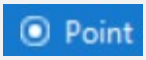
Transmute Dashed

When you need to takeoff dashed lines from a plan, whether its contours or structures using dashed lines, you'll want to use the **Transmute Dashed**. Much like polyline, mouse click on the line, and then keep clicking along the line to continue. Right-mouse click to complete to your previous mouse click.

Transmute Area

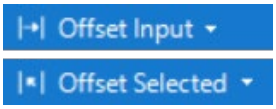
To takeoff an enclosed area, you can use **Transmute Area** to automatically find an area and create boundaries for it. When using **Transmute Area**, you can hover over the area you want to takeoff, and you will see a preview of the boundary area, when the preview shows the area you want the boundaries for, right-mouse click to complete it.

Point



Points are a useful takeoff tool, used for entering spots, boring points and counts.

Offset

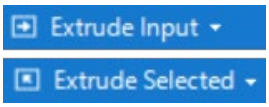


The **Offset** tool lets you select **Offset Input** or **Offset Selected**.

Offset Input will let you draw a line then enter an offset distance and angle to create a new line.

Offset Selected will let you select a line from your plan or takeoff then enter an offset distance and angle to create a new line

Extrude



The **Extrude** tool lets you select **Extrude Input** or **Extrude Selected**.

Extrude Input will let you draw a line then enter an offset distance and angle to create a new area using the boundary of the drawn line and offset.

Extrude Selected will let you select a line then enter an offset distance and angle to create a new area using the boundary of the selected line and offset

Takeoff Boring

A boring represents a soil sample at a given location on a site. Multiple borings help with modelling the initial ground strata for more accurate results. Boring will produce ordered layers of material, detailing the thickness of each material.

There are two ways you can takeoff boring:

- Create and assign boring points as you go
- Create a **Boring Log**, then assign the boring points

You can only input boring for the **Existing Site**.

Create a Boring Point

You can create and assign boring points directly in the Viewport, this is useful if you have simple materials and only a few points to enter.

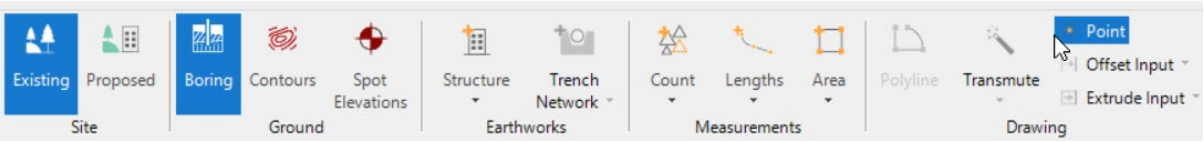


Figure 33. Selecting **Boring** from the ribbon

To enter a boring point:

1. From the **Home** tab in the ribbon, select **Existing** from the **Site** group.
2. From the **Ground** group in the ribbon, click **Boring**.
3. From the **Drawing** group in the ribbon, click **Point**.
4. From the Viewport, click the point you want to enter your boring point.
5. The **Boring Point** window will open.
6. Enter a **Name** for the boring point.

   *Tip: By default **Altitude** will be set to **Undefined**, if you leave this the altitude will be determined by entered contours and spot elevations.*
7. Enter **Materials** and their **Thickness**.
8. Click **OK**.

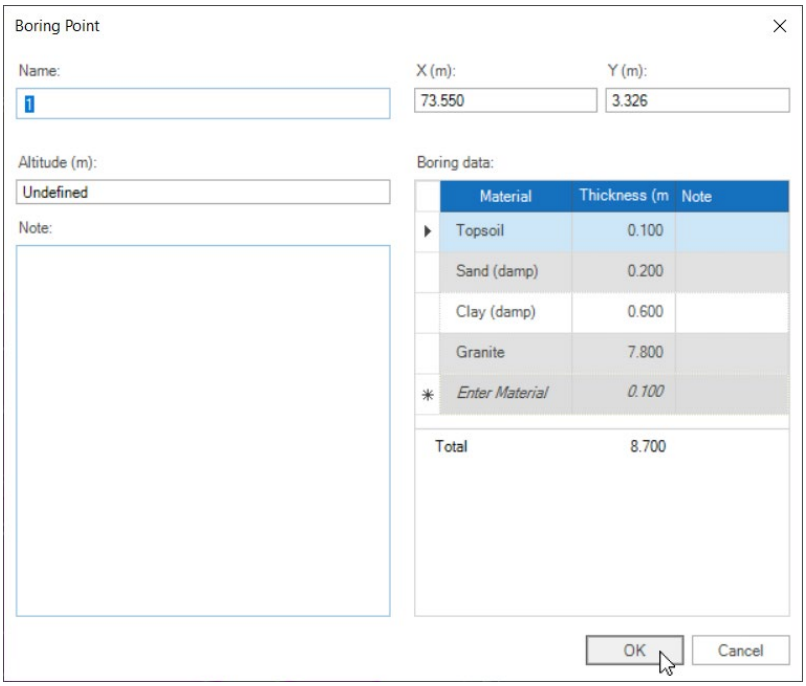


Figure 34. Enter materials in the Boring Point window

Create Boring Log

Especially if you have multiple borings you want to input, you can create a **Boring Log** with all the borings for a project. Creating a **Boring Log** will let you create and define as many borings as you need, and then you can input them quickly.

The Materials in Ground list is the master list of materials for the boring points, deleting a material from here will remove it from all existing borings points.

To create a boring log:

1. Click the **Boring Log** embedded pane.
2. From the **Materials in Ground** pane on the left side of the **Boring Log**, click **Enter Material** in the **Material** column and select or create a material to be used in the project.
   *Tip: Before you can assign a material for a boring point, it need to be entered in the **Materials in Ground**. If there is a consistent thickness for any material you can enter a Thickness, or you can leave it as default and define it for each boring point.*
3. From the **Insert new Boring** window in the **Boring Log** pane, enter a **Name** for the first boring point.
   *Tip: By default **Altitude** will be set to **Undefined**, if you leave this the altitude will be determined by entered contours and spot elevations when you enter the point in the Viewport.*
4. All the available materials entered in **Materials in Ground** will be shown for the boring point, define the thickness of each.
   *Tip: If a material is not present in a point, set the **Material Thickness** to 0.*

5. Continue creating as many boring points as you need for your project, after you name a boring point, a new empty point will be created.

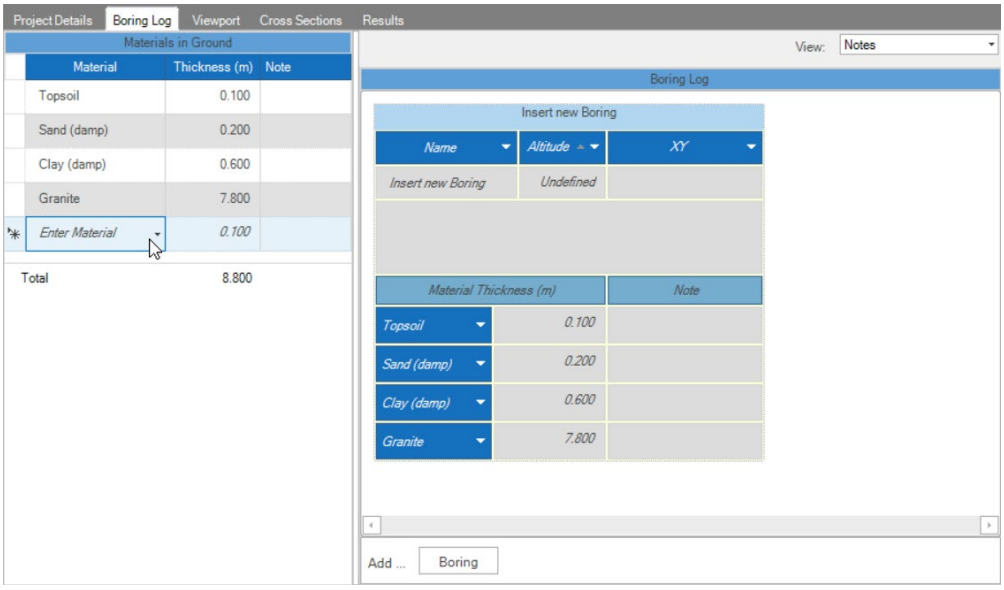


Figure 35 Create a **Boring Log**

Assign a Boring Point

If you have defined boring points in the **Boring Log**, you can assign them in the Viewport.

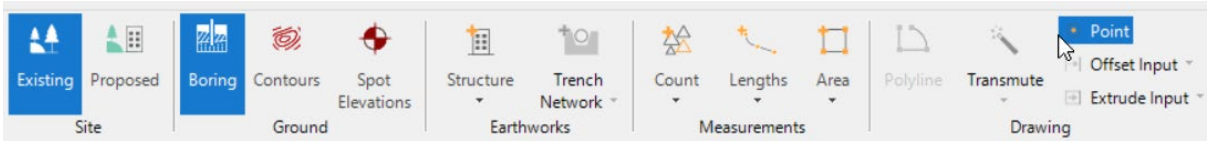


Figure 36. Selecting **Boring** from the ribbon

To assign a boring point:

1. From the **Home** tab in the ribbon, select **Existing** from the **Site** group.
2. From the **Ground** group in the ribbon, click **Boring**.
3. From the **Drawing** group in the ribbon, click **Point**.
4. From the Viewport, click the point you want to enter your boring point.
5. The **Boring Point** window will open.
6. From the **Name** field, select the boring point you want to plot.

   Tip: By default **Altitude** will be set to **Undefined**, if you leave this the altitude will be determined by entered contours and spot elevations.
7. Click **OK**.

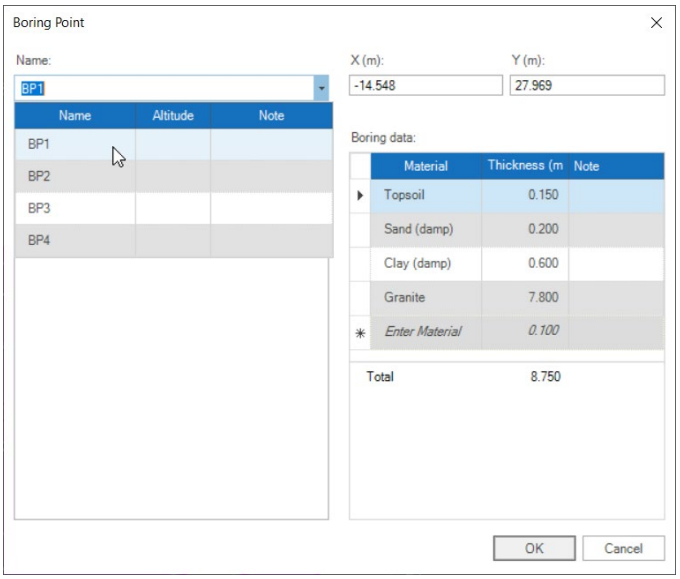


Figure 37. Assign Boring Points

Takeoff Contours

Contours are lines that represent the geographic topography of the site. MudShark gives you multiple ways to takeoff contours, and the more you experience these tools, the easier you will be able to determine when to use each drawing tool.

> *Tip: Always ensure the right **Site** is selected before you takeoff contours.*

Takeoff Contours From a Layer

If the plan you want to takeoff contours from is DWG or DXF file, you might be able to use **Transmute** for a layer to automatically takeoff all contours. This will require the DWG or DXF plan to have a layer with only contours and 3D information about those contours, specifically altitudes. If your plan fulfils the criteria, using **Transmute** on a layer is the fastest way to takeoff contours.

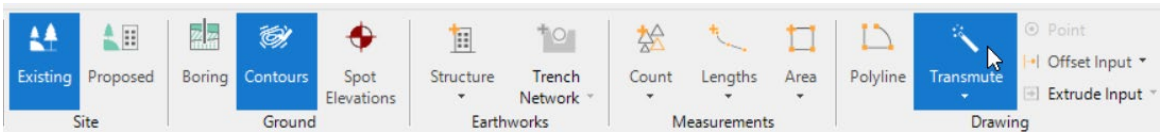


Figure 38. Selecting **Transmute** for contours

To Transmute a contour layer:

1. From the **Home** tab in the ribbon, select **Existing** or **Proposed** to determine the site your contours will be added to.
2. From the **Ground** group in the ribbon, click **Contours**.
3. From the **Drawing** group in the ribbon, click **Transmute**.
4. From the **Plans** pane, expand the DWG or DXF plan which has the contours you want to takeoff.
5. Click the layer that contains the contours.

   Tip: Use the visibility options to ensure you have the right layer for your contours.
6. The **Transmute** window will open, telling you how many layers MudShark will transmute.
7. Click **Transmute**.

Takeoff Contours from the Viewport

If you want to takeoff contours from a plan that contains vector details (like a DWG file, DXF file, or vectorised PDF file) you can use **Transmute**. If your plan does not fulfil the criterial, you might need to takeoff the contour with **Polyline**.

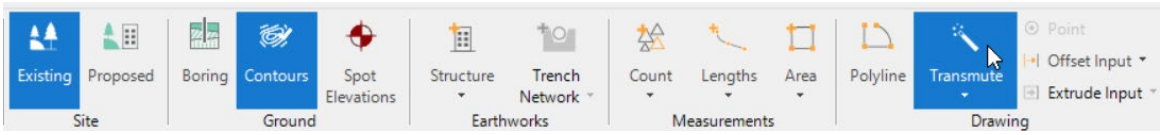


Figure 39. Selecting **Transmute** for contours

To Transmute contours from the Viewport:

1. From the **Home** tab in the ribbon, select **Existing** or **Proposed** to determine the site your contours will be added to.
2. From the **Ground** group in the ribbon, click **Contours**.
3. From the **Drawing** group in the ribbon, click **Transmute**.
4. From the **Task panel**, select **Custom** from the **Altitude source** drop down menu.

   *Tip: You can select **Plan** for the **Altitude source** if you have a DWG or DFX file with 3D data, but want to takeoff the contours one at a time instead of the whole layer.*
5. From the **Task panel**, enter your **Next altitude**, which will be the altitude you will draw first.
6. From the **Task panel**, enter the **Increment** the altitudes on the plan adjust by, then select the **Direction** that the altitude is changing.

   *Tip: You can, and likely will change the **Direction** as you go, between increasing, remaining the same and decreasing.*
7. Mouse click on the contour in the Viewport that you wish to takeoff first.

   *Tip: Regardless of length, complexity and curvature, as long as there are no breaks in the contour, **Transmute** will takeoff the entire contour with one click.*
8. Your **Next altitude** will be displayed in the **Task panel**, which will be the previous altitude modified by the **Increment** and **Direction** set. If these are correct, continue your takeoff, or change them to proceed.

   *Tip: You can also just type the altitude value using your keyboard, this number will be entered as your **Next altitude** regardless of what was there before.*

Takeoff Dashed-Line Contours

If you want to takeoff contours that are created with dashed-lines and the plan contains vector details (like a DWG file, DXF file, or vectorised PDF file) you can use **Transmute Dashed**. If your plan does not fulfil the criterial, you might need to takeoff the contour with **Polyline**.

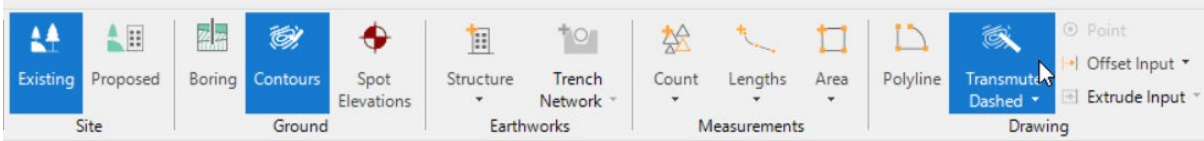


Figure 40. Selecting **Transmute Dashed** for contours

To Transmute dashed-line contours from the Viewport:

1. From the **Home** tab in the ribbon, select **Existing** or **Proposed** to determine the site your contours will be added to.
2. From the **Ground** group in the ribbon, click **Contours**.
3. From the **Drawing** group in the ribbon, click the arrow under **Transmute**, then click **Transmute Dashed**.
4. From the **Task panel**, select **Custom** from the **Altitude source** drop down menu.

   *Tip: You can select **Plan** for the **Altitude source** if you have a DWG or DFX file with 3D data, but want to takeoff the contours one at a time instead of the whole layer.*
5. From the **Task panel**, enter your **Next altitude**, which will be the altitude you will draw first.
6. From the **Task panel**, enter the **Increment** the altitudes on the plan adjust by, then select the **Direction** that the altitude is changing.

   *Tip: You can, and likely will change the **Direction** as you go, between increasing, remaining the same and decreasing.*
7. Mouse click on the contour from the Viewport that you wish to takeoff first.

   *Tip: **Transmute Dashed** will try and takeoff as much of the contour as possible.*
8. If the entire contour is found and added to your takeoff, click the right-mouse button to complete the contour. If not, keep clicking along the dashed line until the contour is complete.

   Tip: You may need multiple clicks to complete the contour.
9. Your **Next altitude** will be displayed in the **Task panel**, which will be the previous altitude modified by the **Increment** and **Direction** set. If these are correct, continue your takeoff, or change them to proceed.

   *Tip: You can also just type the altitude value using your keyboard, this number will be entered as your **Next altitude** regardless of what was there before.*

Takeoff Contours by Tracing

No matter what type of plan you're using, you can always takeoff contours with **Polyline**. However, if you plan will allow you to use another method, you should try it first.

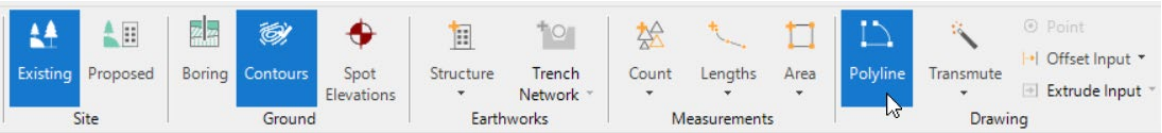


Figure 41. Selecting **Polyline** for contours

To trace a contour:

1. From the **Home** tab in the ribbon, select **Existing** or **Proposed** to determine the site your contours will be added to.
2. From the **Ground** group in the ribbon, click **Contours**.
3. From the **Drawing** group in the ribbon, click **Polyline**.
4. From the **Task panel**, enter your **Next altitude**, which will be the altitude you will draw first.
5. From the **Task panel**, enter the **Increment** the altitudes on the plan adjust by, then select the **Direction** that the altitude is changing.

   *Tip: You can, and likely will change the **Direction** as you go, between increasing, remaining the same and decreasing.*
6. Mouse click at the end of the contour from the Viewport that you wish to takeoff first.

   *Tip: If you are tracing a DWG, DFX or vectorised PDF, you can hold **Shift** to snap to the endpoint for greater accuracy.*
7. If the contour isn't a straight line, click at each corner or point where the line changes direction. If the contour curves, click at the start of the curve and hold the left-mouse button at the end of the curve, then drag your cursor towards to curve the line.

   Tip: If you're having trouble with a curve, try breaking it into smaller arcs.
8. Mouse click the end of the line, then right-mouse click to complete the contour to your last left-mouse click.

   *Tip: To close the boundaries, you can use the shortcut **Ctrl** + **J** to join the last drawn point to the first.*
9. Your **Next altitude** will be displayed in the **Task panel**, which will be the previous altitude modified by the **Increment** and **Direction** set. If these are correct, continue your takeoff, or change them to proceed.

   *Tip: You can also just type the altitude value using your keyboard, this number will be entered as your **Next altitude** regardless of what was there before.*

Takeoff Spot Elevations

Spot elevations are points that represent the geographic topography of the site. MudShark gives you two ways to takeoff spot elevations.

> *Tip: Always ensure the right **Site** is selected before you takeoff spots.*

Takeoff Spot Elevations From a Layer

If the plan you want to takeoff spot elevations from is a DWG or DXF file, you might be able to use **Transmute** for a layer to automatically takeoff all spots. This will require the DWG or DXF plan to have a layer with only points or symbols representing spot points and 3D information about those spots, specifically altitudes. If your plan fulfils the criteria, using **Transmute** on a layer is the fastest way to takeoff spot elevations.

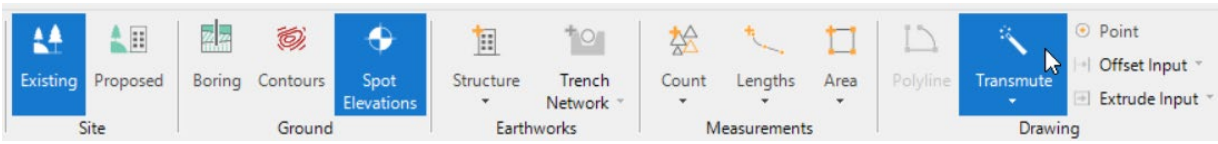


Figure 42.Transmute for Spot Elevations.

To Transmute a spot elevation layer:

1. From the **Home** tab in the ribbon, select **Existing** or **Proposed** to determine the site your spots will be added to.
2. From the **Ground** group in the ribbon, click **Spot Elevations**.
3. From the **Drawing** group in the ribbon, click **Transmute**.
4. From the **Plans** pane, expand the DWG or DXF plan which has the spots you want to takeoff.
5. Click the layer that contains the spot elevations.

   Tip: Use the visibility options to ensure you have the right layer for your spot elevations.
6. The **Transmute** window will open, telling you how many layers or points MudShark will transmute.
7. Click **Transmute**.

Takeoff Spot Elevations Individually

No matter what type of plan you're using, you can always takeoff spot elevations one-at-a-time with **Point**.

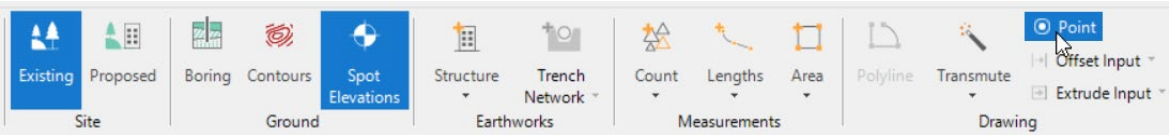


Figure 43. Using **Point** to takeoff **Spot Elevations.**

To enter spot elevations:

1. From the **Home** tab in the ribbon, select **Existing** or **Proposed** to determine the site your contours will be added to.
2. From the **Ground** group in the ribbon, click **Contours**.
3. From the **Drawing** group in the ribbon, click **Point**.
4. From the **Task panel**, enter your **Next altitude**, which will be the altitude of the spot you enter next.
5. From the Viewport, click the spot locations are at the altitude you entered.
6. Using your keyboard, type the altitude for the next spot elevation you intend to takeoff, this value will be displayed in the **Task panel** in the **Next altitude** field.
7. Continue entering the spot elevations you wish to use for calculation.

Takeoff Structures

You can create structures in MudShark to be demolished or built. Structures are created with enclosed boundaries, and have their own volumes.

Understanding Structures

Structures are designed to be flexible, and can be used in a number of ways to simplify your takeoff and provide greater accuracy.

Structures can be used to takeoff:

- Building slabs
- Footpaths and driveways
- Landscaping
- Roads
- Carparks
- Sports fields
- Banking and batter
- Retaining Walls

Any structure created for the **Existing Site** is categorised as a **Demolished Structure**, and any materials detailed in these structures will require to be removed from site.

Any structure created for the **Proposed Site** is categorised as a **Built Structure**, and any materials detailed in these structures will require to be reused from cut materials or imported onto site.

> *Tip: If a structure in your project won't change or affect your earthworks, instead of creating a structure, you can excluded that area from the **Working Area**. Read more here: Understanding Working Areas.*

Create a New Structure

You can create as many structures as you need for a project.

To create a new structure:

1. From the **Home** tab in the ribbon, select **Existing** or **Proposed** to determine the site your structure will be added to.

   *Tip: Structures in the **Existing Site** are **Demolished Structures**, in the **Proposed Site** are **Built Structures**.*
2. From the **Earthworks** group in the ribbon, click the dropdown arrow under **Structure**.

   *Tip: Use the keyboard shortcut **Ctrl** + **Shift** + **N** to create a new structure.*
3. The **New Structure** window will open.
4. Enter a **Name** for your structure.
5. You can select **Overlay** options, and the direction of your **Surface Definition**.
6. Click **Advanced** for additional structure options.

   Tip: Learn more here: Understanding Overlay Options and Advanced Structure Options
7. You can set the **Area type**, **Colour**, and **Line width** to affect the structure's appearance.
8. Enter a **Starting Altitude** for your structure .

   Tip: Structure boundaries can have different altitudes, which can be defined when performing takeoff.
9. Enter any materials for your structure, you can select or create a new material in the **Material** column and set a thickness in the **Thickness** column.
10. Click **Create.**

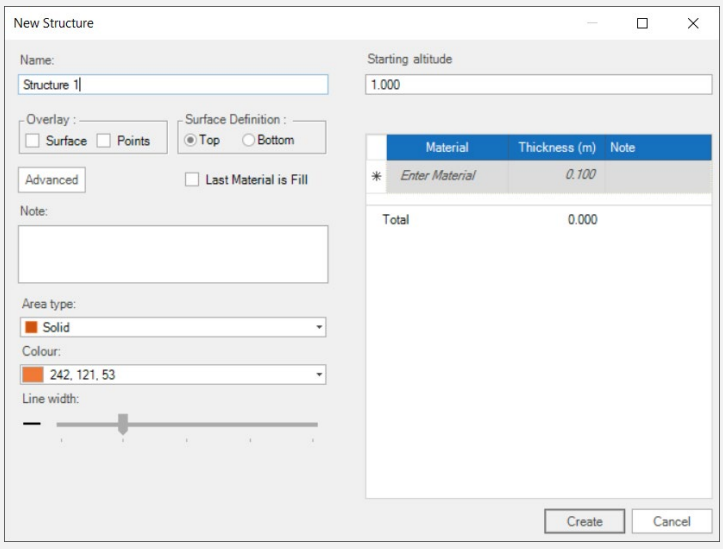


Figure 44. The **New Structure** window.

Understanding Overlay Options

The **Overlay** options define how the surface within a structure boundary is created.

When no **Overlay** options are set, a structure will be calculated from inputted altitudes, so contours and spot elevations are ignored.

When an **Overlay** option is selected, the surface of a given structure is produced from contours or spot elevations, and inputted altitudes for that structure is ignored.

Surface Option Checked

With only the surface option ticked the boundary points as input are used in conjunction with any contours or spots which cross or are within the structure boundary to define the structure surface. The user can use precise control for the boundary points specifying their altitude and use contours and spots to create a complex surface within the boundary. A good example of this use is; you have a car park or road with well-defined edges with known points defining the perimeter in addition to contours or spots defining an internal shape for drainage.

Points Option Checked

With only the boundary points option ticked the input boundary point altitudes are ignored and the altitude of the points projected onto the surface defined by the spots and contours is used instead. A linear surface is created within the boundary. This option is the least commonly used but has some uses when the boundary point altitudes are not know and it is felt the overlaying to obtain the altitudes using the contour and spot information would be accurate enough without seeking further detail.

Surface and Points Options Checked

With both surface and boundary points ticked the structure surface is created using the spots and contours. This is a bit like laying a cloth over the surface so it matches exactly. The most common use of this option is where there is landscaping and there are different areas of materials e.g. One area may be turfed and another may be flower beds.

Tip: Using overlay options will add complexity to your project and increase calculation time.

Advanced Structure Options

Trim

Trimming options allow the structure to be trimmed against the surface generated by the contours and spots in either the **Existing** or **Proposed** sites. By default, your structures are set to **None**, and the structure boundary remains as it was created.

If you check **Top To Proposed** of **Top to Existing,** the top surface of the structure will be trimmed against the **Proposed Site** or the **Existing Site**.

> *Tip: Top to Proposed can be the best option for calculating banking and batter.*

If you check **Bottom to Proposed** or **Bottom to Existing** the bottom surface of the structure will be trimmed against the **Proposed Site** or **Existing Site**. site.

> *Tip: If there are materials in the structure you are trimming from the bottom of, the structure will protrude above the surface by the material depth.*

If setting a Trim option, you will need to indicate whether you are trimming to **Inside** or **Outside** from the **Trim To** options. Selecting **Inside** this will trim the structure and keep the part under the surface. Selecting **Outside** will trim the structure and keep the part above the surface.

> *Tip: In most cases select **Inside** for calculating batter and **Outside** for calculating banking.*

Cut and Fill Options

You can specify what cut and fill calculations are performed for the structure. The default options for a Demolished structure are **Fill Underneath** and **Back Fill**, and for a Built Structure are **Calculate Cut** and **Fill Underneath**.

Calculate Cut and **Fill Underneath** will calculate the cut or fill respectively for the structure.

Trim Fill To Proposed is useful where a structure slab extends above the surface of the **Proposed Site** and you want to have fill underneath, but only to the point where the structure intersects the Proposed surface.

Back Fill indicates whether fill should be applied above the structure.

Respread Under is used in conjunction with **Trim Fill to proposed** and re-spreading, and if a structure extends beyond the surface of the **Proposed Site**, the respread will be extended under that structure extension.

Trace Structure Boundary

There are multiple ways to takeoff boundaries for a structure, including tracing the boundary from a plan.

To trace a boundary for a structure:

1. From the **Home** tab in the ribbon, select **Existing** or **Proposed**, depending on where the Structure was created.
2. From the **Earthworks** group in the ribbon, click the arrow in **Structure**.
3. Select the structure you want to takeoff the boundary for.
4. From the **Drawing** group in the ribbon, click **Polyline**.
5. From the **Task panel**, enter your **Next altitude**, which will be the altitude you will draw first. You can change the altitudes at each point, or leave it the same depending on the structure you're drawing.
6. From the Viewport, click at the corner of the a structure you're tracing.

   *Tip: If you are tracing a DWG, DFX or vectorised PDF, you can hold **Shift** to snap to the corner for greater accuracy.*
7. If a part of the structure is curved, click at where the line begins to arc, then click and hold the left-mouse button at the end of the curve, then drag your cursor towards to curve the line.

   Tip: If you're having trouble with a curve, try breaking it into smaller arcs.
8. Mouse click the end of the line, then right-mouse click to complete the contour to your last left-mouse click.

   *Tip: To close the boundaries, you can also use the keyboard shortcut **Ctrl + J** to join the last drawn point to the first.*

Takeoff Structure Area

There are multiple ways to takeoff boundaries for a structure, including finding the area for a structure.

To takeoff a structure from an area:

1. From the **Home** tab in the ribbon, select **Existing** or **Proposed**, depending on where the Structure was created.
2. From the **Earthworks** group in the ribbon, click the arrow in **Structure**.
3. Select the structure you want to takeoff the boundary for.
4. From the **Drawing** group in the ribbon, click the arrow in **Transmute.**
5. Select **Transmute Area**.
6. From the **Task panel**, enter your **Next altitude**, which will be the altitude your structure uses
7. From the Viewport, move your mouse into the are of the structure you're trying to takeoff.
   Tip: You can move your mouse around until the area preview displays the area you want to use.
8. Use your mouse to click, and the boundary of the area will be used to create a takeoff for the structure.
   *Tip: **Transmute Area** is the fastest way to takeoff a boundary, but if the boundary uses changing altitude points it has to be edited after you have created your structure. Alternatively, you can use **Polyline** to takeoff the structure for more control as you takeoff.*

Editing Structure Boundary Altitudes

You can edit the altitudes for each point of a structure boundary, whether you're input the boundary wrong or just want to change it.

To edit the altitudes of a structure boundary:

1. From the list panes, click **Takeoff**.
2. Navigate to expand either the items from the **Demolished Structures** in **Existing** or **Built Structures** in **Proposed**.
3. Click the arrow to expand the structure you want to edit.
4. Click to select the **Boundary** you want to edit.
5. Click **Point Altitudes** from the **Properties** pane.
6. The altitudes for each point will be shown, you can enter a new altitude for any of these points.

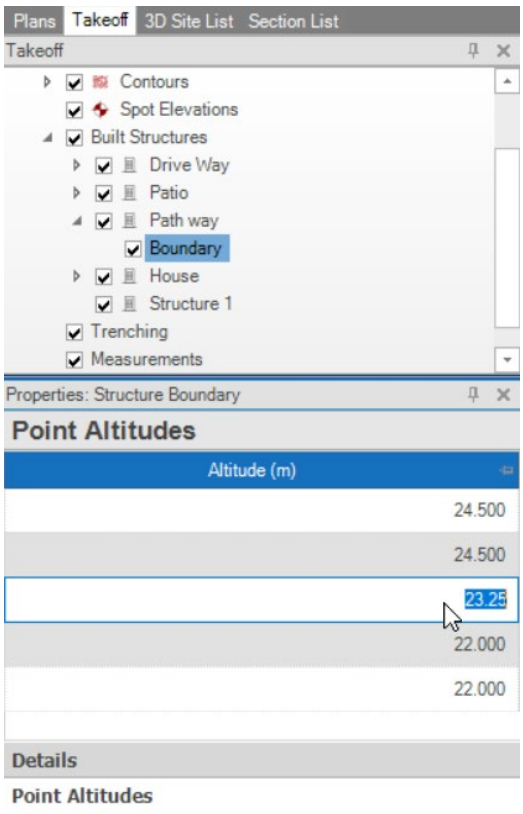


Figure 45. Edit **Point Altitudes** for a takeoff item boundary

Stripping and Respread

To save you time, MudShark automatically calculates the volumes for stripping and respread based on the takeoff you have entered. All you need to calculate your stripping and respread, is to enter a thickness for each.

By default, **Strip by thickness** and **Respread thickness** will be set to *0*, unless you have set a default in **Options** before you created the project. Instead of stripping by thickness, you can select layers to be removed using the **Strip Away** drop-down menu.

You can enter a thickness for stripping and respread, or the layers to strip from the **Ground Settings** options in the **Project Details** embedded tab or from the **Calculate Checklist** window which appears when you click **Calculate**.

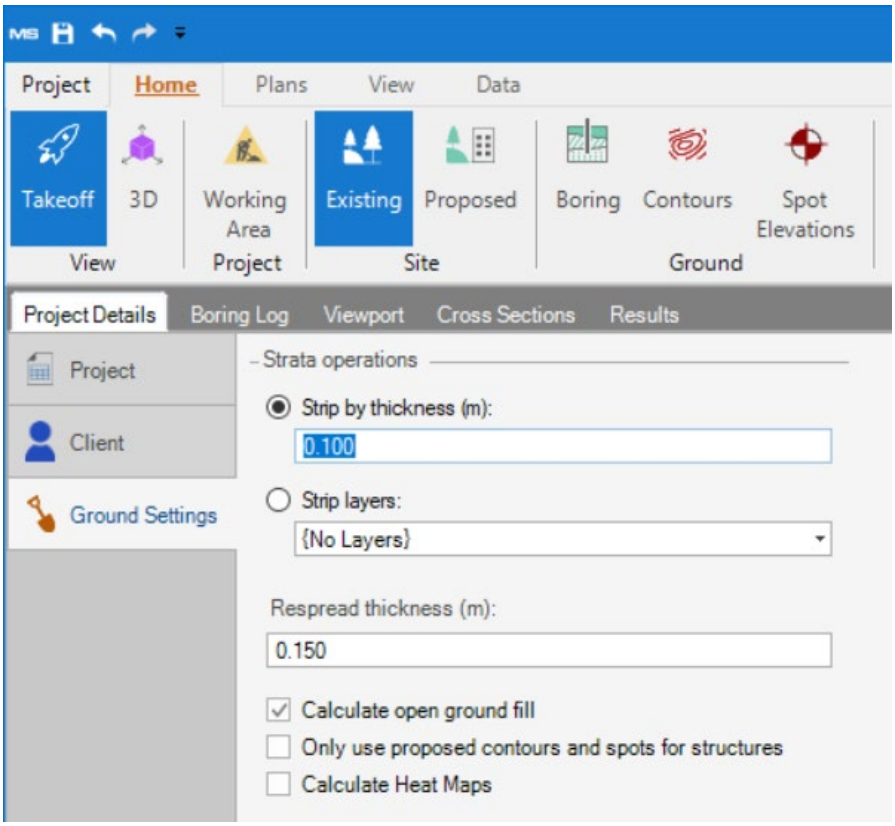


Figure 46. **Striping** and **Respread** options in **Ground Settings**.

Set Stripping Thickness

Your stripping can be calculated by setting a thickness, and your **Existing Site** will strip the thickness regardless of material layer.

To set a stripping thicknesses:

1. From the **Project Details** embedded tab, click **Ground Settings** option.
2. Click the radio button for **Strip by thickness**.
3. You can enter the thickness you wish to strip for your **Existing Site** in the **Strip by Thickness** field.
   Tip: You don't need to enter whole numbers, you can use decimals for accuracy, like 0.1 or 0.75.

Select Layers to be Stripped Away

Your stripping can be calculated by selecting one or more material layers, which will be stripped from your **Proposed Site** regardless of thickness.

To strip by layers:

1. From the **Project Details** embedded tab, click **Ground Settings** option.
2. Click the radio button for **Strip away**.
3. Click the field under **Strip away**, and select the material layer or material category you wish to strip away to.
   Tip: You can read more about materials, including material categories, here: Understanding Materials

Set Respread Thickness

Your respread can only be respread by setting a thickness.

To set a respread thicknesses:

1. From the **Project Details** embedded tab, click **Ground Settings** option.
2. You can enter the thickness you wish to respread for your **Proposed Site** in the **Respread Thickness** field.
   Tip: You don't need to enter whole numbers, you can use decimals for accuracy, like 0.1 or 0.75.

Materials

Understanding Materials

In MudShark, you can use a materials library to control how it looks and affects how the Material behaves when subjected to cut and fill operations.

Materials can also be divided into **Global Materials** which are accessible for all projects, and **Project Materials** which are accessible only for a specific project.

There are multiple editable fields for materials, including **Description**, **Category**, **Colour**, **Unsuitable** percentage and **Note**. Within a project you can set whether that material is used for **Respread**, **Structure Fill**, and **Ground Fill**. You can also set a **Bulking** and **Compression** factor.

Access Global Materials

Materials created in the **Global Materials** list can be used in any project.

To access Global Materials:

1) From the **Data** tab in the ribbon, click **Global Materials**.
2) The **Global Material** window will open.

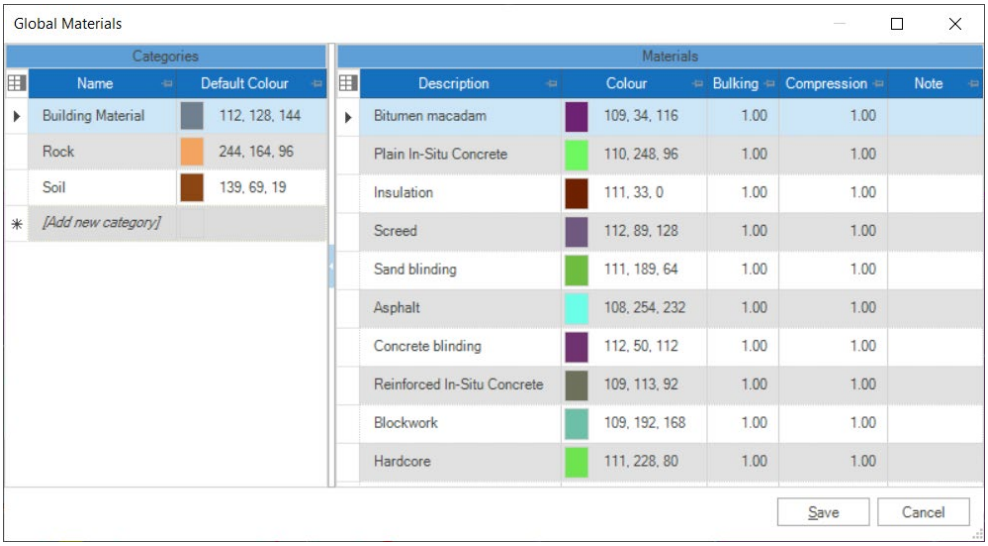


Figure 47. Global Materials window

Access Project Materials

Once you use a material in a project, it will be added to the **Project Materials** list.

Project Materials are unique to a project, any property of that material that is changed will change everywhere in that project, but will not affect other projects or the **Global Material** list.

For **Project Materials**, you can set whether certain materials are used for **Respread**, **Structure Fill**, and **Ground Fill**.

> *Tip: Selecting a Material in the Project Materials window will highlight that Material in the Viewport, if its use is currently visible.*

To access Project Materials:

1) From the **Data** tab in the ribbon, click **Project Materials**.
2) The **Project Materials** window will open.

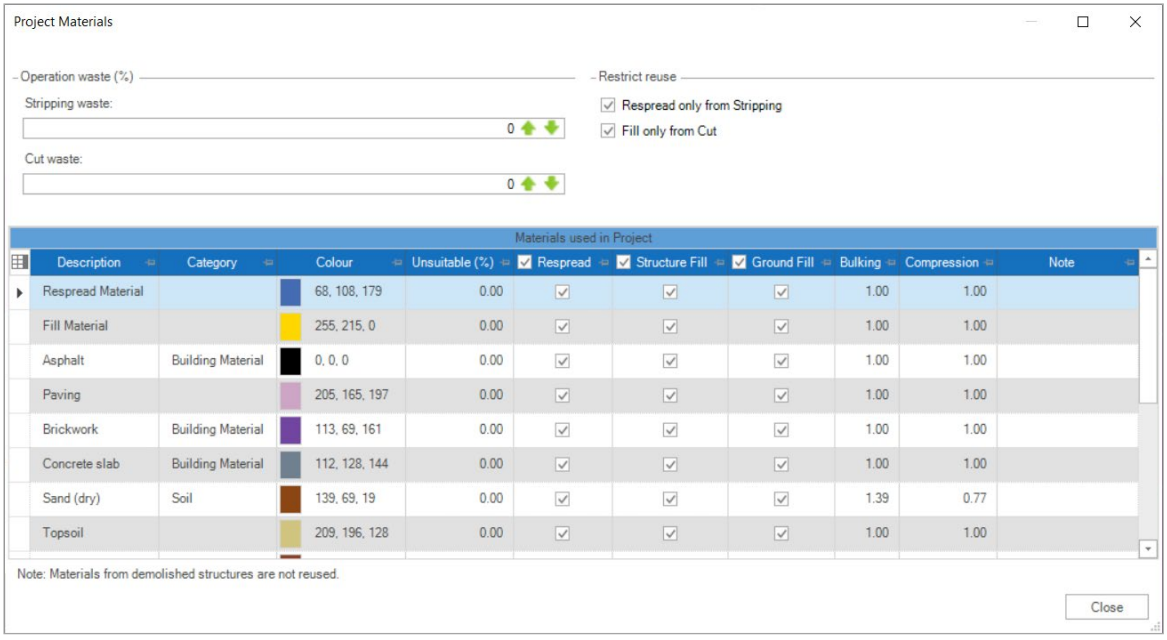


Figure 48. **Project Materials** window

Understanding Factors

You can set two factors for each material, a **Bulking Factor** and a **Compression Factor**. These materials affect the volumes added or removed to the ground or a structure. By default, factors are set to 1.0, but they can be changed. If you have set these factors for the **Global Materials** list, those factors will be used for each project, but can be changed.

Bulking Factor

Sometimes, when material is moved from the ground it can swell up to occupy a larger volume. You can use the **Bulking Factor** to indicate the extent of this bulking.

> *For Example: If a material has its **Bulking Factor** set to 2.00, when that material is Cut from the soil the volume will be double.*

Compression Factor

Sometimes, when Material is added to the ground it can settle, shrink, or be compacted to be a smaller volume. You can use the **Compression Factor** to indicate how material behaves in this circumstance.

> *For Example: If you are importing material from offsite, you can set the **Compression to** 0.5, so that the imported material will halve in volume when it is put into the ground.*

Factor Order

If you are reusing material, the **Bulking Factor** will be calculated first and then the **Compression Factor** applied next

> *For Example:* If the materials **Bulking Factor** is 2, the **Compression Factor** is 0.5, the reused material will be half of the banked volume and a quarter of the bulked volume.

Using Materials

Two Materials are added into a project by default; **Respread Material** and **Fill Material**. These both denote the properties of material that may need to be imported into the site. Changes made to the **Respread Material** can affect the **Imported Respread** results, likewise, changes to the **Fill Material** can affect the **Imported Fill** results.

> *Tip: The default values for **Respread Material** and **Fill Material** can be changed in* **Options**, but these will *take effect on the next new project.*

Add a New Material

You can add materials to the **Global Materials** list.

To add a new material:

1) From the **Data** tab in the ribbon, click **Global Materials**.
2) The **Global Material** window will open.
3) From the **Categories** pane, select a category.
   *Tip: To create a new category, enter a **Name** then select a **Default Colour** for that category.*
4) Select the bottom most row from the **Materials** pane.
5) Enter a **Description** for the material. A default **Colour** will automatically be set, as will **Bulking** and **Compression** factors; you can edit these.
6) Click **Save**.

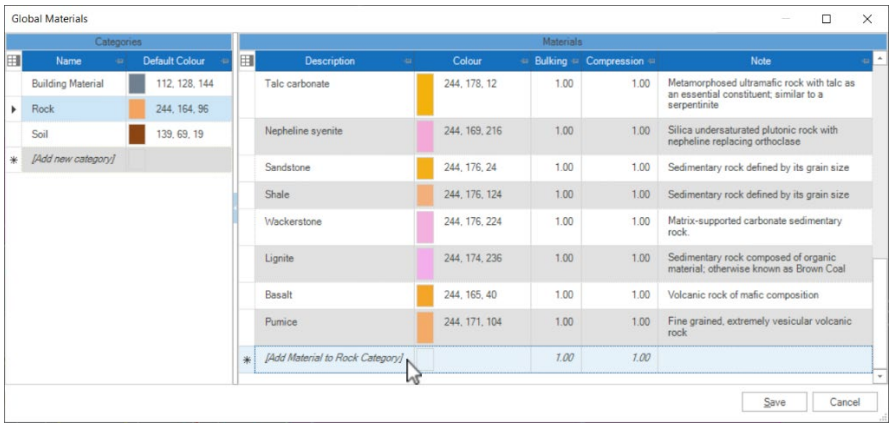


Figure 49. Add material to **Global Materials**

Results

Understanding Results

So your takeoff is efficient and seamless, MudShark won't calculate your results until you're ready.

MudShark can calculate Results for:

- Stripping area and volumes
- Cut and fill volumes in open ground and beneath structures
- Respread area and volumes
- Structure material volumes
- Material reuse
- Site balance volumes
- Trench and pipe networks
- Areas, Lengths, and counts

To calculate results MudShark requires at least:

- A defined **Working Area**
- An elevation (Contour or Spot Elevation) in the **Existing Site**

Calculate Your Results

You can calculate results at anytime, however we recommend waiting until most of your takeoff is done or complete.

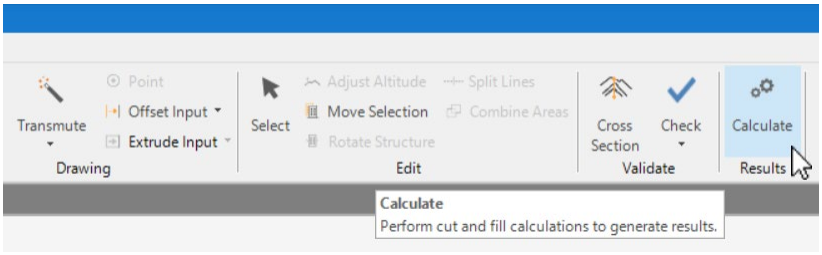


Figure 50. Calculate button

To calculate your Results:

1. From the **Home** tab in the ribbon, click **Calculate**.
2. The **Calculate Check List** window will appear.

   *TIP: Any defaults entered in the **Ground Settings** under **Project Details** will show here. You can change these settings, and your defaults for the project will remain unchanged.*

3. You can set the depth you want to strip the site by in **Strip by thickness** or select layers to strip from the **Strip layers** menu.
4. Select a volume that will be used for **Respread thickness**.
5. You can check, or uncheck **Calculate Open Ground Fill**, if checked, any area without a structure on top will be calculated when you click **Calculate**.
6. You can check **Only Use Proposed Contours For Structures,** which will otherwise ignore contours except for structures. By default, this is unchecked.
7. You can check **Calculate Heat Map**, which will generate a Heat Map for your project. Checking this option will increase the time it takes for your calculation to complete.
8. Click **Ok.**

   TIP: Your project may take a few minutes to calculate, calculation time depends on multiple factors, including scale and amount of takeoff.

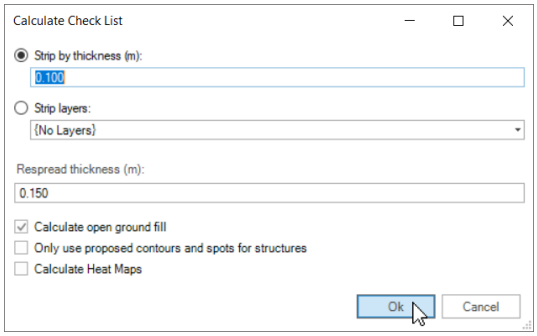


Figure 51. Calculate Check List window

Inspect 3D Site

Calculating your project, will generate your site in 3D, which you can use to validate your results. Inspecting your 3D site in the Viewport is one of the best ways to validate your results, because you can zoom in close and any incorrect altitudes will be immediately noticeable by spikes.

> *Tip: You can export an image of the current **Viewport** or your site as a 3D vector file by clicking **Viewport Snapshot** and **Visible Site** respectively from the **Data** tab in the ribbon.*

To inspect your site in 3D:

1) From the **Home** tab in the ribbon, click **3D**.
2) Use the **Viewcube** to change the angle of your site, and scroll into your site with your mouse wheel, and pan around the site by clicking your scroll wheel button.
3) From the 3D Site List pane, you can change the visibility of different layers.
   TIP: Click Existing or Proposed from the Home tab in the ribbon, to change your 3D site between these states.

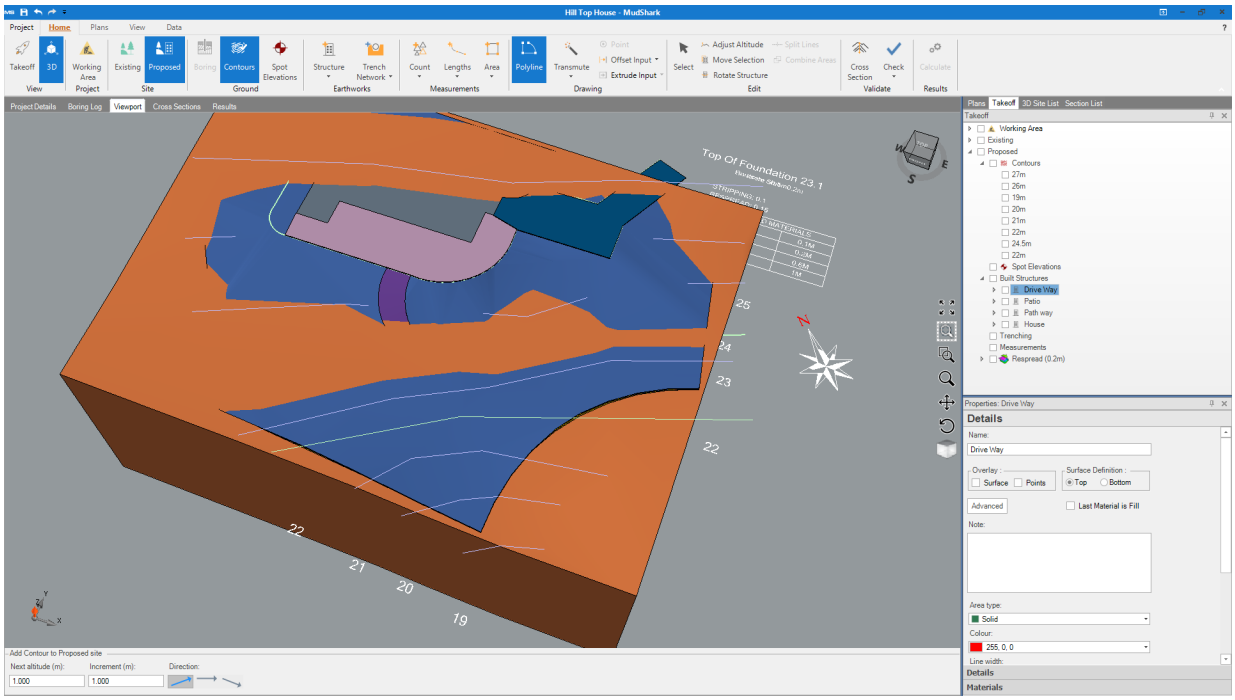


Figure 52. 3D Site of a Proposed Site.

Understanding Edge Styles

You can change how the 3D is displayed in your **Viewport**.

There are three display options:

- **Sharp** highlights the edges of your 3D with a black line.
- **Opaque** highlights the edges with a lighter version of the material colour.
- **Smooth** doesn't highlight edges at all.

Change Edge Styles

To rotate a plan by a custom degrees:

1. From the **View** tab in the ribbon, click **Edge Style**.
2. Select between **Sharp**, **Opaque**, and **Smooth** for the edge style you which to view your 3D site.

   TIP: By default, Sharp edge style will be displayed.

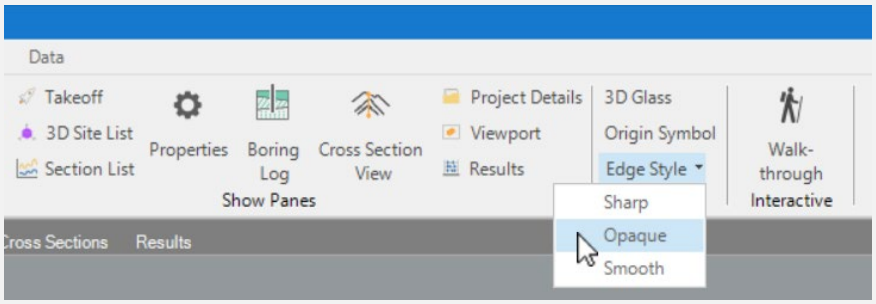


Figure 53 Select **Edge Style**

Check Contours

If your results couldn't be calculated, or on inspecting your site in 3D something looked wrong, you might have crossing contours. MudShark can check if you have any contours that match this.

To check your Contours:

1. Click the arrow under **Check** from the **Home** tab in the ribbon.
2. Click **Check Contours**.
3. Any crossing contours will be highlighted, or you will be greeted with a notification reading: **No incorrect contours found.**

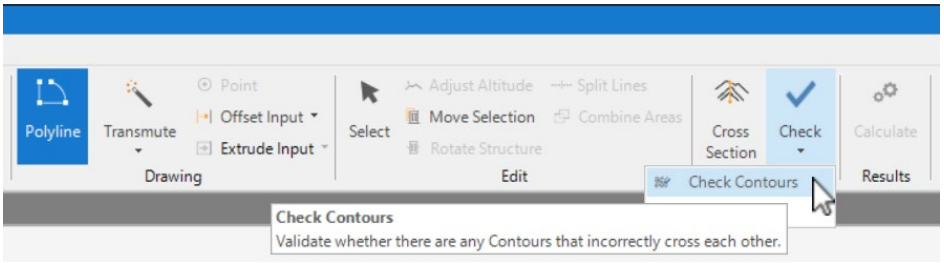


Figure 54. Check contours

Results Grid

All volume results are collated, filtered and grouped in the **Results** pane as a grid. From the Results embedded tab, you can drill down into details about your volumes.

The **Results** pane will show you total **Cut (Bulked)** volume for a single **Strata Operation**, a single **Material** or the **Entire Site**. It will also show you how much **Exported (Bulked)** volume needs to be taken off site and how much is **Reused (Bulked)** in the site.

You can see the total volume for the **Fill (Compressed)** and a breakdown of how much of that was reused **From Site (Compressed)** versus what will need to be **Imported (Banked)** from off site.

These volumes are then summarised as **Site Balance (Bulked)**, which displays which items have a net effect of requiring materials to be removed from the site or brought in from elsewhere. A negative number indicates a net effect of material being removed from the site. You can then use the **Site Balance (Bulked)** values to adjust your earthwork plans to try and achieve the optimal material reuse.

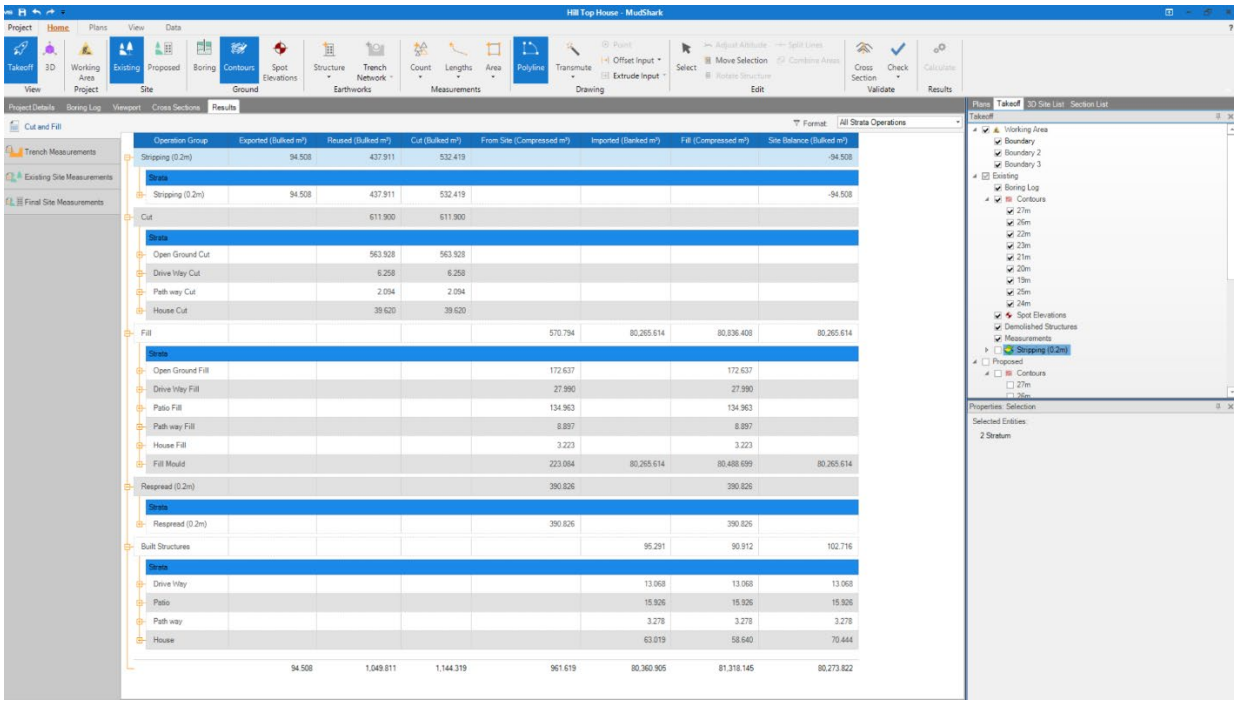


Figure 55. **Results** pane

Result Filters

There are filters you can apply to your results.

There are two groupings:

- The **Strata Operations** group includes results organised by the **Strata Operation** that affects them so you can easily see volumes as they relate to each operation, regardless of material.

    *For example: All **Stripping** is under a single group.*

- The **Materials** group includes results organised by the type of material used, so you can see how much of each material is being used, and where it is being used on the site.

    *For example: All **Sand (dry)** is under a single group.*

For each grouping you are able to drill down into finer detail that shows where the result has come from. You can filter these groups so that you are only able to see volume results from **Structures**, **Ground** or **All**.

Tip: *Selecting items in the **Results** pane will highlight them in the **Viewport.***

Export Results

You can export your results in a number of formats, including for Microsoft Excel and a snapshot of the **Viewport**.

Export to Cubit

You can export your results for Cubit – Natural Estimating. You will save your results as a XML result file, which can then be imported into Cubit.

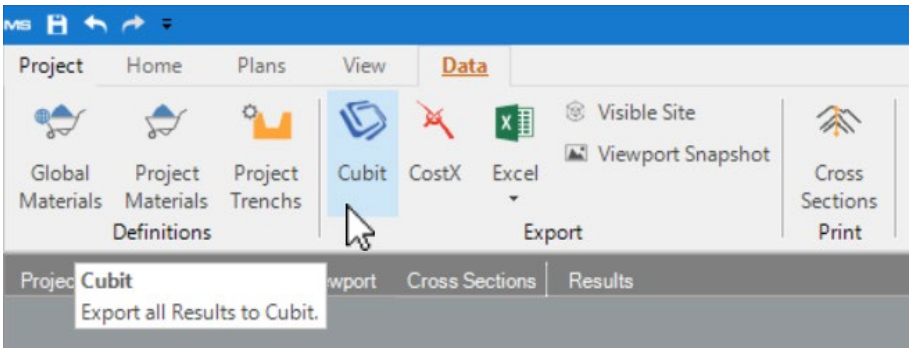


Figure 56. Click **Cubit** to export your results for the estimating software

To Export your results for Cubit:

1. From the **Data** tab in the ribbon, click **Cubit**.
2. Navigate your computer and select the location where you want to save the file.
3. Enter a name in the **File name** box, by default the project name will be used.

   TIP: Your results will be saved as a XML result file.
4. Click **Save**.

Export to CostX

You can export your results for CostX. You will save your results as a RIB file, which can then be imported into CostX.

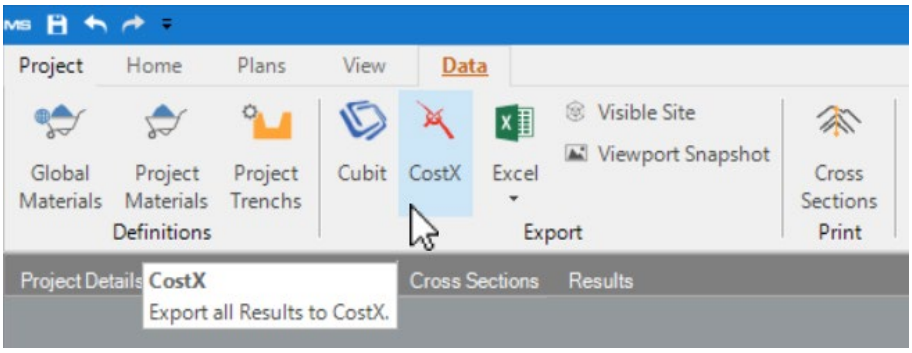


Figure 57. Click **Cubit** to export your results for the estimating software

To Export your results for Cubit:

1. From the **Data** tab in the ribbon, click **CostX.**
2. Navigate your computer and select the location where you want to save the file.
3. Enter a name in the **File name** box, by default the project name will be used.

   TIP: *Your results will be saved as a RIB file.*
4. Click **Save**.

Export to Microsoft Excel

You can export your results, or measurements to a Microsoft Excel file.

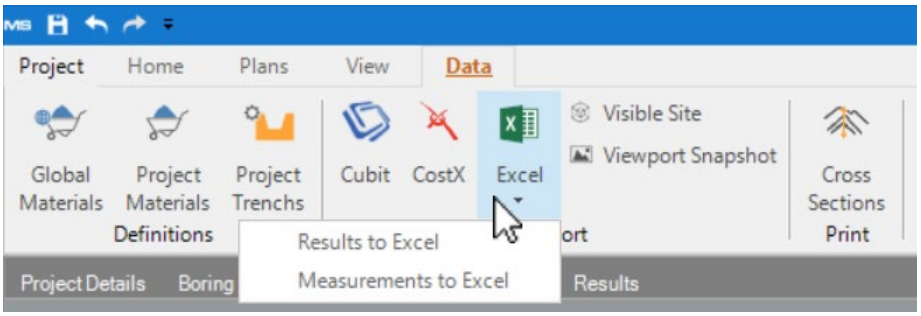


Figure 58. Excel export options

To export a Microsoft Excel file:

1. From the **Data** tab in the ribbon, click the arrow under **Excel**.
2. Select **Results to Excel** or **Measurements to Excel**, to export your results or measurements.

   *TIP: If there are changes to your project that haven't been calculated, you will be offered a chance to **Calculate Site**.*
3. Navigate your computer and select the location where you want to save the file.
4. Enter a name in the **File name** box, by default the project name will be used.
5. Click **Save**.

The Excel file will have the different results filters as separate tabs. Also, the data is formatted so you can interact with the data groups like you do in MudShark , with expandable and collapsible groups.

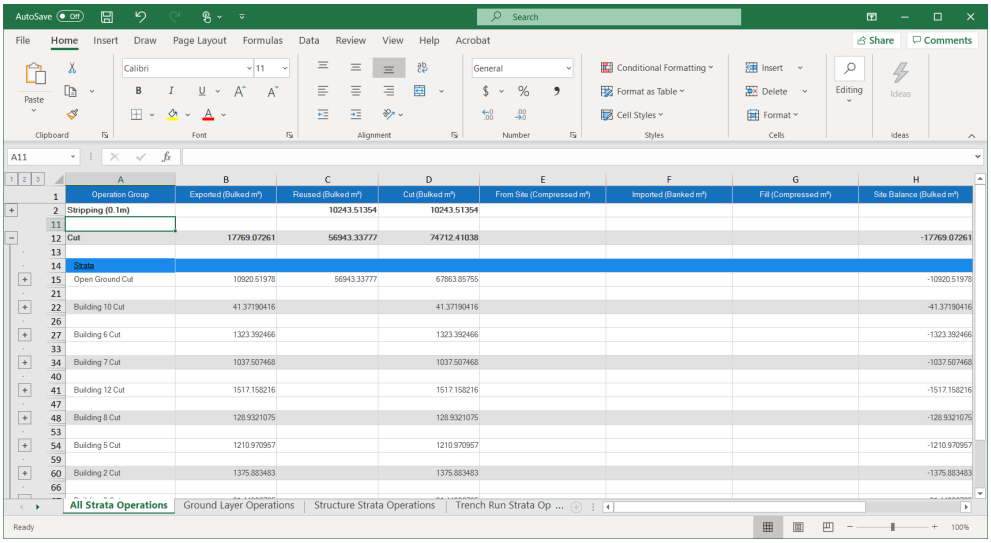


Figure 59. A MudShark project in Microsoft Excel

Export a Viewport Snapshot

You can save an image file of the **Viewport** and its contents. You can take snapshots of your project **Takeoff** or **3D**, **Existing** or **Proposed** sites, and with any visibility you've set.

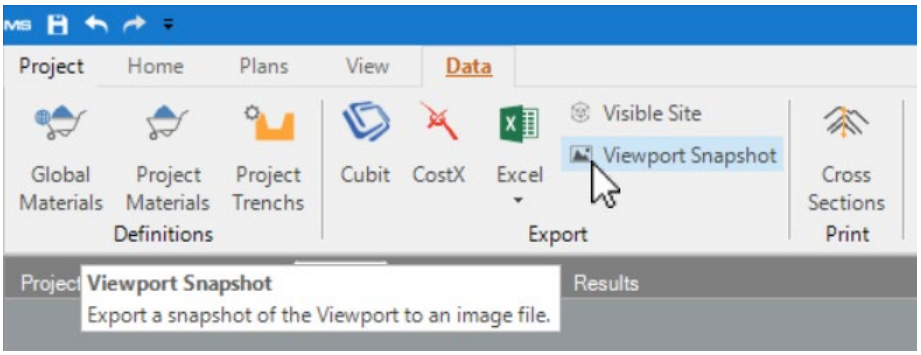


Figure 60. Click **Viewport Snapshot** to export an image of your **Viewport**

To Export a Viewport Snapshot:

1. From the **Data** tab in the ribbon, click **Viewport Snapshot**.
2. Navigate your computer and select the location where you want to save the file.
3. Enter a name in the **File name** box, by default the project name will be used.
4. From the **Save as Type** box select the file type you want to create, by default this is set to PNG.

   TIP: You can also save your site as a BMP file or EMF file.
5. Click **Save**.

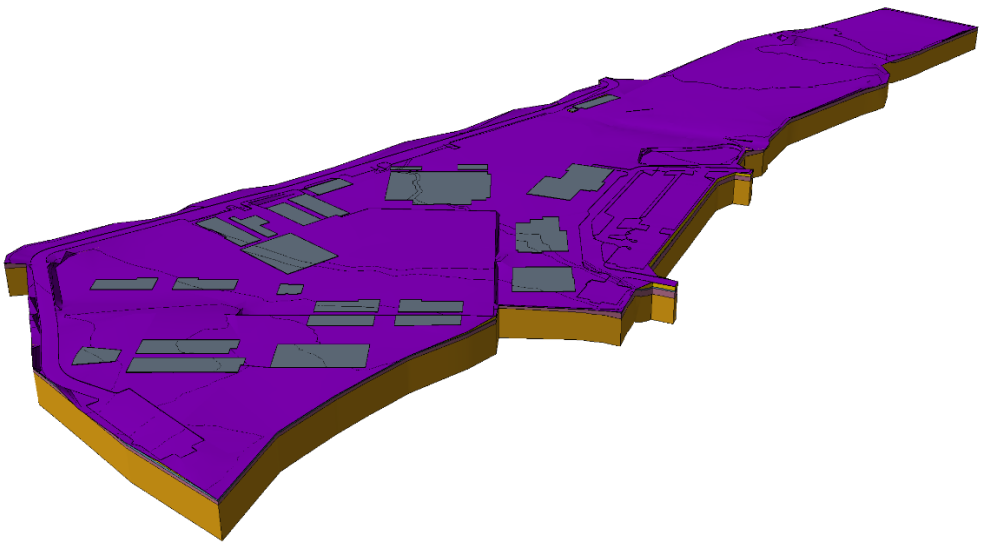


Figure 61. A Viewport snapshot

Export 3D Vector Data

You can export all visible entities in the **Viewport** as a 3D vector file, which can be used in other applications. You can control the visibilities from the **3D Site List** pane.

Saving your project as a 3D vector file is useful if you utilise a BIM workflow or 3D printing.

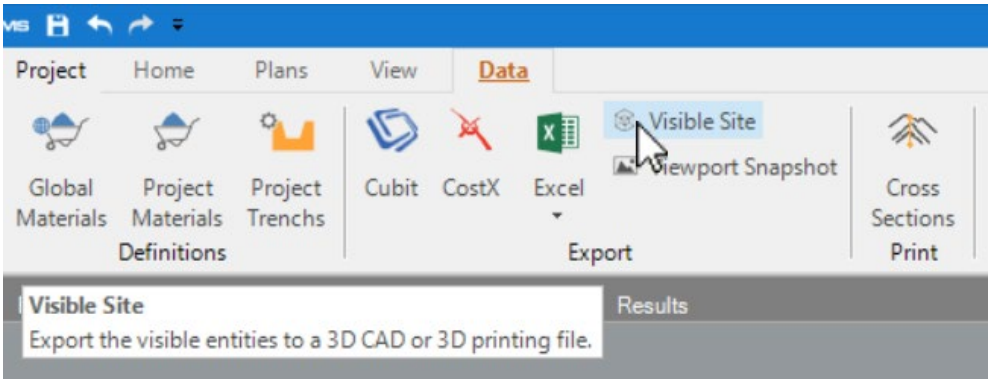


Figure 62. Click **Visible Site** to export your 3D vector site

To Export the Visible Site:

1. From the **Data** tab in the ribbon, click **Visible Site**..
2. Navigate your computer and select the location where you want to save the file.
3. Enter a name in the **File name** box, by default the project name will be used.
4. From the **Save as Type** box select the file type you want to create, by default this is set to DWG.

   TIP: You can also save your site as a DXF file, OBJ file, 3D Print STL file, or a 3d Webgl HTML file. (Use 3D Print STL file for 3D printing.)
5. Click **Save**.

Keyboard and Mouse Shortcuts

General

Delete	Delete current selection.
Ctrl + S	Save the current Project.
Ctrl + O	Open a Project.
Ctrl + N	Create a New Project.
Ctrl + Shift + N	Create a New Structure.
Ctrl + Z	Undo.
Ctrl + Y	Redo.
Ctrl + C	Copy text from a control.
Ctrl + V	Paste text into an editable control.
Ctrl + right arrow	Move the insertion point to the beginning of the next word.
Ctrl + left arrow	Move the insertion point to the beginning of the previous word.
Ctrl + Tab	Cycle through pane windows.
Ctrl + F4	Close the active pane if that pane can be closed.
Ctrl + 1	Show Plan List pane.
Ctrl + 2	Show Take Off List pane.
Ctrl + 3	Show 3D Site List pane.
Ctrl + 4	Show Properties pane.
Ctrl + 5	Show Project Details pane.
Ctrl + 6	Show Viewport pane.
Ctrl + 7	Show Results pane.

Viewport

Ctrl + A	Selects all the entities in the Viewport.
Left arrow	Pan the Viewport left.
Right arrow	Pan the Viewport right.
Up arrow	Pan the Viewport up.
Down arrow	Pan the Viewport down.
Ctrl + 0	Perform zoom fit of Viewport entities.
Ctrl + J	Joins the last takeoff point to the start point.
Scroll mouse wheel	Zooms into the Viewport.
Click mouse wheel	Enables panning of the Viewport contents.

List Panes

Asterix*	Display all sub-items under selected item.
Plus*	Display all sub-items directly under selected item.
Minus*	Collapse items directly under the selected item group.
Left arrow	Collapse current selection.
Right arrow	Display all sub-items directly under the selected item.
Ctrl + up arrow	Scroll the list without affecting the selection.
Ctrl + down arrow	Scroll the list without affecting the selection.

** Shortcut only applies to numeric keypad*