TUTORIAL WORKBOOK

Slope Optimisation

Six practical cases. One complete workflow.

IOC 2026 OPTIMALMINE School

Wednesday 7 October 2026 | 09:00-17:00 | Bor Lake Hotel Hall

WORK TEAM

Beatrice Carrozzo [1]
b.carrozzo@campus.unimib.it

Filippo Bianchi [3]
f.bianchi16@phd.uniba.it

Riccardo Castellanza [1]
riccardo.castellanza@unimib.it

Stefano Utili [2, 4]
stefano.utili@newcastle.ac.uk
stefano_utili@optimalslope.com

Matteo Ciantia [1]
matteo.ciantia@unimib.it

Dainius Jenkus [1, 4]
dainius_jenkus@optimalslope.com

1 Università degli Studi Milano-Bicocca, Department of Earth and Environmental Sciences (DISAT), Milano 4, 20126, Italy.

2 Newcastle University, Newcastle upon Tyne, UK.

3 Università degli Studi di Bari Aldo Moro, Piazza Umberto I, 70121 Bari, Italy.

4 Optimal Slope: Stefano Utili, CEO; Dainius Jenkus, CTO.

YOUR ROUTE THROUGH THE WORKBOOK

Contents

Start with the overview and licence setup, then work through the six cases.

START HERE **Tutorial overview** — Scope and workflow — 03

SETUP **Activate your licence** — Configure and check your account — 04

CASE 1a **Homogeneous / Mohr-Coulomb** — Build your first slope optimisation model — 05

CASE 1b **Homogeneous / Hoek-Brown** — Use a Generalised Hoek-Brown rock mass — 12

CASE 02 **Layered open-pit section** — Assign properties across geological layers — 17

CASE 3a **Groundwater / Crest anchor** — Introduce a piezometric line — 22

CASE 3b **Groundwater / Toe anchor** — Toe anchor using the Case 3a result — 28

CASE 04 **Groundwater and faults** — Add geological faults to the section — 31

REFERENCE **Export and reuse results** — DXF formats and output sections — 37

BEFORE YOU BEGIN

Tutorial Case Studies

THE SHARED WORKFLOW

Activate license → Create Project → Import Models → Define rock properties → Run simulation → Review → Export

This tutorial introduces the modelling and optimisation of open-pit slopes using OptimalSlope. Six case studies cover homogeneous and layered materials, groundwater conditions and geological faults. Cases 1a and 1b compare Mohr-Coulomb and Generalised Hoek-Brown models.

Cases 3a and 3b compare crest and toe anchors with the same groundwater setup.

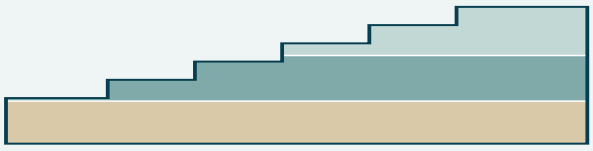
1a / 1b



Homogeneous

Mohr-Coulomb / Hoek-Brown

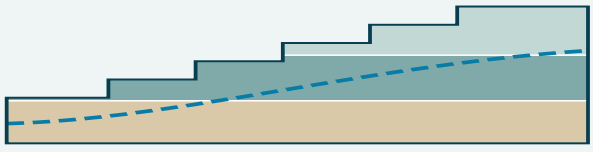
02



Layered

Multiple materials

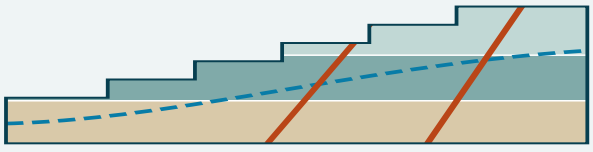
3a / 3b



Groundwater

Crest / Toe anchor

04



Faults

Water and faults

Full software user manual: optimalslope.github.io/manual/

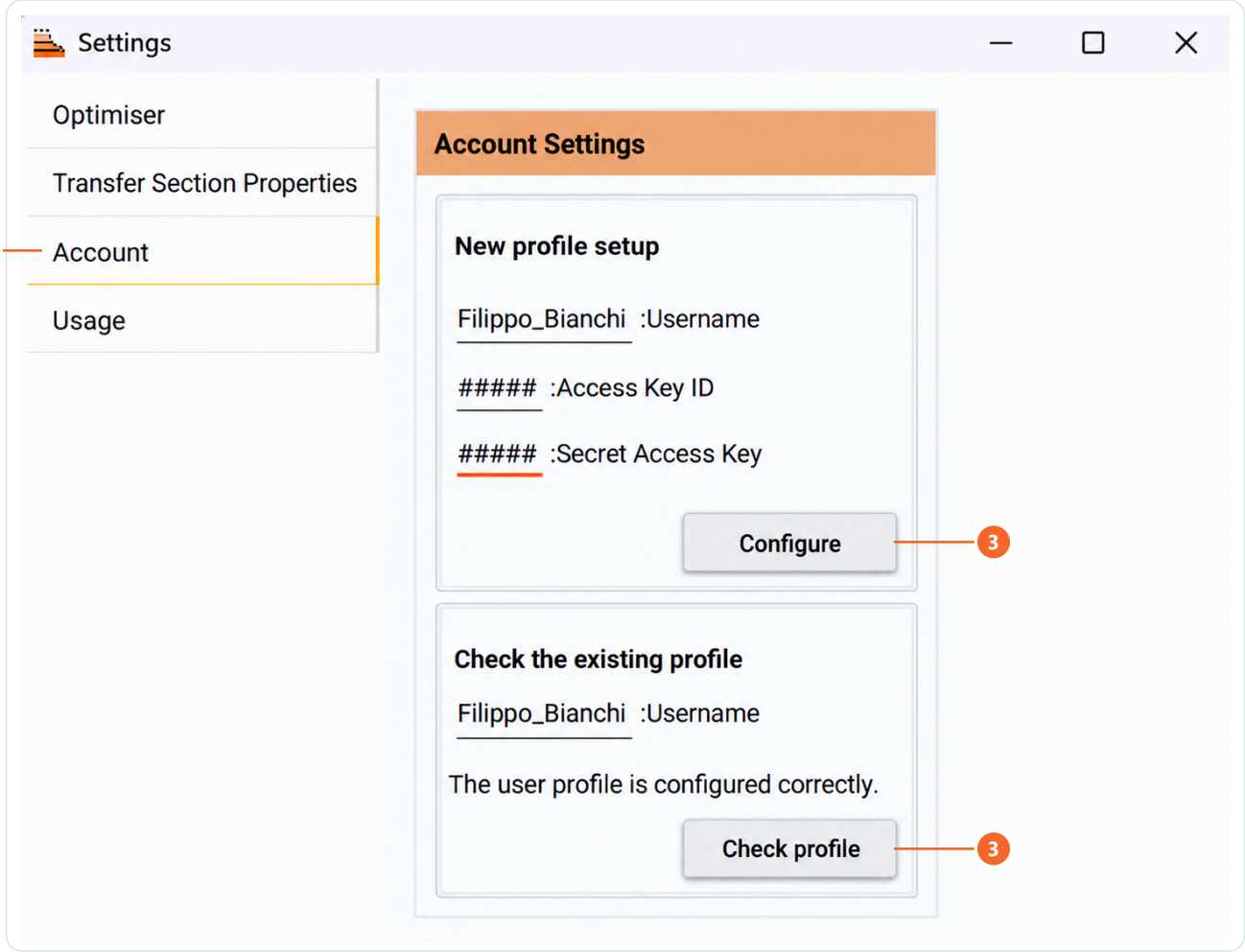
SOFTWARE SETUP

Activate your licence

Download the software from the OptimalSlope website.
Install the software, then configure your account using the steps below.

1 **Open Tools → Settings.**

2 **Select Account.** Enter your Username, Access Key ID and Secret Access Key in the New profile setup fields.



3 **Click Configure, then Check profile.** Confirm that the account panel reports: "The user profile is configured correctly."

Before running a simulation, ensure that a valid software licence is configured.

CASE 1A / CREATE AND IMPORT

Homogeneous / Mohr-Coulomb

You will learn to create and optimise a homogeneous rock-mass slope.

1 **Create a new project.** Choose **File** → **New**.

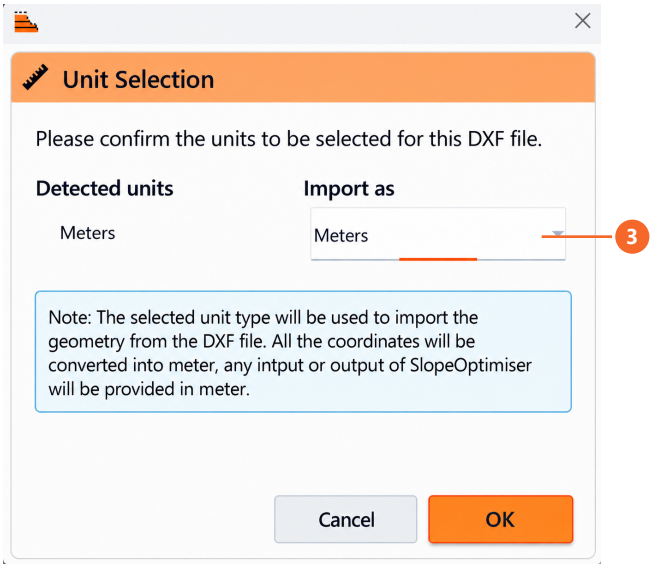
2 **Import the section.** Choose **File** → **Import Section** → **DXF**, select the file below and click **Open**.

EXERCISE FILE

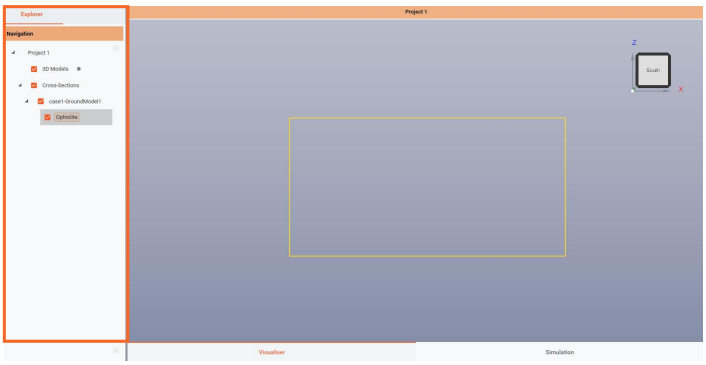
case1-GroundModel.dxf

Folder: Case_1A_homogeneous_MC

3 **Set the import units.** For the supplied exercise file, select **Meters** under **Import as**, then click **OK**.



IMPORTED SECTION & LAYERS



After import, find your section and its layers under **Cross-Sections** in the left-hand **Navigation** panel.

Next: switch to the 2D view and expand Navigation (page 6).

Read more about DXF model preparation here.

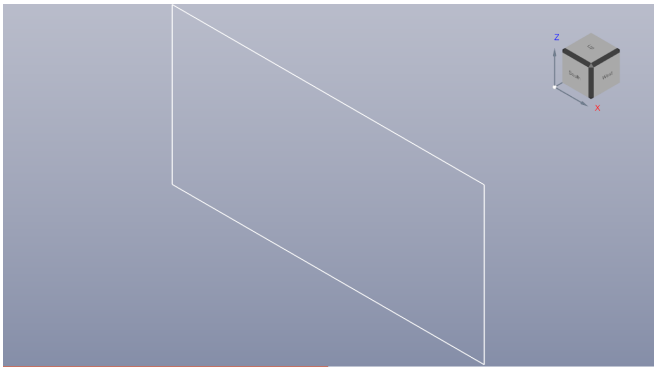
CASE 1A / CREATE AND IMPORT

View and navigate the section

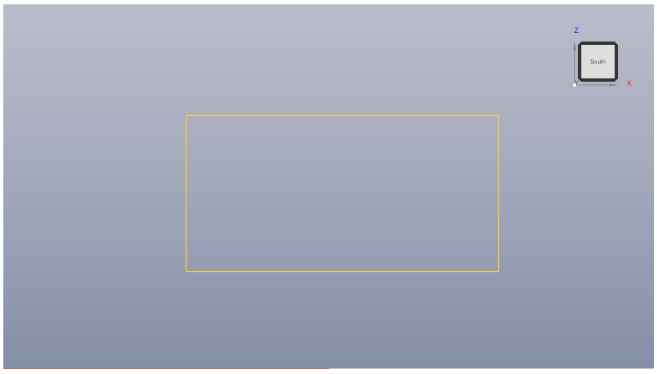
After import, the cross-section appears in a 3D view. Switch to the 2D view, then expand the Navigation tree to select its layers.

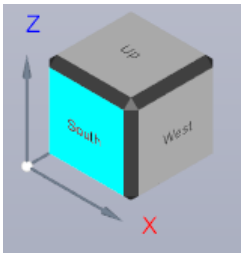
1 **Switch to the 2D view.** Click the **South** face of the small view cube in the top-right corner of the Visualiser.

AFTER IMPORT / 3D VIEW



AFTER CLICKING SOUTH / 2D VIEW

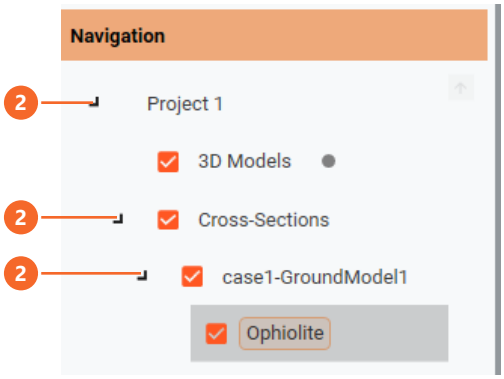




CLICK THE SOUTH FACE

The highlighted face is labelled **South**. Clicking it aligns the view with the cross-section, which appears as a rectangle.

2 **Expand the Navigation tree.** Click the small arrows in the left-hand **Navigation** panel to reveal the imported section and its layers.



FOLLOW THE TREE

Project → **Cross-Sections** → imported section → **Ophiolite**

Select the **Ophiolite** layer to define its material properties in the right-hand **Properties** panel.

CASE 1A / MATERIAL PROPERTIES

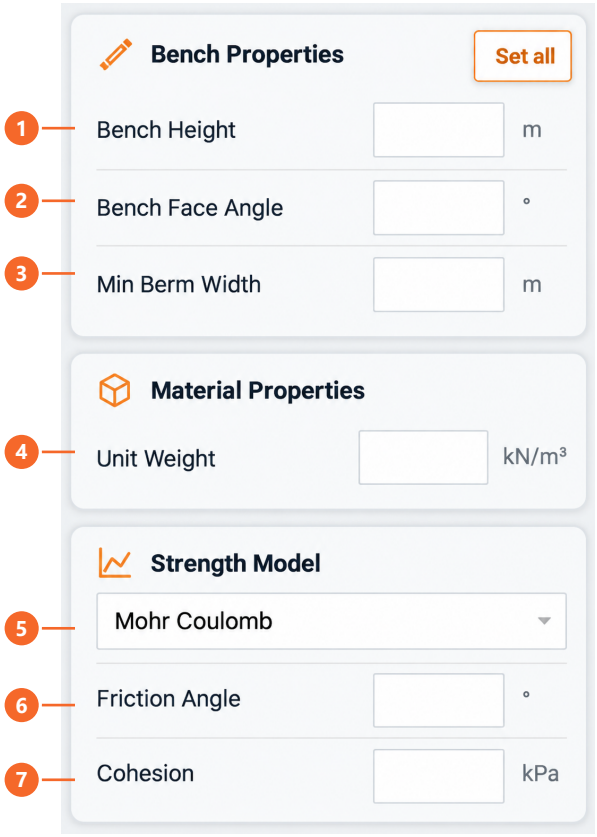
Define the materials

Select Ophiolite layer in the left-hand Navigation panel. Enter its properties on the right.

	MATERIAL INPUT	VALUE
1	Bench height	12.19 m
2	Bench face angle	90°
3	Minimum berm width	6.938 m
4	Unit weight	29 kN/m³
5	Strength model	Mohr-Coulomb
6	Friction angle	31°
7	Cohesion	469 kPa

AUTOMATIC BERM WIDTH

If no berm width is entered:
$b_w = 4.5\ m + 0.2 \times H_{bench}$



Properties panel before values are entered.

Select Ophiolite layer

CASE 1A / SLOPE GEOMETRY

Set the slope geometry

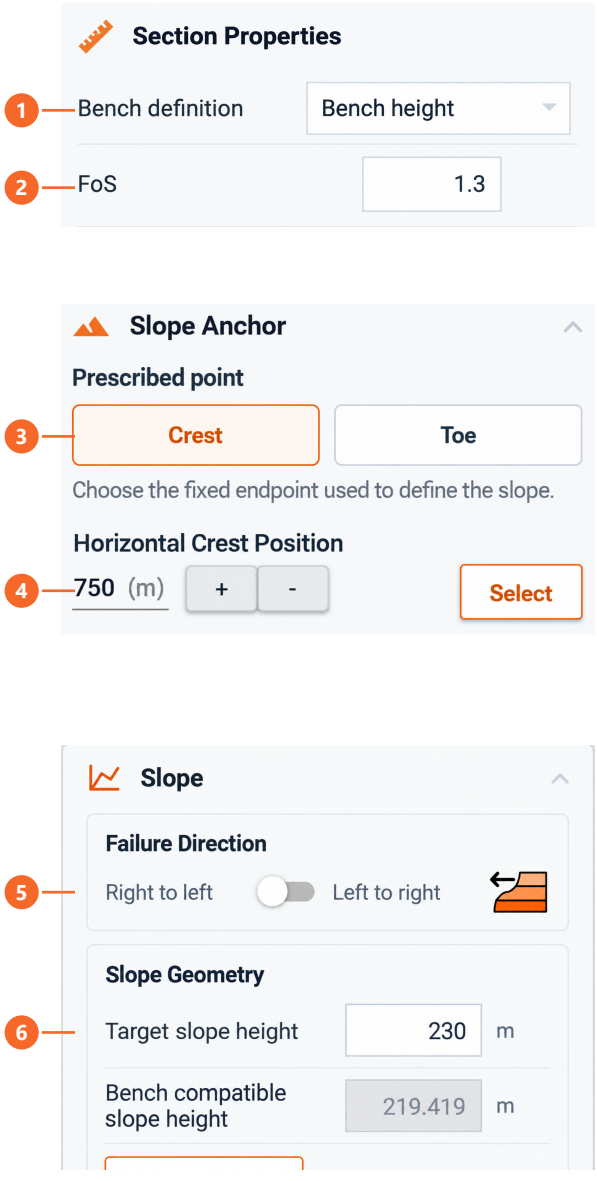
In the left-hand Navigation panel, select the imported cross-section, **case1-GroundModel1**, and enter the settings below.

	SECTION INPUT	VALUE
1	Bench definition	Bench height
2	Target FoS	1.3
3	Prescribed point	Crest
4	Horizontal crest position	750 m
5	Failure direction	Right to left
6	Target slope height	230 m

The target FoS is a design constraint. The geometry preview displays the estimated minimum and maximum Overall Slope Angle.

Slope Anchor fixes the crest or toe. Choose **Crest** and enter the horizontal position shown above.

Slope height options: see the illustrated comparison on page 9 to understand equal-height benches and the shorter crest bench.



CASE 1A / SLOPE GEOMETRY

Slope Height Definition

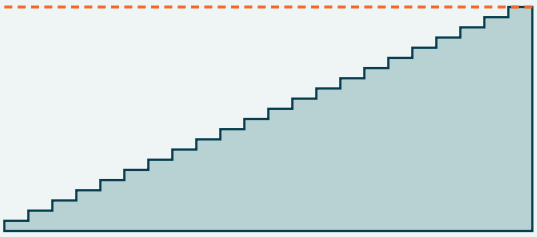
The **target slope height** is the requested overall height. **Bench-compatible height** uses full, equal-height benches and may be lower. These examples hold the target at 330 m and change the bench height.

01 15 m benches: exact fit

Target slope height	**330 m**
Specified bench height	**15 m**
Bench-compatible height	**330 m**

22 full benches × 15 m = 330 m

Every bench has the specified height; the two slope heights match.

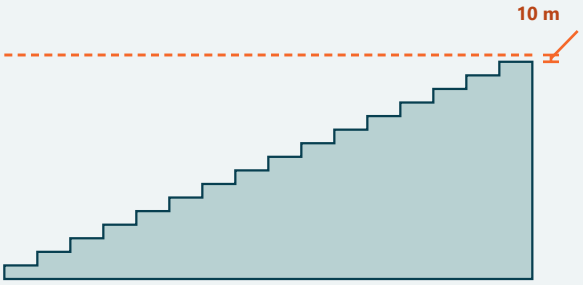


02 20 m benches: below target

Target slope height	**330 m**
Specified bench height	**20 m**
Bench-compatible height	**320 m**

16 full benches × 20 m = 320 m

A seventeenth full bench would give 340 m, exceeding the target.

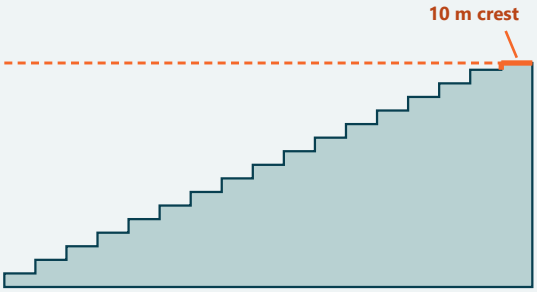


03 Use target slope height

Target slope height	**330 m**
Specified bench height	**20 m**
Resulting slope height	**330 m**
Crest bench height	**10 m**

16 × 20 m + 10 m crest bench = 330 m

Click Use target slope height. Only the crest bench is shorter; all other benches remain 20 m.



Target height: 330 m. Illustrative examples; the Case 1a inputs remain unchanged.

CASE 1A / RUN THE SIMULATION

Save and run the model

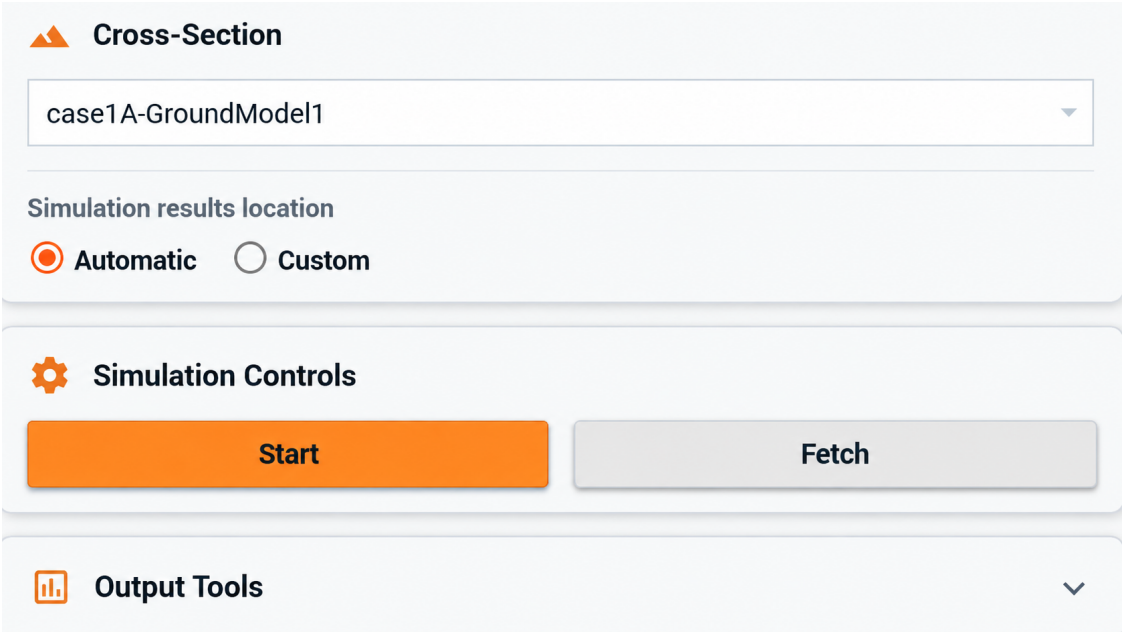
Use the Simulation page after defining the material and geometric inputs.

1. **Save the project.** Choose **File** → **Save** and save it as **Case1A-final** in your selected directory.

2. **Select the cross-section.** On the **Simulation** page, select **case1-GroundModel1**.

3. **Set the results location.** Choose **Automatic**. Results are saved in the folder containing the source **.cbf** project file.

4. **Start the analysis.** Click **Start** under Simulation Controls, then enter your username.



Review the displayed output before exporting. The example result is shown on the next page.

CASE 1A / REVIEW THE RESULTS

Inspect the output

Review the calculated geometry and Factor of Safety before exporting.

TARGET FoS	ACHIEVED FoS	TARGET HEIGHT	BENCH-COMPATIBLE HEIGHT
1.3	1.337	230 m	219.419 m

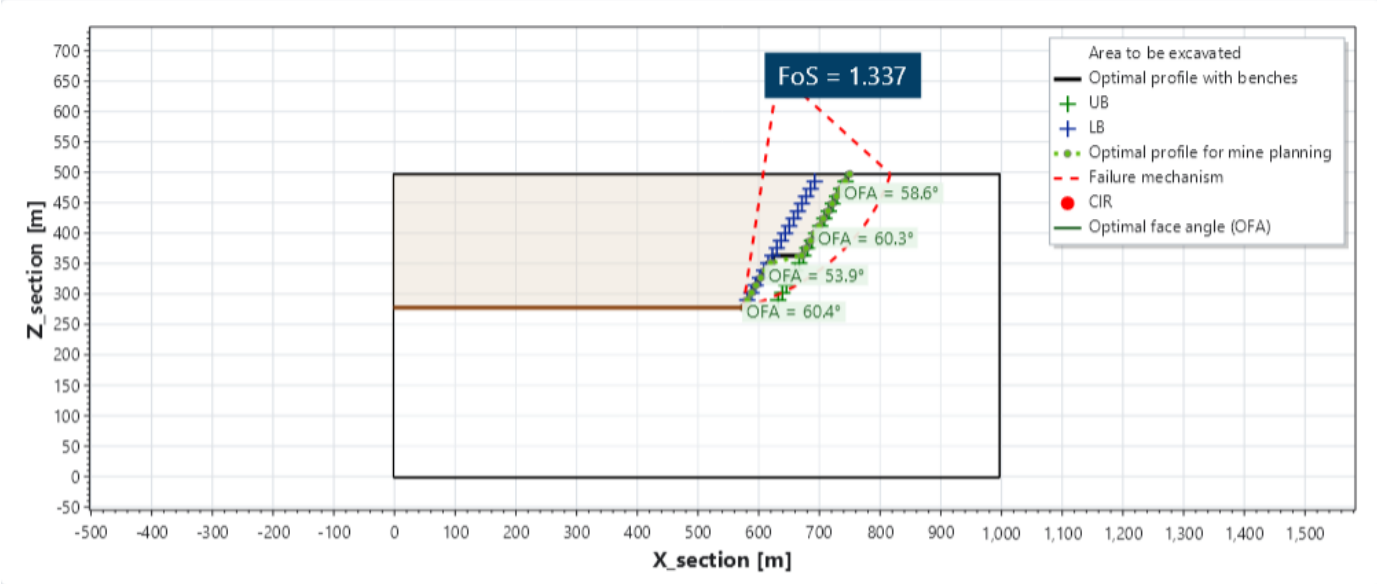


Figure 1a. Example output: optimised slope and failure mechanism.

CHECK BEFORE EXPORT

Check the calculated Factor of Safety, slope height, bench geometry and prescribed crest position against the inputs. Verify the calculated geometry and FoS before exporting the results.

Export and reuse results → page 37

CASE 1B / CREATE AND IMPORT

Homogeneous / Hoek-Brown

You will learn to optimise a homogeneous rock mass using the Generalised Hoek-Brown strength model.

1 **Create a new project.** Choose **File** → **New**.

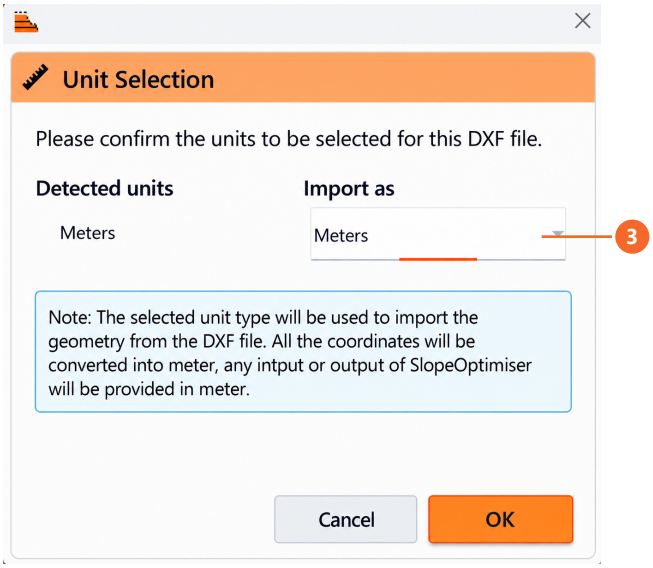
2 **Import the section.** Choose **File** → **Import Section** → **DXF**, select the file below and click **Open**.

EXERCISE FILE

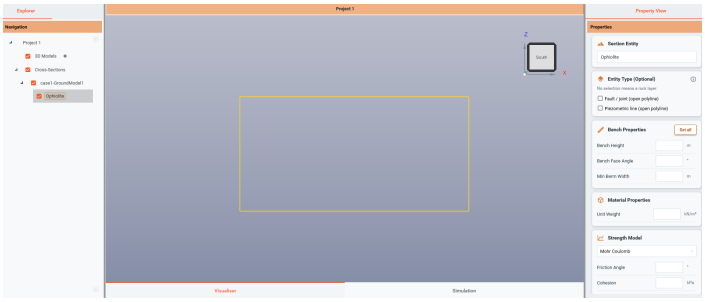
case1-GroundModel.dxf

Folder: Case_1B_homogeneous_HB

3 **Set the import units.** For the supplied exercise file, select **Meters** under **Import as**, then click **OK**.



IMPORTED SECTION & LAYERS



After import, find your section and the **Ophiolite** layer under **Cross-Sections** in the left-hand **Navigation** panel.

The imported-view screenshot is shared with Case 1a in the source manual.

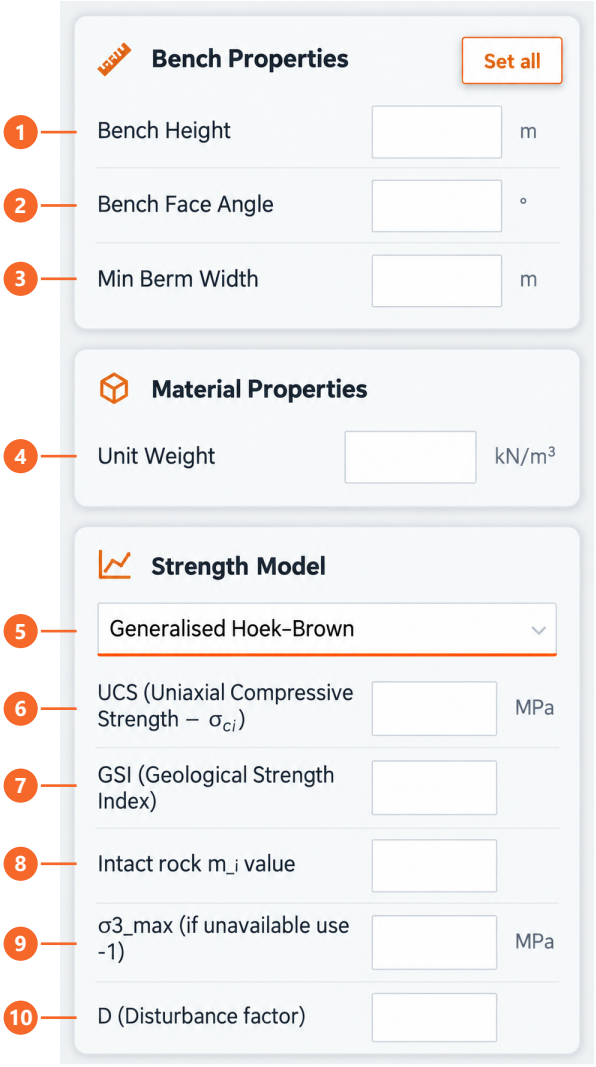
Read more about DXF model preparation here.

CASE 1B / MATERIAL PROPERTIES

Define the materials

Select Ophiolite layer in the left-hand Navigation panel. Enter its properties in the right-hand panel.

	MATERIAL INPUT	VALUE
1	Bench height	10 m
2	Bench face angle	90°
3	Minimum berm width	6.5 m
4	Unit weight	25.9 kN/m³
5	Strength model	Generalised Hoek-Brown
6	UCS	50 MPa
7	GSI	45
8	Intact rock m_i	12
9	$\sigma_{3,max}$	-1 MPa
10	Disturbance factor D	1



Properties panel before values are entered.

AUTOMATIC BERM WIDTH

If no berm width is entered, the software uses $\mathbf{b_w = 4.5\ m + 0.2 \times H_{bench}}$. For a 10 m bench, this gives **6.5 m**.

CASE 1B / SLOPE GEOMETRY

Set the slope geometry

In the left-hand Navigation panel, select the imported cross-section, **case1B-GroundModel1**, and enter the settings below.

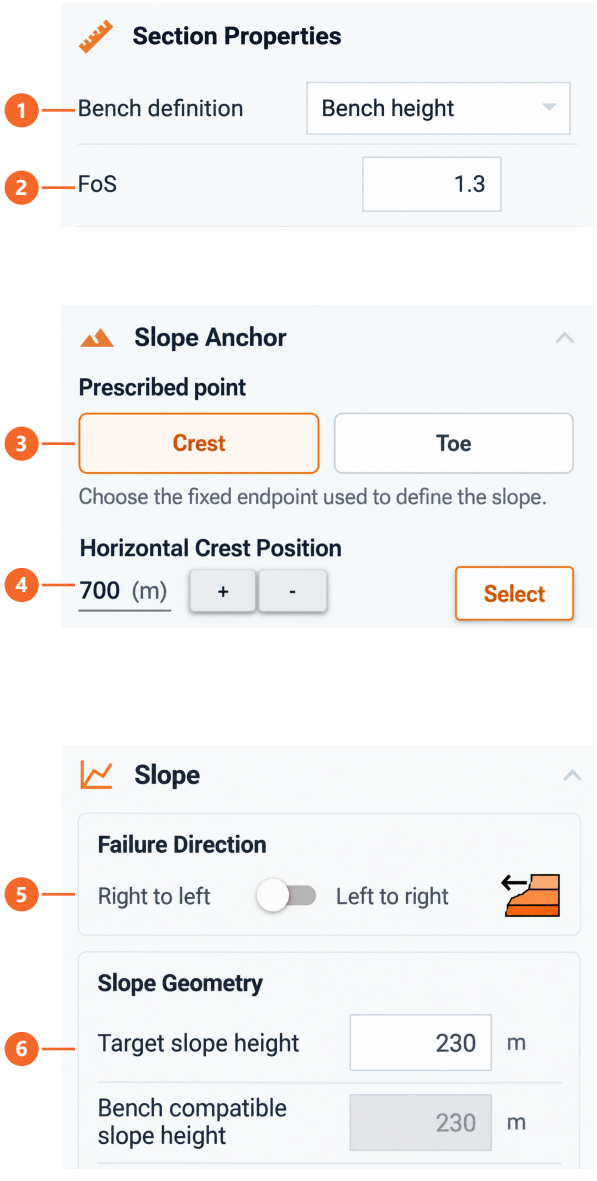
	SECTION INPUT	VALUE
1	Bench definition	Bench height
2	Target FoS	1.3
3	Prescribed point	Crest
4	Horizontal crest position	700 m
5	Failure direction	Right to left
6	Target slope height	230 m

The target FoS is a design constraint. The geometry preview displays the estimated minimum and maximum Overall Slope Angle.

Slope Anchor fixes the crest or toe. Choose **Crest** and enter **700 m** for the horizontal position.

SLOPE HEIGHT

Target height and bench-compatible height are both **230 m**. With 10 m benches, the height fits **23 full benches**.



CASE 1B / RUN THE SIMULATION

Save and run the model

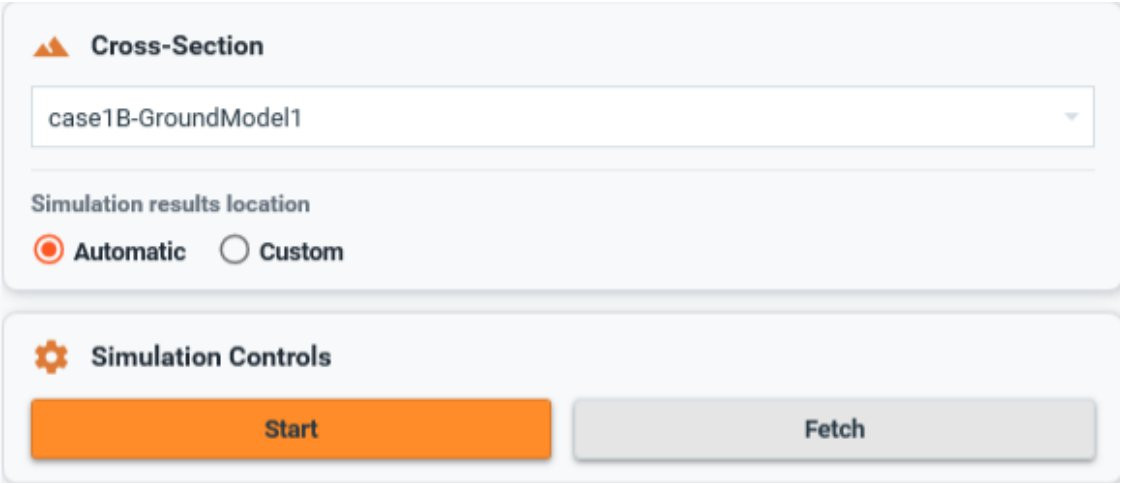
Use the Simulation page after defining the material and geometric inputs.

1. **Save the project.** Choose **File** → **Save** and save it as **Case1B_final** in your selected directory.

2. **Select the cross-section.** On the **Simulation** page, select **case1B-GroundModel1**.

3. **Set the results location.** Choose **Automatic**. Results are saved in the folder containing the source **.cbf** project file.

4. **Start the analysis.** Click **Start** under Simulation Controls, then enter your username.



Review the displayed output before exporting. The example result is shown on the next page.

CASE 1B / REVIEW THE RESULTS

Inspect the output

Review the calculated geometry and Factor of Safety before exporting.

TARGET FoS	ACHIEVED FoS	TARGET HEIGHT	BENCH-COMPATIBLE HEIGHT
1.3	1.362	230 m	230 m

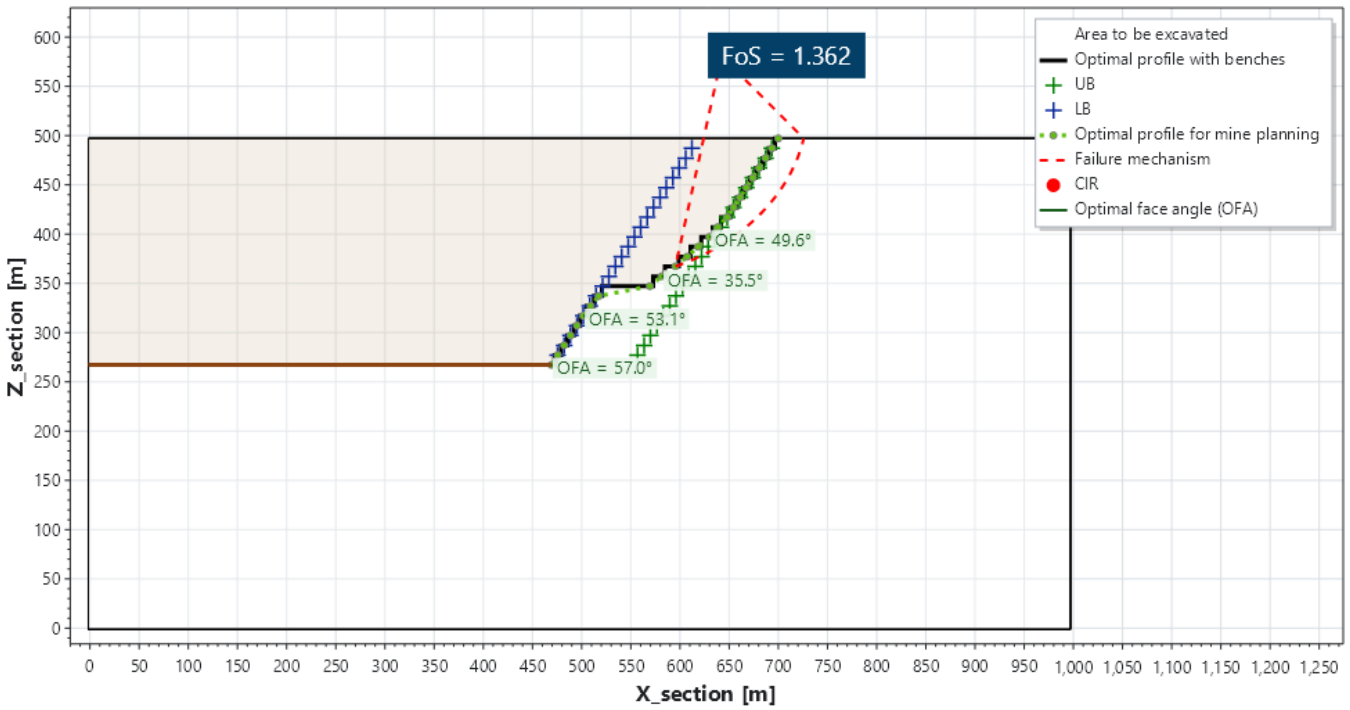


Figure 1b. Example output: optimised slope and failure mechanism.

CHECK BEFORE EXPORT

Check the calculated Factor of Safety, slope height, bench geometry and prescribed crest position against the inputs. Verify the calculated geometry and FoS before exporting the results.

Export and reuse results → page 37

CASE 2 / CREATE AND IMPORT

Layered open-pit section

You will learn to assign rock properties to multiple geological layers.

1 **Create a new project.** Choose **File** → **New**.

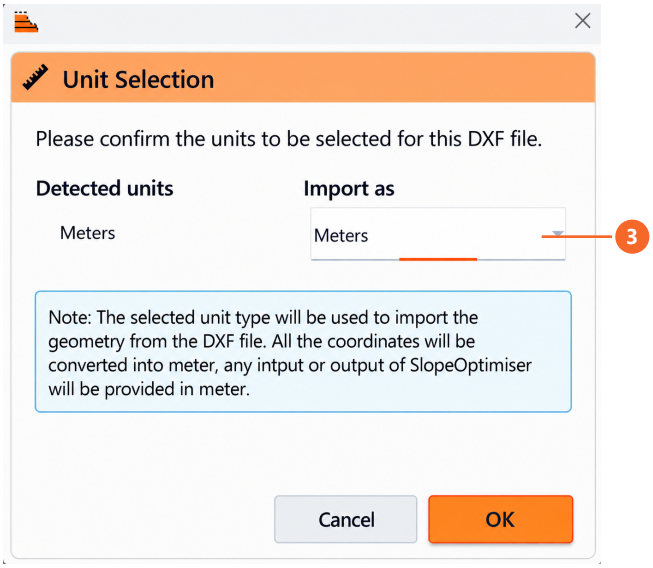
2 **Import the section.** Choose **File** → **Import Section** → **DXF**, select the file below and click **Open**.

EXERCISE FILE

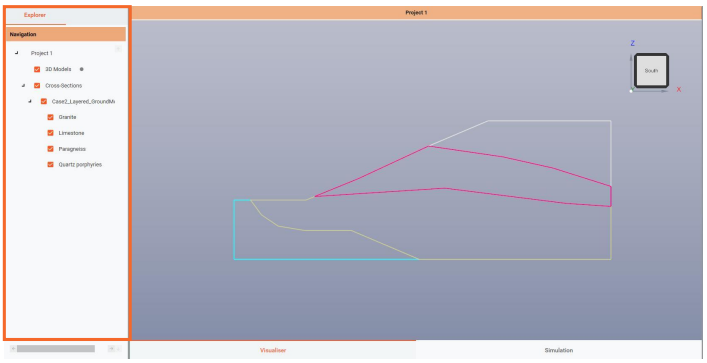
Case2_Layered_GroundModel.dxf

Folder: Case_2_layered

3 **Set the import units.** For the supplied exercise file, select **Meters** under **Import as**, then click **OK**.



IMPORTED SECTION & LAYERS



After import, find your section and its layers under **Cross-Sections** in the left-hand **Navigation** panel.

Read more about DXF model preparation here.

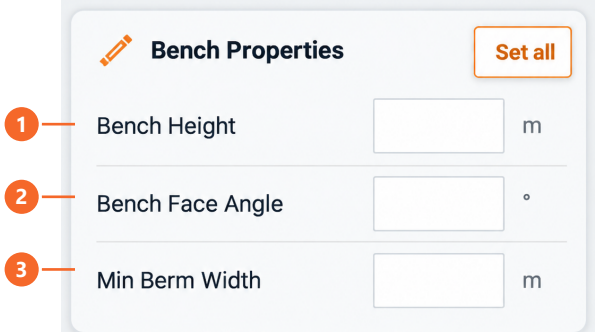
CASE 2 / MATERIAL PROPERTIES

Define the materials

Select a rock-material layer in the left-hand Navigation panel. Enter its properties on the right.

Define the unit weight, failure criterion and corresponding strength parameters for each material.

	BENCH INPUT	VALUE
1	Bench height	15 m
2	Bench face angle	80°
3	Minimum berm width	7.5 m



ROCK-MATERIAL PARAMETERS

MATERIAL	COHESION kPa	FRICTION ANGLE degrees	UNIT WEIGHT kN/m^3
Granite	400	38	26.5
Limestone	400	28	24
Paragneiss	250	30	25.5
Quartz porphyries	280	33	27

AUTOMATIC BERM WIDTH

If no berm width is entered, the software uses $\mathbf{b_w = 4.5\ m + 0.2 \times H_{bench}}$. The bench and berm values above apply to all rock-material layers.

CASE 2 / SLOPE GEOMETRY

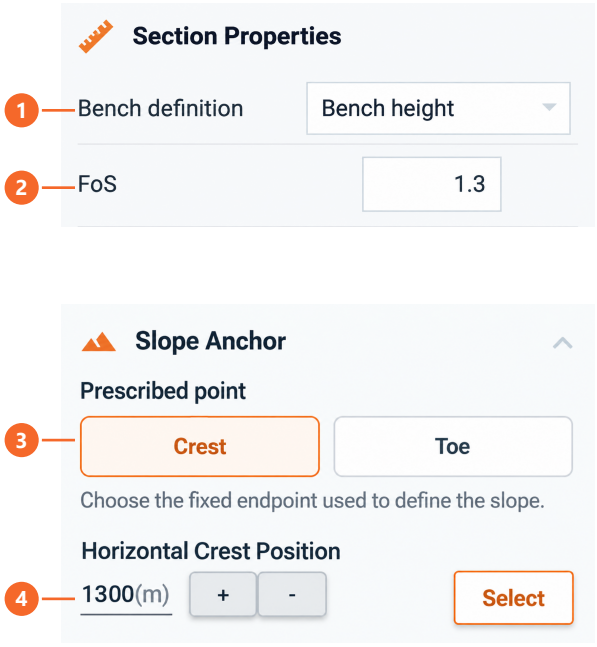
Set the slope geometry

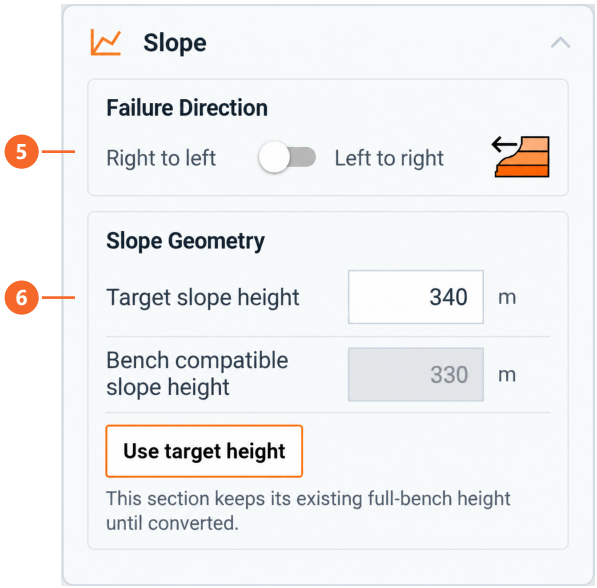
In the left-hand Navigation panel, select the imported cross-section, **Case2_Layered_GroundModel1**, and enter the settings below.

	SECTION INPUT	VALUE
1	Bench definition	Bench height
2	Target FoS	1.3
3	Prescribed point	Crest
4	Horizontal crest position	1300 m
5	Failure direction	Right to left
6	Target slope height	340 m

The target FoS is a design constraint. The geometry preview displays the estimated minimum and maximum Overall Slope Angle.

Slope Anchor fixes the crest or toe. Choose **Crest** and enter the horizontal position shown above.





CASE 2 / RUN THE SIMULATION

Save and run the model

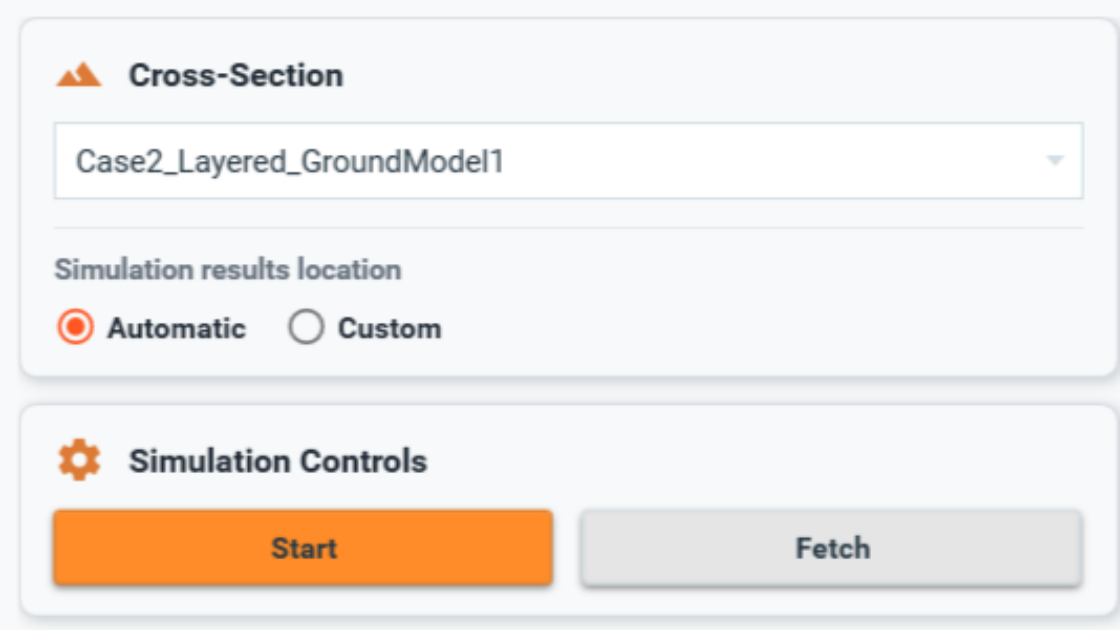
Use the Simulation page after defining the material and geometric inputs.

1. **Save the project.** Choose **File** → **Save** and save it as **Case2_layered_final** in your selected directory.

2. **Select the cross-section.** On the **Simulation** page, select **Case2_Layered_GroundModel1**.

3. **Set the results location.** Choose **Automatic**. Results are saved in the folder containing the source **.cbf** project file.

4. **Start the analysis.** Click **Start** under Simulation Controls, then enter your username.



Review the displayed output before exporting. The example result is shown on the next page.

CASE 2 / REVIEW THE RESULTS

Inspect the output

Review the calculated geometry and Factor of Safety before exporting.

TARGET FoS	ACHIEVED FoS	TARGET HEIGHT	BENCH-COMPATIBLE HEIGHT
1.3	1.319	340 m	330 m

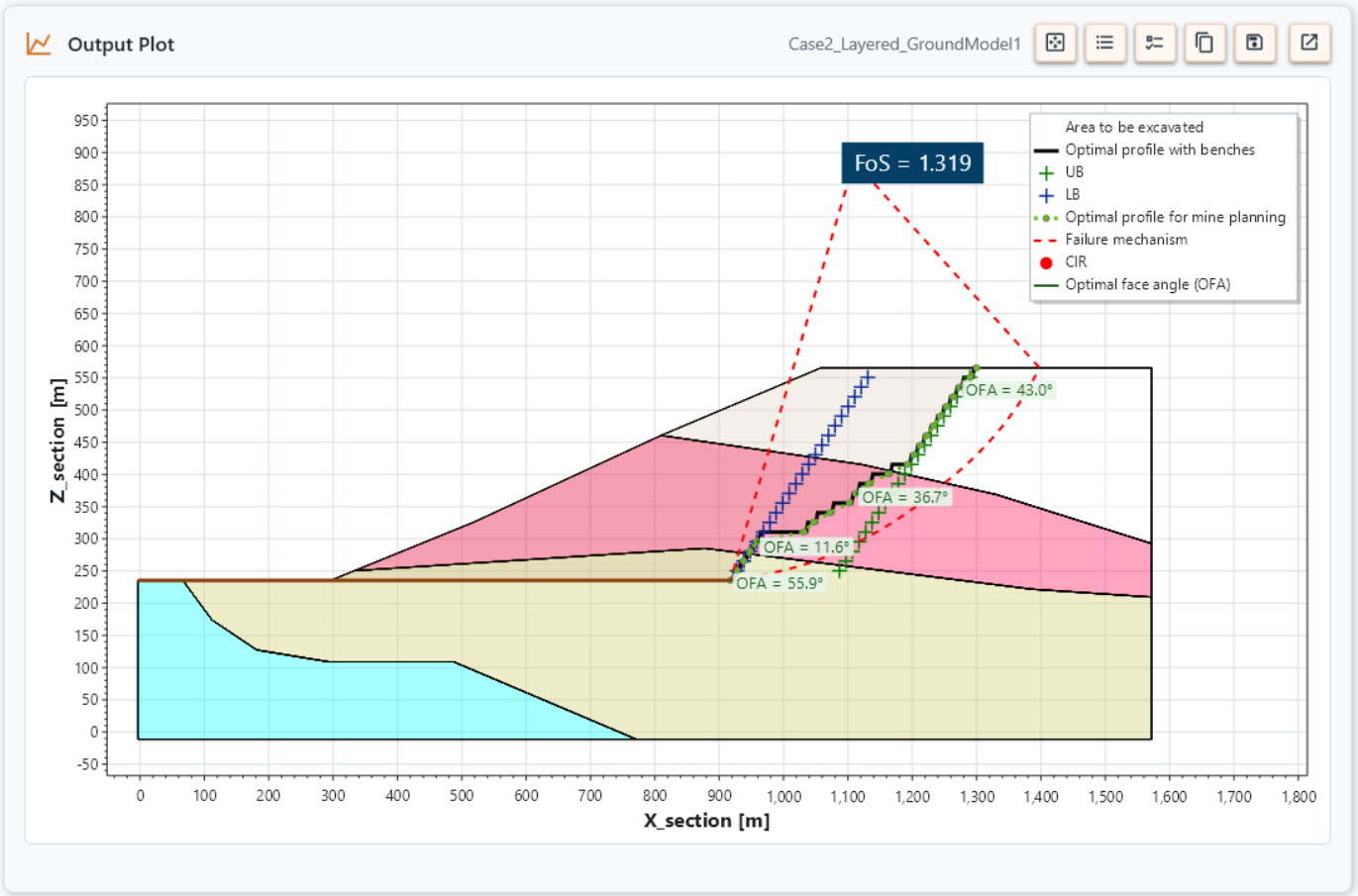


Figure 2. Example output: optimised slope and failure mechanism.

Export and reuse results → page 37

CASE 3A / CREATE AND IMPORT

Groundwater / Crest anchor

You will learn to add groundwater to a layered slope.

1 **Create a new project.** Choose **File** → **New**.

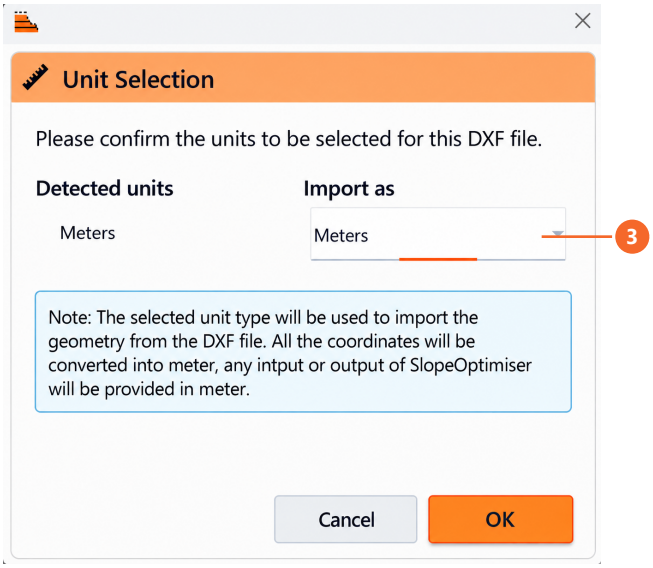
2 **Import the section.** Choose **File** → **Import Section** → **DXF**, select the file below and click **Open**.

EXERCISE FILE

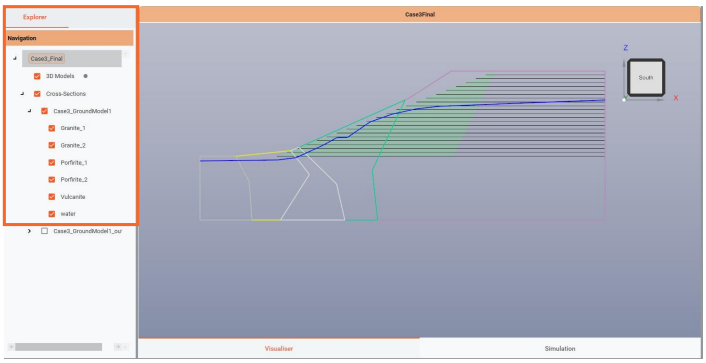
Case3_GroundModel.dxf

Folder: Case_3A_water_crest

3 **Set the import units.** For the supplied exercise file, select **Meters** under **Import as**, then click **OK**.



IMPORTED SECTION & LAYERS



After import, find your section and its layers under **Cross-Sections** in the left-hand **Navigation** panel.

Original reference view; later setup is also visible.

Read more about DXF model preparation here.

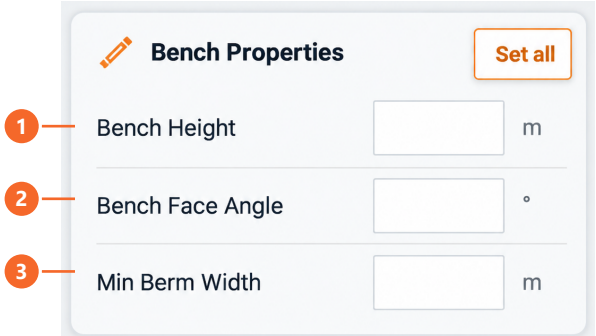
CASE 3A / MATERIAL PROPERTIES

Define the materials

Select a rock-material layer in the left-hand Navigation panel. Enter its properties on the right.

Define the unit weight, failure criterion and corresponding strength parameters for each material.

	BENCH INPUT	VALUE
1	Bench height	15 m
2	Bench face angle	90°
3	Minimum berm width	7.5 m



ROCK-MATERIAL PARAMETERS

MATERIAL	COHESION kPa	FRICTION ANGLE degrees	UNIT WEIGHT kN/m^3
Granite_1	1430	27.62	25.1
Granite_2	732	16.68	24.5
Porfirite_1	971	20.01	26.3
Porfirite_2	727	16.61	23.6
Vulcanite	700	33.6	26.4

AUTOMATIC BERM WIDTH

If no berm width is entered, the software uses $\mathbf{b_w = 4.5\ m + 0.2 \times H_{bench}}$. The bench and berm values above apply to all rock-material layers.

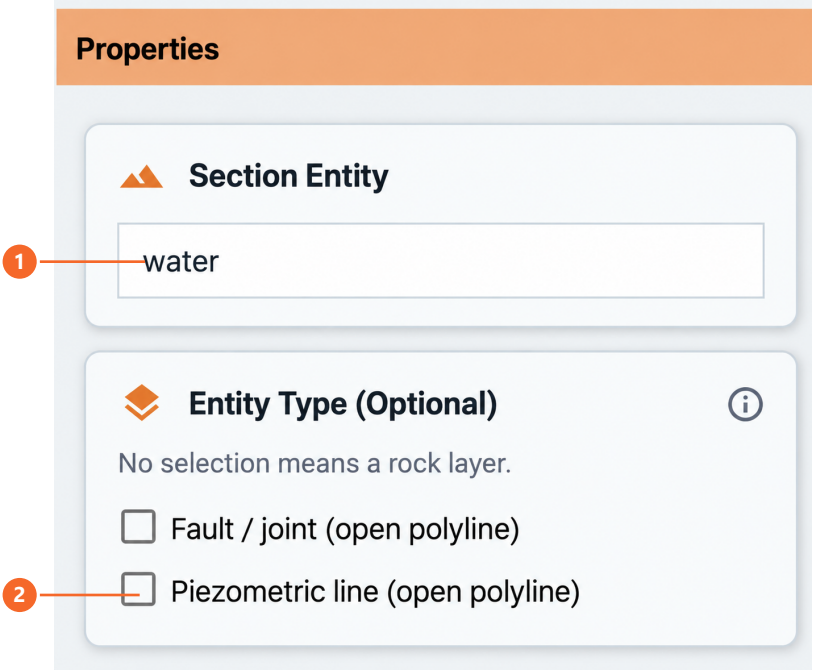
CASE 3A / GROUNDWATER

Define the piezometric line

Use the open polyline supplied in the DXF file to define groundwater conditions.

1. **Select the water layer.** Choose **water** in the list of imported layers.

2. **Set the entity type.** In the Properties panel, enable **Piezometric line (open polyline)**.



Before-selection view: enable the Piezometric line checkbox.

BEFORE CONTINUING

Confirm that Piezometric line is enabled for the water entity, then select the cross-section to define the slope geometry.

CASE 3A / SLOPE GEOMETRY

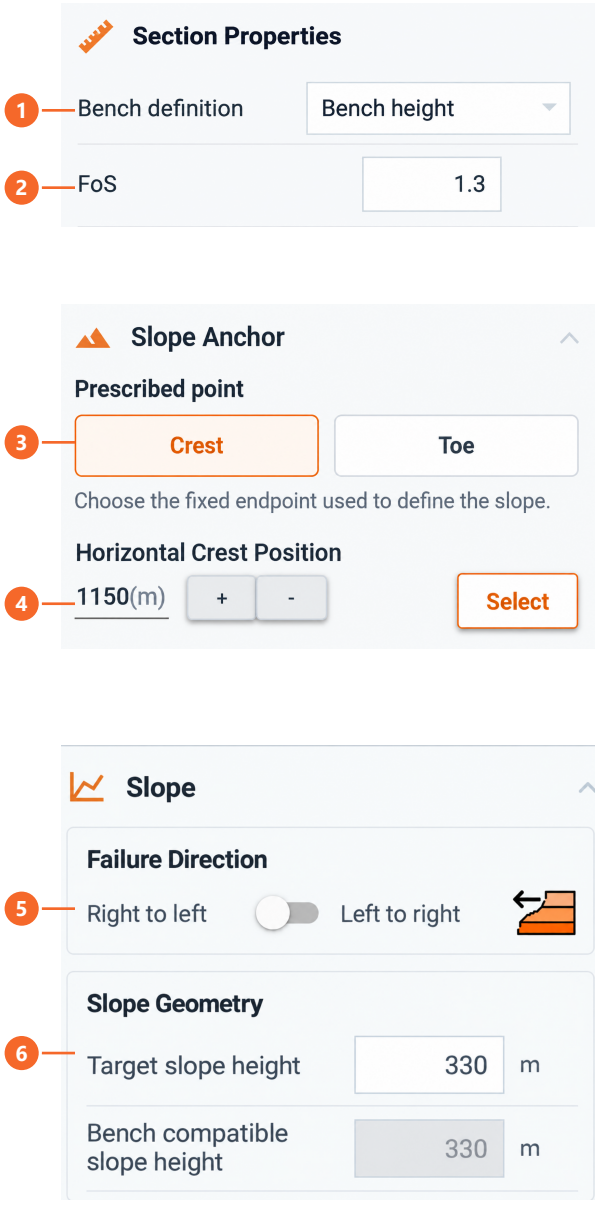
Set the slope geometry

In the left-hand Navigation panel, select the imported cross-section, **Case3_GroundModel1**, and enter the settings below.

	SECTION INPUT	VALUE
1	Bench definition	Bench height
2	Target FoS	1.3
3	Prescribed point	Crest
4	Horizontal crest position	1150 m
5	Failure direction	Right to left
6	Target slope height	330 m

The target FoS is a design constraint. The geometry preview displays the estimated minimum and maximum Overall Slope Angle.

Slope Anchor fixes the crest or toe. Choose **Crest** and enter the horizontal position shown above.



CASE 3A / RUN THE SIMULATION

Save and run the model

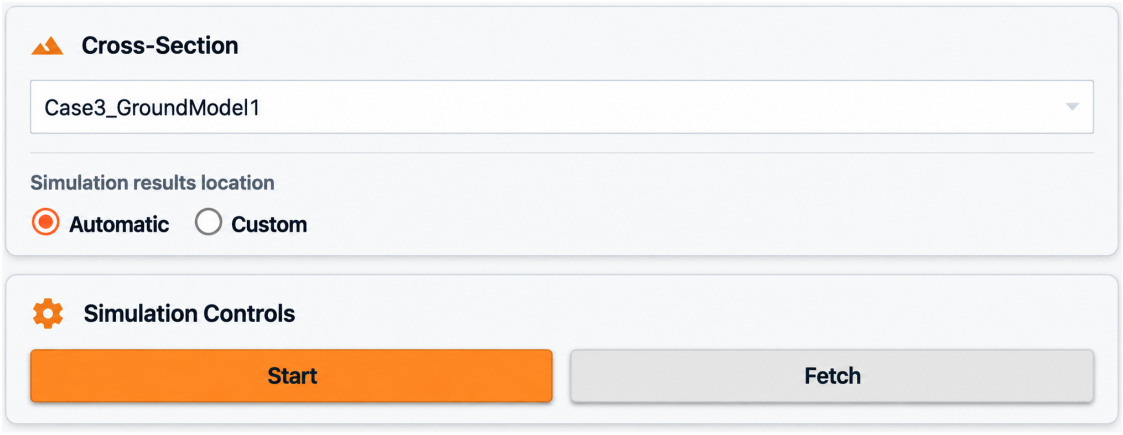
Use the Simulation page after defining the material and geometric inputs.

1. **Save the project.** Choose **File** → **Save** and save it as **Case3A_final** in your selected directory.

2. **Select the cross-section.** On the **Simulation** page, select **Case3_GroundModel1**.

3. **Set the results location.** Choose **Automatic**. Results are saved in the folder containing the source **.cbf** project file.

4. **Start the analysis.** Click **Start** under Simulation Controls, then enter your username.



Review the displayed output before exporting. The example result is shown on the next page.

CASE 3A / REVIEW THE RESULTS

Inspect the output

Review the calculated geometry and Factor of Safety before exporting.

TARGET FoS	ACHIEVED FoS	TARGET HEIGHT	BENCH-COMPATIBLE HEIGHT
1.3	1.323	330 m	330 m

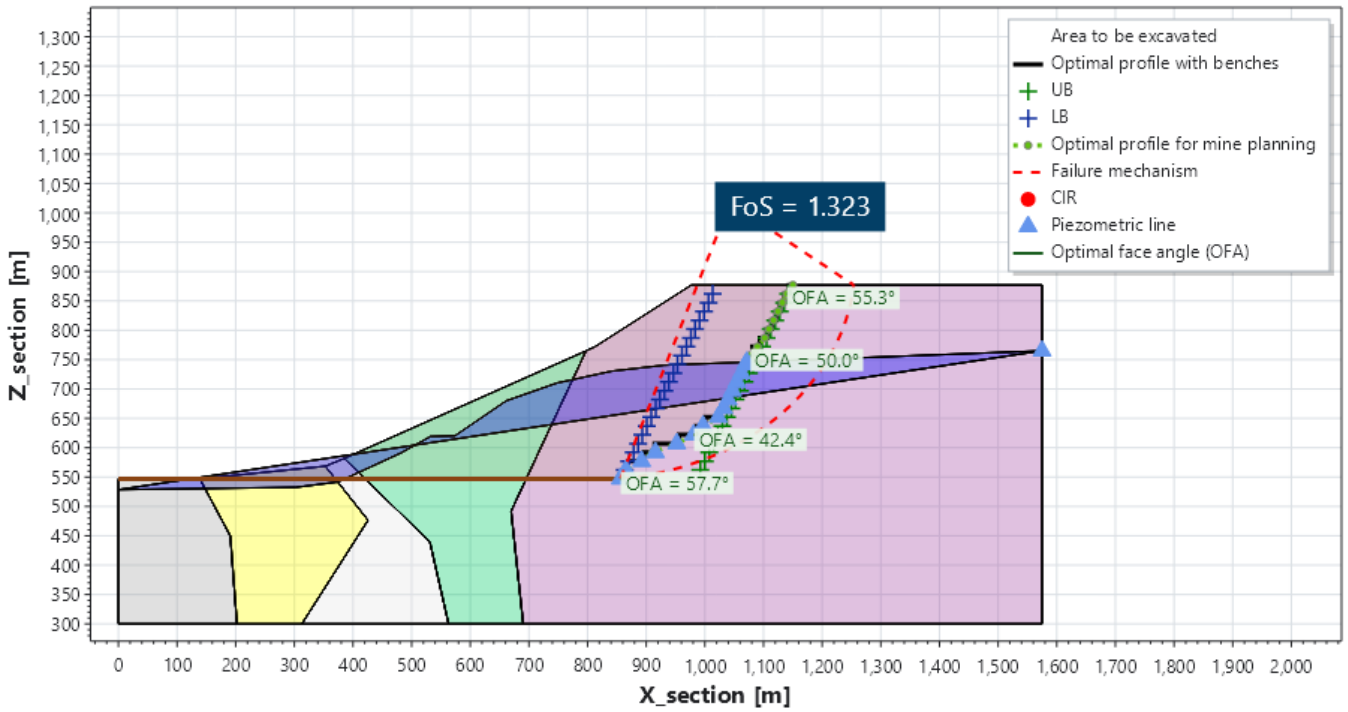


Figure 3a. Example output: optimised slope and failure mechanism.

CHECK BEFORE EXPORT

Check the calculated Factor of Safety, slope height, bench geometry and prescribed crest position against the inputs. Verify the calculated geometry and FoS before exporting the results.

Export and reuse results → page 37

CASE 3B / SLOPE GEOMETRY

Set the slope anchor to Toe

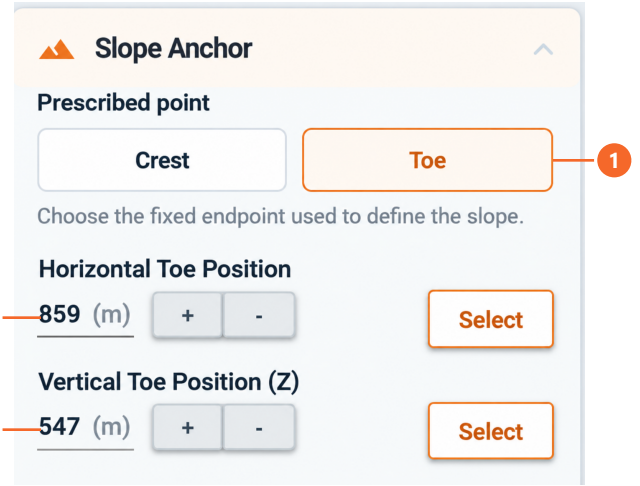
Open the supplied **Case3A_final** project in the **Case_3A_water_crest** folder. This variant fixes the toe using coordinates from the previous optimised slope.

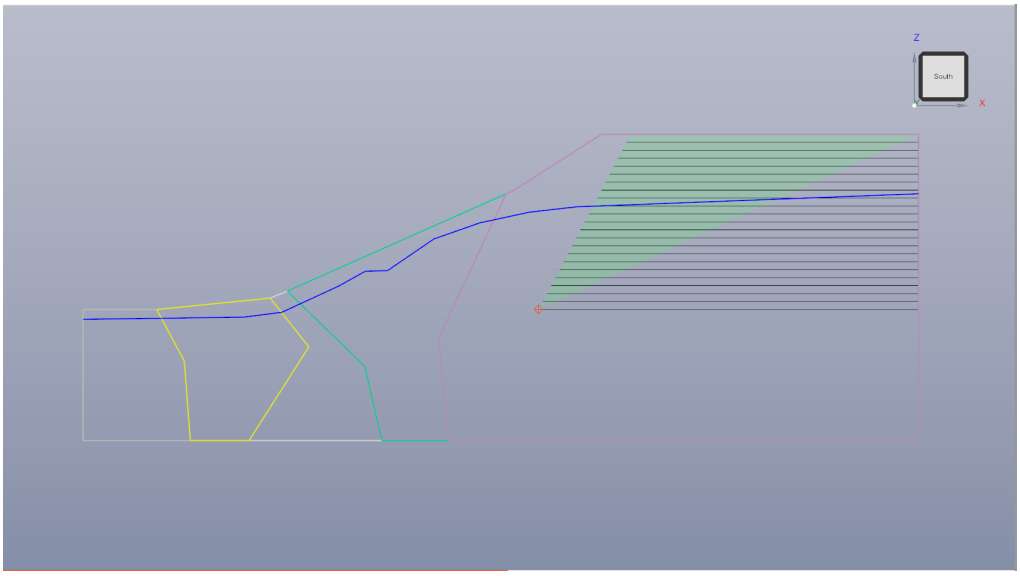
KEEP THE CASE 3a INPUTS

Reuse the materials and groundwater setup on **pages 23-24**. Keep **15 m** benches, **90°** bench faces, **7.5 m** berms, target FoS **1.3**, **Right to left** failure direction and target height **330 m**.

Select **Case3_GroundModel1** in Navigation. In **Slope Anchor**, enter:

	ANCHOR INPUT	VALUE
1	Prescribed point	Toe
2	Horizontal Toe Position	859 m
3	Vertical Toe Position (Z)	547 m





Visualiser preview: the fixed toe is marked at the lower end of the slope.

CASE 3B / RUN THE SIMULATION

Save and run the model

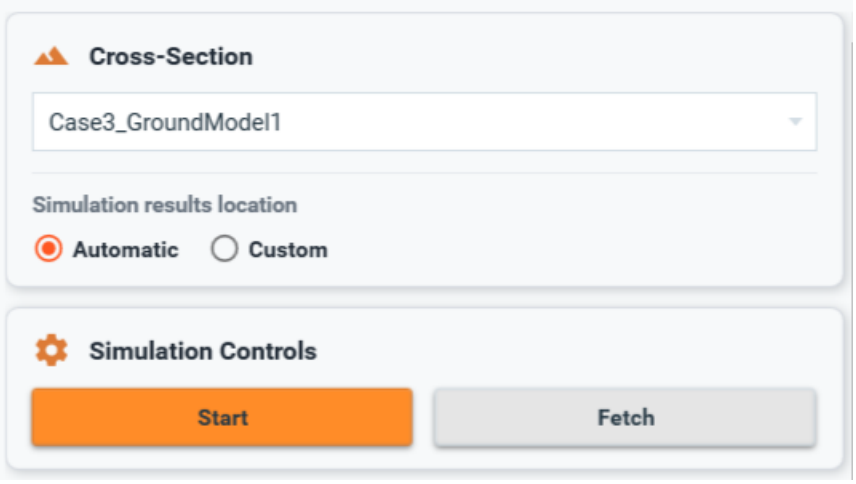
Run the groundwater model with the toe fixed at X = 859 m and Z = 547 m.

1. **Save the project.** Save the toe-anchored variant as **Case3B_final** in the **Case_3B_water_toe** folder so that you can compare it with Case 3a.

2. **Select the cross-section.** On the **Simulation** page, select **Case3_GroundModel1**.

3. **Set the results location.** Choose **Automatic**. Results are saved in the folder containing the source **.cbf** project file.

4. **Start the analysis.** Click **Start** under Simulation Controls, then enter your username.



BEFORE YOU RUN

Confirm that **Toe** is selected and both toe coordinates are entered. The rock properties, piezometric line and remaining slope settings are the same as in Case 3a.

CASE 3B / REVIEW THE RESULTS

Inspect the output

Review the toe-anchored result and compare its geometry with the crest-anchored Case 3a.

TARGET FoS	ACHIEVED FoS	TARGET HEIGHT	BENCH-COMPATIBLE HEIGHT
1.3	1.336	330 m	330 m

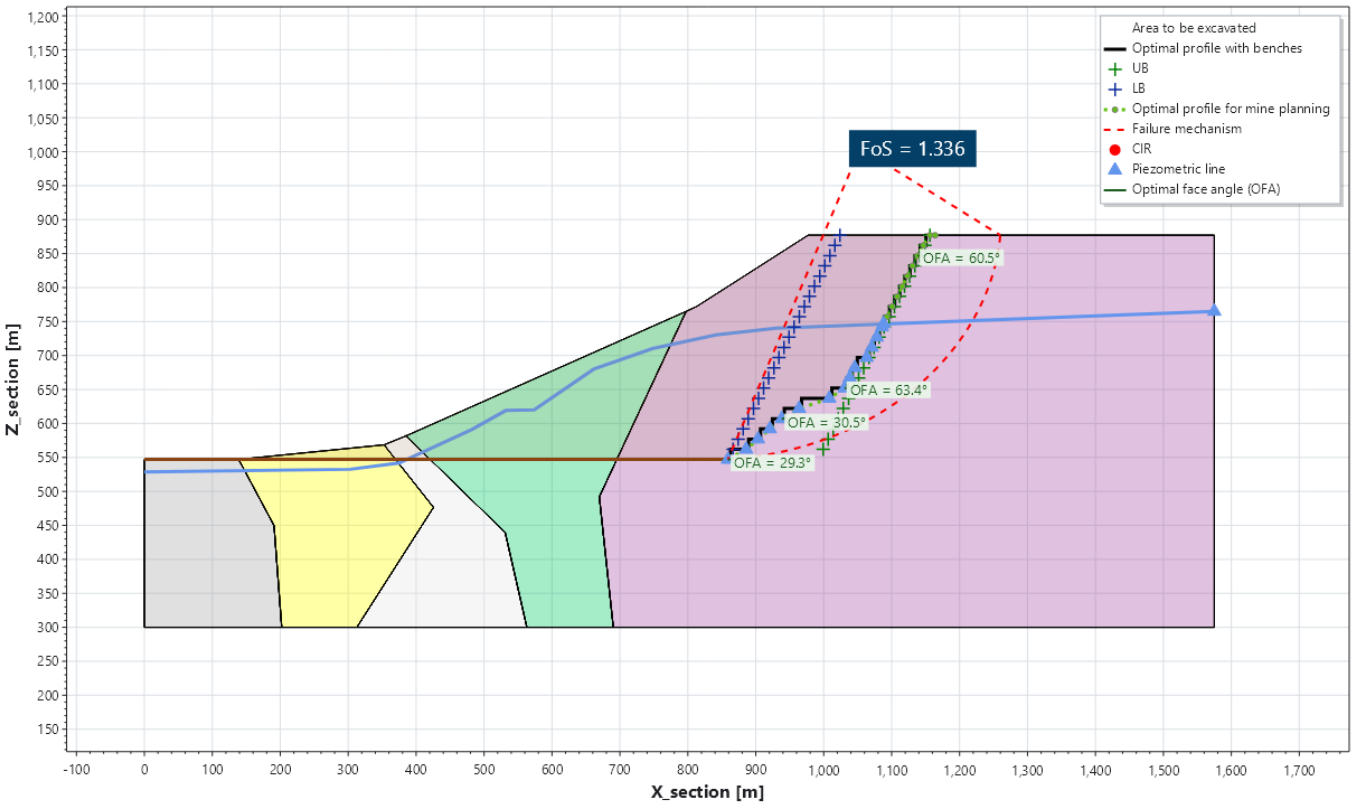


Figure 3b. Example output with the slope anchored at the toe.

CHECK BEFORE EXPORT

Check the prescribed toe at **X = 859 m, Z = 547 m**, slope height, bench geometry and achieved FoS. Compare the optimised profile with Case 3a (page 27).

Export and reuse results → page 37

CASE 4 / CREATE AND IMPORT

Groundwater and faults

You will learn to add faults to a layered slope with groundwater.

1 **Create a new project.** Choose **File** → **New**.

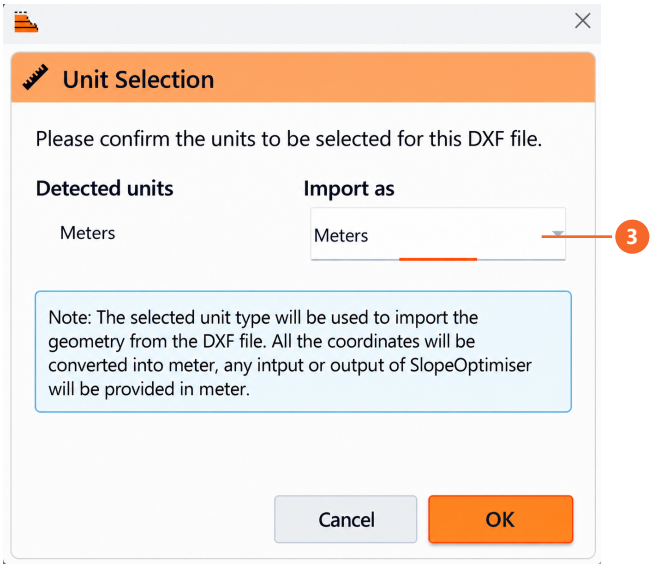
2 **Import the section.** Choose **File** → **Import Section** → **DXF**, select the file below and click **Open**.

EXERCISE FILE

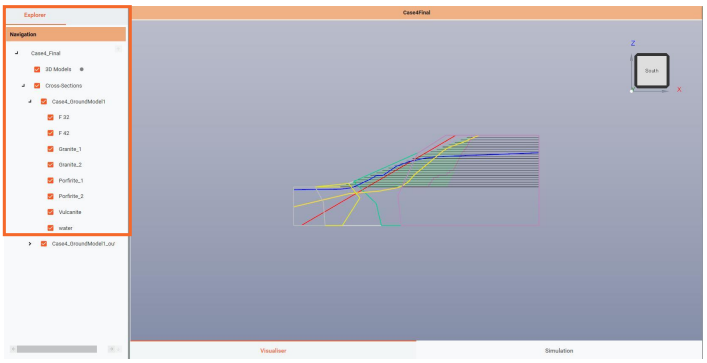
Case4_GroundModel.dxf

Folder: Case_4_faults

3 **Set the import units.** For the supplied exercise file, select **Meters** under **Import as**, then click **OK**.



IMPORTED SECTION & LAYERS



After import, find your section and its layers under **Cross-Sections** in the left-hand **Navigation** panel.

Original reference view; later setup is also visible.

Read more about DXF model preparation here.

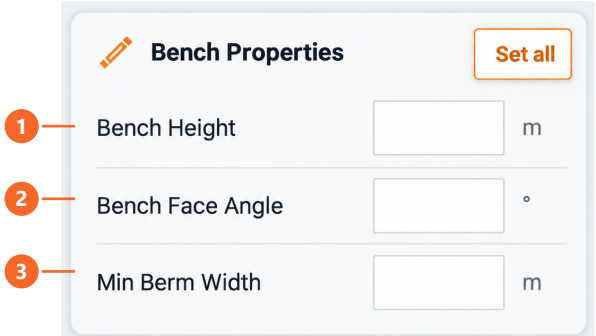
CASE 4 / MATERIAL PROPERTIES

Define the materials

Select a rock-material layer in the left-hand Navigation panel. Enter its properties on the right.

Define the unit weight, failure criterion and corresponding strength parameters for each material.

	BENCH INPUT	VALUE
1	Bench height	15 m
2	Bench face angle	90°
3	Minimum berm width	7.5 m



ROCK-MATERIAL PARAMETERS

MATERIAL	COHESION kPa	FRICTION ANGLE degrees	UNIT WEIGHT kN/m^3
Granite_1	1430	27.62	25.1
Granite_2	732	16.68	24.5
Porfirite_1	971	20.01	26.3
Porfirite_2	727	16.61	23.6
Vulcanite	700	33.6	26.4

AUTOMATIC BERM WIDTH

If no berm width is entered, the software uses $\mathbf{b_w = 4.5\ m + 0.2 \times H_{bench}}$. The bench and berm values above apply to all rock-material layers.

CASE 4 / GROUNDWATER AND FAULTS

Assign water and faults

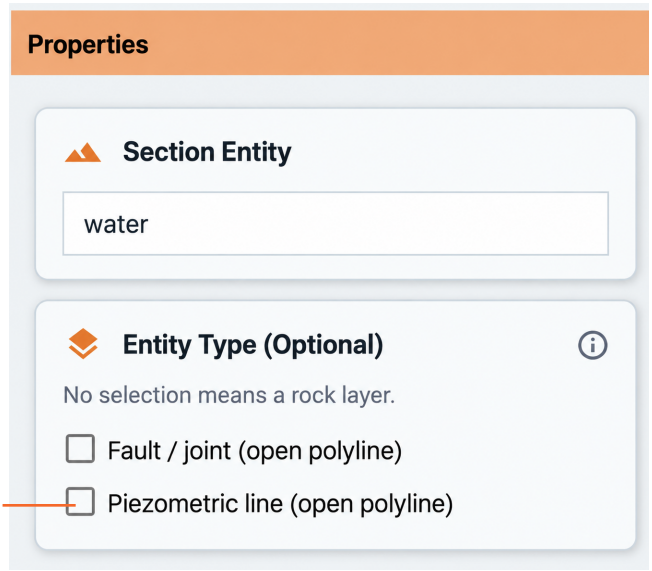
Classify the auxiliary entities separately from the rock-material layers.

01 GROUNDWATER

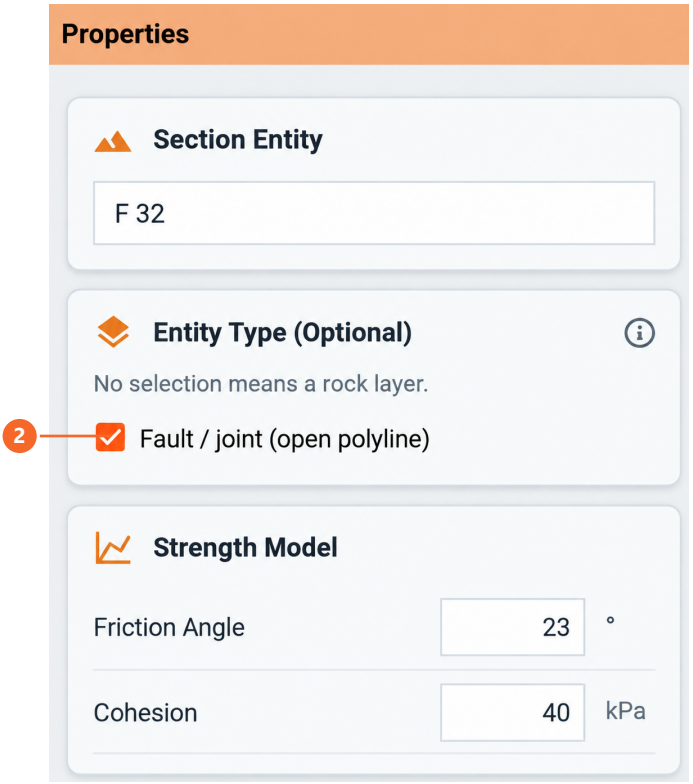
Select **water** and enable **Piezometric line (open polyline)** under Entity Type.

02 FAULT PLANES

Select each fault, **F32** and **F42**, and enable **Fault / joint (open polyline)**.



Before-selection view: enable the checkbox.



BOTH FAULTS: MOHR-COULOMB

Use **cohesion c = 40 kPa** and **friction angle φ = 23°** for both fault planes. Screenshot labels include spaces: F 32 and F 42.

CASE 4 / SLOPE GEOMETRY

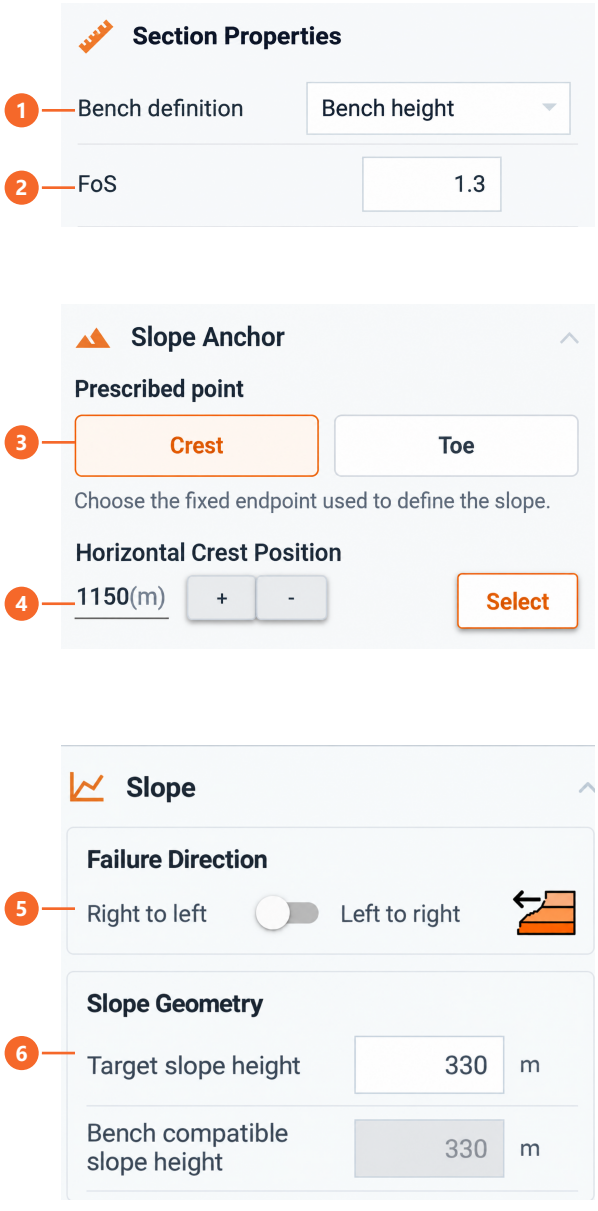
Set the slope geometry

In the left-hand Navigation panel, select the imported cross-section, **Case4_GroundModel1**, and enter the settings below.

	SECTION INPUT	VALUE
1	Bench definition	Bench height
2	Target FoS	1.3
3	Prescribed point	Crest
4	Horizontal crest position	1150 m
5	Failure direction	Right to left
6	Target slope height	330 m

The target FoS is a design constraint. The geometry preview displays the estimated minimum and maximum Overall Slope Angle.

Slope Anchor fixes the crest or toe. Choose **Crest** and enter the horizontal position shown above.



CASE 4 / RUN THE SIMULATION

Save and run the model

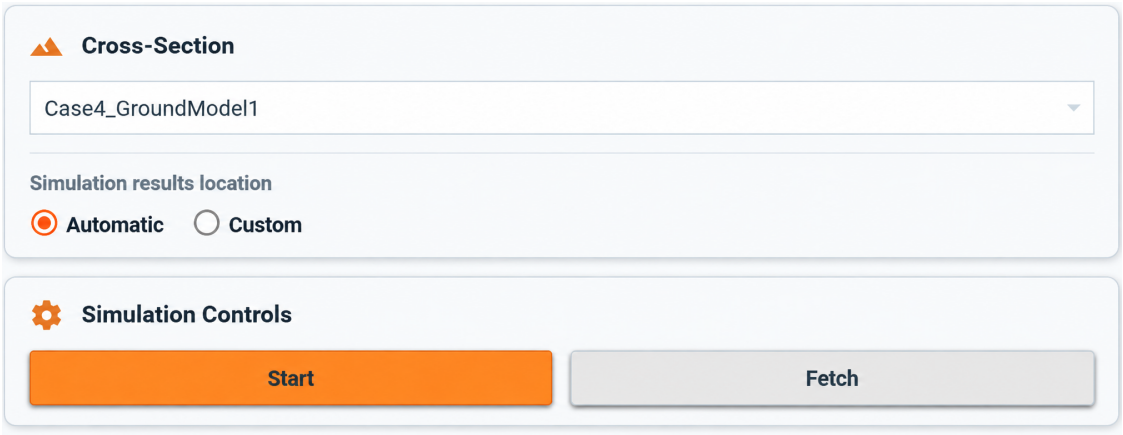
Use the Simulation page after defining the material and geometric inputs.

1. **Save the project.** Choose **File** → **Save** and save it as **Case4_final** in your selected directory.

2. **Select the cross-section.** On the **Simulation** page, select **Case4_GroundModel1**.

3. **Set the results location.** Choose **Automatic**. Results are saved in the folder containing the source **.cbf** project file.

4. **Start the analysis.** Click **Start** under Simulation Controls, then enter your username.



Review the displayed output before exporting. The example result is shown on the next page.

CASE 4 / REVIEW THE RESULTS

Inspect the output

Review the calculated geometry and Factor of Safety before exporting.

TARGET FoS	ACHIEVED FoS	TARGET HEIGHT	BENCH-COMPATIBLE HEIGHT
1.3	1.319	330 m	330 m

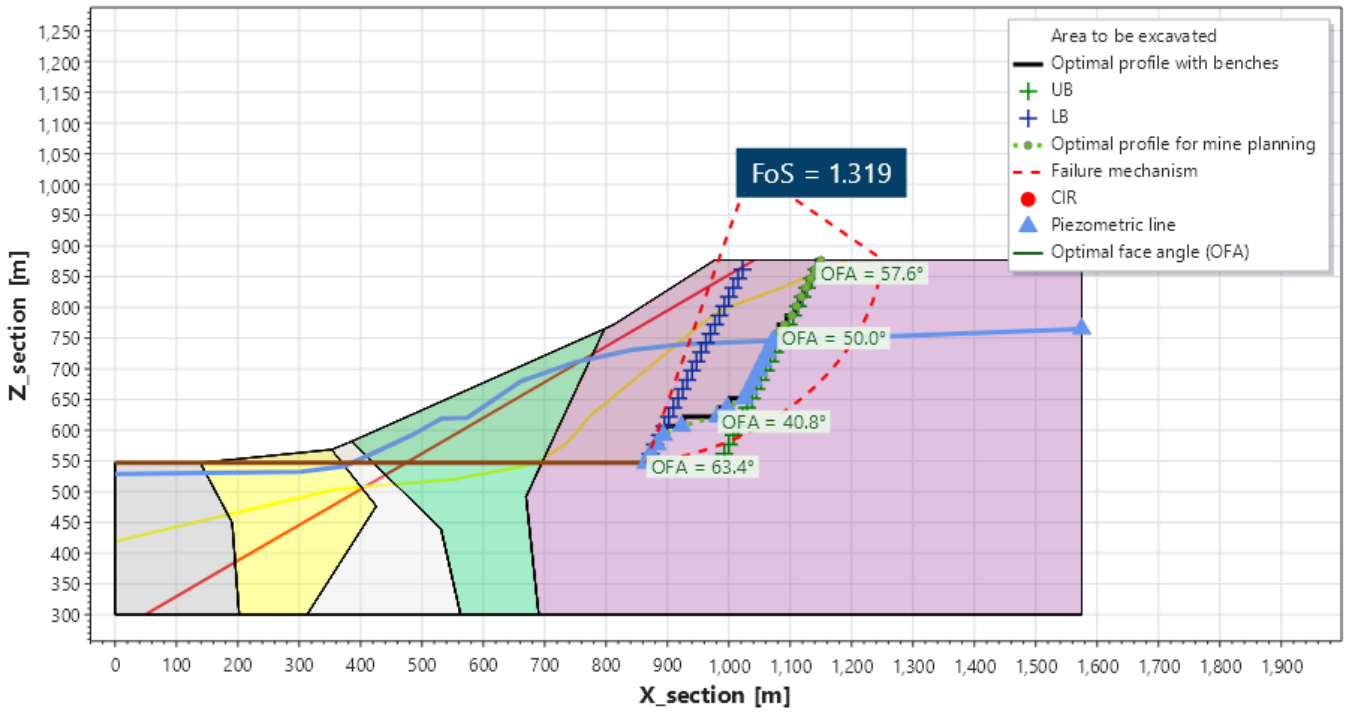


Figure 4. Example output: optimised slope and failure mechanism.

CHECK BEFORE EXPORT

Check the calculated Factor of Safety, slope height, bench geometry and prescribed crest position against the inputs. Verify the calculated geometry and FoS before exporting the results.

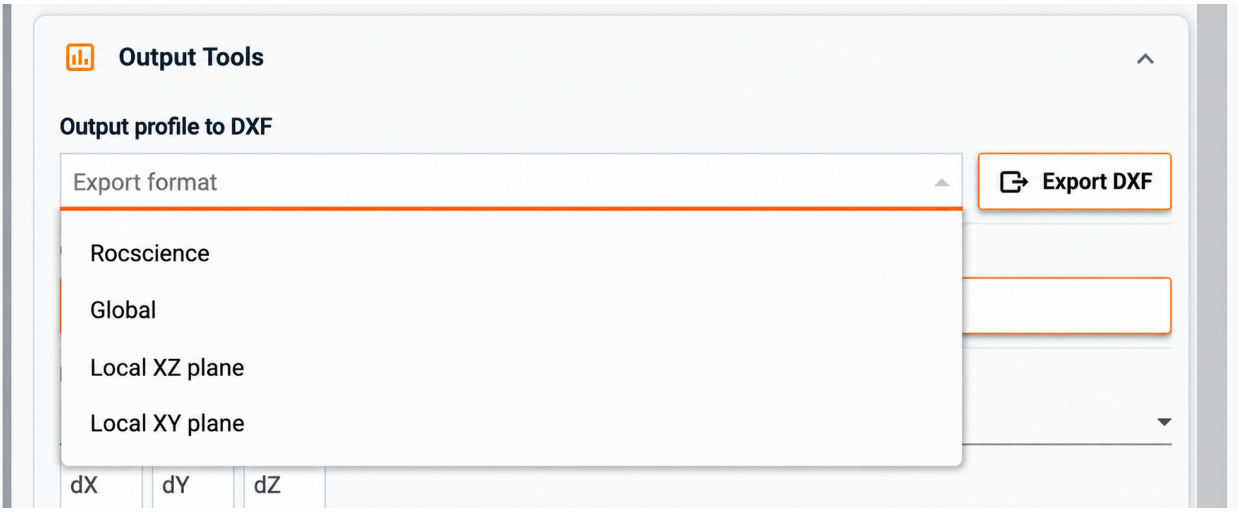
Export and reuse results → page 37

FOR ALL SIX CASES

Export the results

Export the optimised section as a DXF for verification in other LEM/FEM software.

1. **Open Output Tools.** On the Simulation page, expand the output tools panel.
2. **Choose an export format.** Select **Rocscience** or one of the three coordinate options below.
3. **Export the DXF.** Click **Export DXF** to start the export process.



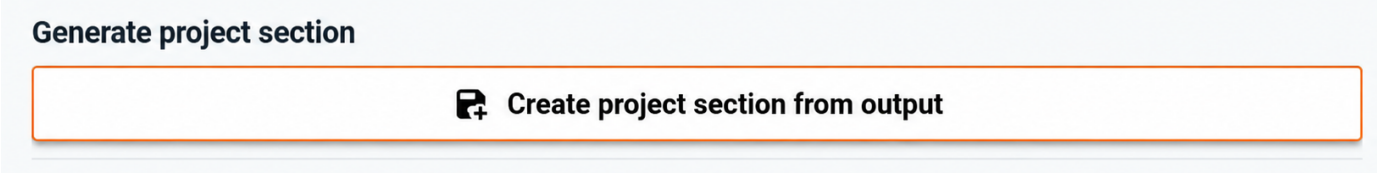
FORMAT	USE
Rocscience	Automatically converts the section orientation to the import plane used by Rocscience.
Global	Manual selection of the Global option.
Local XZ plane	Manual selection of the Local XZ Plane option.
Local XY plane	Manual selection of the Local XY Plane option.

FOR ALL SIX CASES

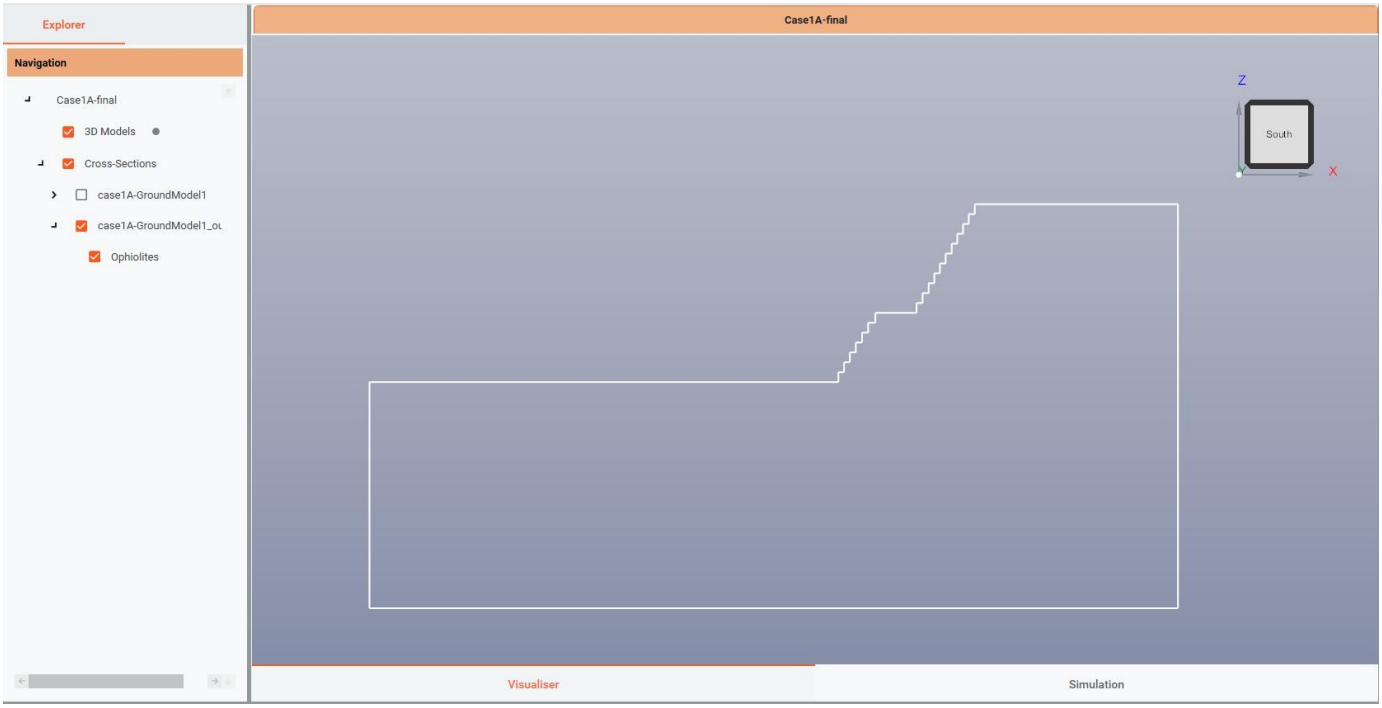
Create an output section

Bring the optimised geometry into the project for viewing on the Visualiser page.

1 **Create the project section.** In Simulation, open **Output Tools** and click **Create project section from output**.



2 **View the new section.** Open **Visualiser**. The new section appears in the left-hand **Navigation** panel.



Example shown: the new output section for Case 1a.