



**Start designing the change
with our new software!**

E-DESIGN HUB	
MACRA DESIGN	
MAIN PAGE	
1. CREATION OF A NEW PROJECT	
1.1 PROJECT INFO	
1.2 PROJECT TYPE	
2. CHANNEL AND BANK PROTECTION	
2.1 TEMPLATE	
2.2 DESIGN CONDITION	
2.2.1 HYDRAULIC DATA	3.2.1.1 HYDRAULIC DATA
2.2.2 GEOMETRY	3.2.1.2 CHANNEL GEOMETRY
2.2.3 MATERIALS	3.2.1.3 WEIR GEOMETRY
2.3 CALCULATION	3.2.1.4 WINGS GEOMETRY
2.4 OUTPUT RESULTS	3.2.1.5 STILLING BASIN
3. GRADE CONTROL STRUCTURES	3.2.1.6 SOIL DATA
3.1 TEMPLATE	3.2.2 CALCULATION
3.2 WEIRS WITH VERTICAL DROP	3.2.3 OUTPUT RESULTS
3.2.1 DESIGN CONDITION	3.3 STEPPED WEIRS
	3.3.1 DESIGN CONDITION
	3.3.1.1 HYDRAULIC DATA
	3.3.1.2 WEIR GEOMETRY
	3.3.2 CALCULATION
	3.3.3 OUTPUT RESULTS
	3.4 SLOPED WEIRS
	3.4.1 DESIGN CONDITION
	3.4.2 CALCULATION
	3.4.3 OUTPUT RESULTS



Welcome to the E-Design Hub!

Software suite

In case you need technical support, contact us!



Mac S-Design

Mac S-Design software is used to determine suitable facing systems for pinned drapery solutions. It has been developed to help the user to ...

[START THE DESIGN](#)



MacBars Design

MacBars Design is a software used to design basal reinforcement solutions for embankments over soft and very soft foundation soils, piled embankment ...

[START THE DESIGN](#)



MacRA Design

MacRA Design is a suite of design software for hydraulic engineering. As stated by the name, Maccaferri River Analysis focuses on the design ...

[START THE DESIGN](#)



MacTube Design

MacTubes are tubular geotextile containers made from high strength woven geotextile; MacTubes are filled in position with a sand/water slurry to cre ...

[START THE DESIGN](#)



REQUALIFE

REQUALIFE web application allows



Click here to start your MacRa Design experience



First things first, we would like to tell you a bit about the unique features of our software

MacRA Design

MacRA Design is a suite of design software for hydraulic engineering.

As stated by the name, **Maccaferri River Analysis** focuses on the design of river works for erosion control in natural or artificial watercourses, using Maccaferri solutions specifically developed and tested for these challenging applications.

Typical structures are for the longitudinal bank protection of the watercourse, or for grade control of the longitudinal slope.

When designing a channel and bank protection, the software analyses cross-sections for longitudinal works, for free surface channels with steady uniform turbulent flow. The cross-section can be completely or partially lined with specific materials to evaluate the erosive processes, protect riverine structures, and assess flow capacity.

In the field of grade control structures, the software allows to check a large number of flow conditions and to design different types of erosion control structures (vertical drops, stepped or sloped weirs) and their dissipation basins.

The hydraulic performance and structural stability of gabion weirs and spillways can be verified with **MacRA Design**.

Go to Application



Click here to start your MacRa Design experience



[Back to the Hub](#)**MACCAFERRI**[Open](#) [Language](#) [Help](#)[User Name](#)[Project Info](#) [Project Type](#) [Template](#) [Design Condition](#)

Now we can truly start!

[New Project](#)

Recent projects

Name	Last update	Type	
Weir - Section 900	Monday, September 25, 2023 at 10:14 AM	CHANNEL AND BANK PROTECTION	×
Section 600	Monday, September 25, 2023 at 10:13 AM	CHANNEL AND BANK PROTECTION	×
Section 400	Friday, August 25, 2023 at 9:49 AM	CHANNEL AND BANK PROTECTION	×
Section 0	Monday, August 21, 2023 at 7:31 AM	CHANNEL AND BANK PROTECTION	×

[<](#) [1](#) [2](#) [>](#)

PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

Open ▾

Language ▾

? Help ▾

User Name ▾

Project Info

Project Info

English

Italian

Chinese

Czech

German

Spanish

French

Polish

Portuguese

Serbian

Russian

Slovak

MacRA Design_Scientific Reference Manual - rev1

User Guide

If you need help, here you can download the User Guide and the Reference Manual



New Project

Recent projects

Name	Last update	Type	
Weir - Section 900	Monday, September 25, 2023 at 10:14 AM	CHANNEL AND BANK PROTECTION	×
Section 600	Monday, September 25, 2023 at 10:13 AM	CHANNEL AND BANK PROTECTION	×
Section 400	Friday, August 25, 2023 at 9:49 AM	CHANNEL AND BANK PROTECTION	×
	Monday, August 21, 2023 at 7:31 AM	CHANNEL AND BANK PROTECTION	×

< 1 2 >



If you want to change the language, we have more than 10 to choose from

PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

Open ▾
Open from cloud
Open from your computer

Language ▾

? Help ▾

User Name ▾

Open a project from cloud saving or from your personal device...

... or resume working on a project that you have already started

New Project

Otherwise, you can create a new project from scratch!

Recent projects

Name	Last update	Type	
Weir - Section 900	Monday, September 25, 2023 at 10:14 AM	CHANNEL AND BANK PROTECTION	×
Section 600	Monday, September 25, 2023 at 10:13 AM	CHANNEL AND BANK PROTECTION	×
Section 400	Friday, August 25, 2023 at 9:49 AM	CHANNEL AND BANK PROTECTION	×
Section 0	Monday, August 21, 2023 at 7:31 AM	CHANNEL AND BANK PROTECTION	×

< 1 2 >

CREATION OF A NEW PROJECT

1.1 CREATION OF A NEW PROJECT – PROJECT INFO

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Back to the Hub

MACCAFERRI

Open ▾ Language ▾ ? Help ▾

User Name ▾

Project Info

Let's start a new project, and first, let's enter the project information.

PROJECT DETAILS

Project name *

Client *

Project No.

Location *
Latitude: | Longitude:
Notes

Project Info and notes

COMPANY DETAILS

Company *

Country *

City *

Designer company info

Location *

Click on the map to set Project position
(coordinates automatically retrieved from the map)



Next

1.1 CREATION OF A NEW PROJECT – PROJECT INFO

MACCAFERRI

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Back to the Hub

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Open ▾ Language ▾ Help ▾

User Name ▾

Project InfoProject TypeTemplateDesign Condition

PROJECT DETAILS

Project name *
Example Project

Client *
Maccaferri

Project No.
1

Location *
Latitude: 44.4891 | Longitude: 11.2482

Notes
Example project for the User Guide

COMPANY DETAILS

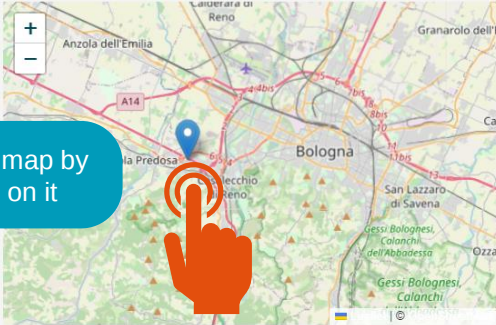
Company *
Officine Maccaferri Spa

Country *
Italia

City *
Zola Predosa

Location *

Click on the map to set Project position
(coordinates automatically retrieved from the map)



Coordinates automatically retrieved from the map

Locate the project on the map by navigating and clicking on it

When you're done, click "Next" to proceed to the next tab

Next

1.2 CREATION OF A NEW PROJECT – PROJECT TYPE

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Back to the Hub

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Open ▾Language ▾? Help ▾

User Name ▾

Project InfoProject TypeTemplateDesign Condition

Here you can choose between two main project types



CHANNEL AND BANK PROTECTION

Cross section analysis for longitudinal works: free surface channels with steady uniform turbulent flow. The cross-section can be completely or partially lined with specific materials to evaluate the erosive processes, protect riverine structures, and assess flow capacity.



GRADE CONTROL STRUCTURES

Check many flow conditions and design different types of erosion control structures (vertical drops, stepped or sloped weirs) and their dissipation basins. Evaluate hydraulic performance and structural stability of gabion weirs and spillways.

Click "Next" to proceed to the Template selection

Next

CHANNEL AND BANK PROTECTION

2.1 CHANNEL AND BANK PROTECTION – TEMPLATE

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Back to the Hub

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Open Language Help User Name

Project Info Project Type **Template** Design Condition

Available templates

Unit System Metric System

1 Select the unit system (Metric or Imperial)

2 Select one of the pre-set templates based on the project's characteristics

3 Click "Next" to proceed to the design

Double trapezoidal section

Simple trapezoidal section

Rectangular section

Simple trapezoidal section with subsectors

Simple trapezoidal section with right bank

Rectangular section with banks

Next

2.2 CHANNEL AND BANK PROTECTION – DESIGN CONDITION

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Back to the Hub

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+ New Open Save Language

Project Info Project Type Template **Design Condition**

Hydraulic data
Geometry
Materials

In the “Design Condition” tab you have the possibility to modify the project input data and run the calculation

Here you will find three menus to enter your data.
Clicking on “Hydraulic Data” the relevant menu will expand

0 m/s 0% 0 m 0 m/s

Left Bank Main Channel Right Bank

Channel Design

RUN

2.2.1 CHANNEL AND BANK PROTECTION – HYDRAULIC DATA

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Back to the Hub

MACCAFERRI

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User Name RUN

Project Info Project Type Template Design Condition

Hydraulic data

1 ☐ Discharge m³/s 50

2 ☒ Automated discharge

3 Freeboard (m) 0.5

4 Longitudinal Slope (%) 1

5 Soil admissible velocity (m/s) 0.76

6 ☒ Straight ☐ Curved

Radius (m) 100

Left side Right side

Soil Admissible Velocity

Soil	Velocity
Fine sand	0.76
Sand and gravel	1.5
Coarse gravel	1.82
Cobbles and shingles	1.67
Stiff Clay (cohesive)	1.52
Shales (cohesive)	1.8
Silts w/cobbles (cohesive)	1.67

Soil Admissible Velocity [m/s] 0.76

Ok

Discharge 0 m³/s

Longitudinal slope

Water depth

Average velocity

1 **Discharge:** you can both insert a design value for the discharge or select the “automated discharge” option to calculate the maximum drainable discharge in the channel

2 Set the minimum *freeboard* in the channel

3 Set the average *Longitudinal Slope* of the considered stretch of the channel

4 *Soil admissible velocity* relative to natural soil under the lining – literature values available by clicking on the button next to the relevant box

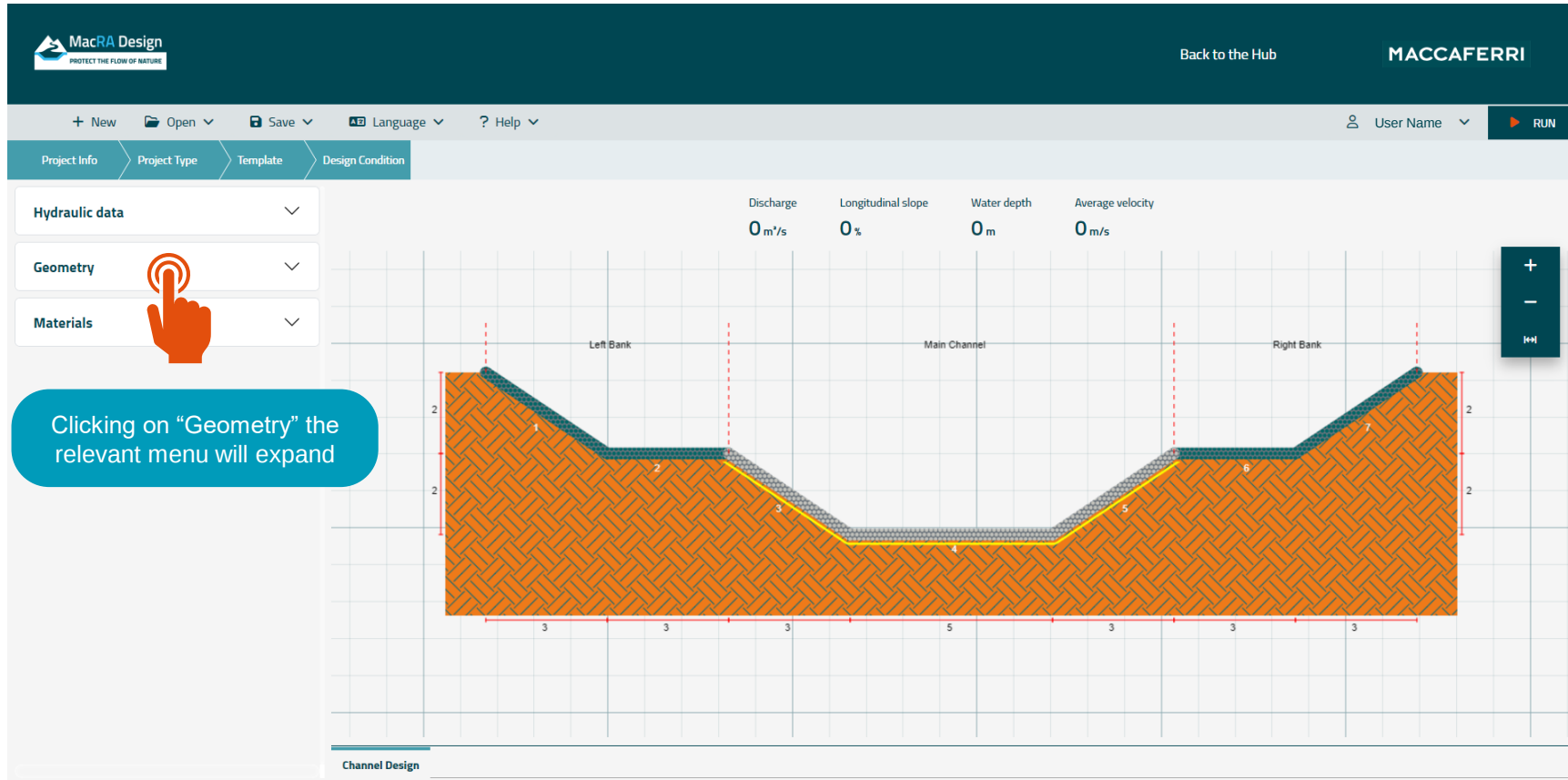
5

6 Select if the considered river stretch is “straight” or “curved” and set the relative parameters (radius and bending side)

NOTE: every change in the data will automatically be saved by the software

2.2.2 CHANNEL AND BANK PROTECTION – GEOMETRY

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2.2.2 CHANNEL AND BANK PROTECTION – GEOMETRY

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Back to the Hub

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+ New Open Save Language ? Help User Name RUN

Project Info Project Type Template Design Condition

Hydraulic data

Geometry

Sector

1 2 3 4 5 6 7

Height (m)

2

Each sector can be edited by selecting it in the drop-down menu

You can define the geometry of your section by dividing it into sectors, ranging from a minimum of three to a maximum of seven.

Water depth 0 m

Average velocity 0 m/s

Left Bank Main Channel Right Bank

1 2 3 4 5 6 7

NOTE: The main channel is always defined by sectors 3-4-5

Channel Design

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18

2.2.2 CHANNEL AND BANK PROTECTION – GEOMETRY

MacRA Design
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Back to the Hub

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+ New | Open | Save | Language | ? Help

User Name | RUN

Project Info | Project Type | Template | Design Condition

Hydraulic data

Geometry

Materials

Sector

Sector geometry

Materials

Sector

3

Inclination

1:1

Height (m)

4

Width (m)

4

Angle (°)

45

Changing the “Inclination” and the “Height” or “Width” of a sector the graphic representation will change accordingly

Average velocity

0 m/s

Left Bank

Main Channel

Right Bank

1

2

3

4

5

6

7

NOTE: once you have selected the inclination, you can proceed modifying only the “Height” or “Width” of a sector, the other data will be calculated automatically

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20

2.2.3 CHANNEL AND BANK PROTECTION – MATERIALS

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Back to the Hub

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+ New Open Save Language ? Help User Name RUN

Project InfoProject TypeTemplateDesign Condition

Hydraulic data

Geometry

Materials

Discharge
0 m³/s

Longitudinal slope
0%

Water depth
0 m

Average velocity
0 m/s

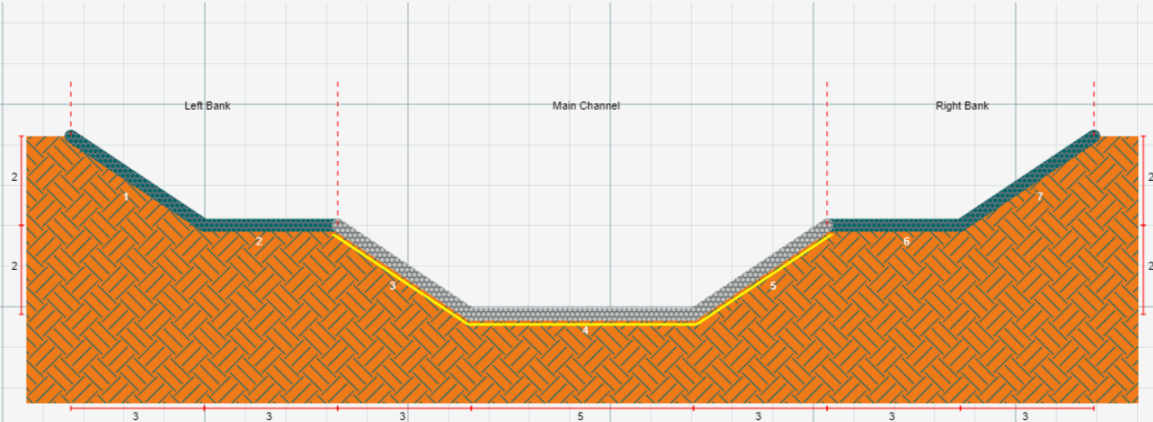
Left Bank

Main Channel

Right Bank

Channel Design

Clicking on "Materials" the relevant menu will expand



2.2.3 CHANNEL AND BANK PROTECTION – MATERIALS

MacRA Design
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Back to the Hub

MACCAFERRI

Project Info | Project Type | Template | Design Condition

Hydraulic data

Geometry

Materials

Choose materials

Subsector

Create subsector

Discharge
0 m³/s

Left Bank

Materials

1 Material: Protection systems

2 Sector: 3

3 Allowed shear stress (N/m²): 426

Roughness: 0.03

4 Reno Mattress Plus PoliMac™

Gabions PoliMac™

Reno Mattress Standard PoliMac™

Macmat R1 PoliMac™

Riprap

Use material for all sectors

Geotextile filter

X-Ties

Castoro

Thickness (m): 0.3

Rock d50 (m): 0.09

CU: 1

Allowed shear stress (N/m²): 638

Roughness: 0.03

Cancel

Apply

2 / 2

22

2.2.3 CHANNEL AND BANK PROTECTION – MATERIALS

NOTE: In “Protection systems” the value of “Allowed shear stress” cannot be directly modified. This value varies, depending on the material selected, according to:

- User input
- Database values
- Literature formulations
- Research test results

On the other hand, the “Roughness” value can be modified.

Discharge
0 m³/s

Materials

Material	Sector	Allowed shear stress (N/m ²)	Roughness
Protection systems	3	426	0.03

Gabions PoliMac™

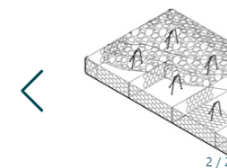
Reno Mattress Plus
PoliMac™

Reno Mattress Standard
PoliMac™

Macmat R1 PoliMac™

Riprap

Articulated blocks



☐ Use material for all sectors

☒ Geotextile filter

☒ X-Ties

☒ Castor

Thickness (m)

0.3

Rock d50 (m)

0.09

CU

1

Allowed shear stress (N/m²)

638

Roughness

0.03

Cancel

Apply

To learn more about each material allowed shear stress you can click on the “info” button!

Click on “Apply” to save the selected material for the relevant sector

2.2.3 CHANNEL AND BANK PROTECTION – MATERIALS

Materials

Material: Natural soils | Sector: 3 | Allowed shear stress (N/m²): 426 | Roughness: 0.03

☐ Use material for all sectors

Allowed shear stress (N/m²): 3.5 | Roughness: 0.02

Cancel Apply

Materials

Material: Soil bioengineering natural vegetation | Sector: 3 | Allowed shear stress (N/m²): 426 | Roughness: 0.03

☐ Use material for all sectors

Allowed shear stress (N/m²): 10 | Roughness: 0.04

Cancel Apply

NOTE: In “Natural soils” and “Soil bioengineering & natural vegetation” you have the possibility to directly change the default values of “Allowed shear stress” taken from literature

2.2.3 CHANNEL AND BANK PROTECTION – MATERIALS

The screenshot displays the MacRA Design software interface. On the left, a sidebar contains tabs for 'Project Info', 'Project Type', 'Template', and 'Design Condition'. Below these are sections for 'Hydraulic data', 'Geometry', and 'Materials'. The 'Materials' section is active, showing a 'Choose materials' button and a 'Subsector' checkbox. The main workspace shows a cross-section of a channel and its left bank, with a green material layer highlighted on the bank slope. A blue callout box points to this layer, stating: 'Selecting a different material for the chosen sector and clicking on “Apply” the material will be automatically shown in the cross-section'. A second blue callout box, with a red arrow pointing to the 'Materials' dialog, states: 'The materials tab can be moved anywhere on the screen'. The 'Materials' dialog is open on the right, showing a list of materials: 'Grass mats', 'Cutting shrubs', 'Riparian wattles', 'Willow protections', 'Dense grass and light bushes', 'Brush mats w/willow', and 'Dense bushes'. The 'Grass mats' material is selected. The dialog also shows 'Sector' (1), 'Allowed shear stress (N/m²)' (10), and 'Roughness' (0.04). A checkbox 'Use material for all sectors' is unchecked. A preview image of a grassy bank is shown. At the bottom right of the dialog are 'Cancel' and 'Apply' buttons. A red arrow points to the 'Apply' button.

MacRA Design
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+ New Open Save Language ? Help

Project Info Project Type Template Design Condition

Hydraulic data

Geometry

Materials

Choose materials

☐ Subsector Create Subsector

Left Bank

1 2 3

Channel Design

Materials

Material: Soil bioengineering natural vegetation

Sector: 1

Allowed shear stress (N/m²): 10

Roughness: 0.04

Grass mats

Cutting shrubs

Riparian wattles

Willow protections

Dense grass and light bushes

Brush mats w/willow

Dense bushes

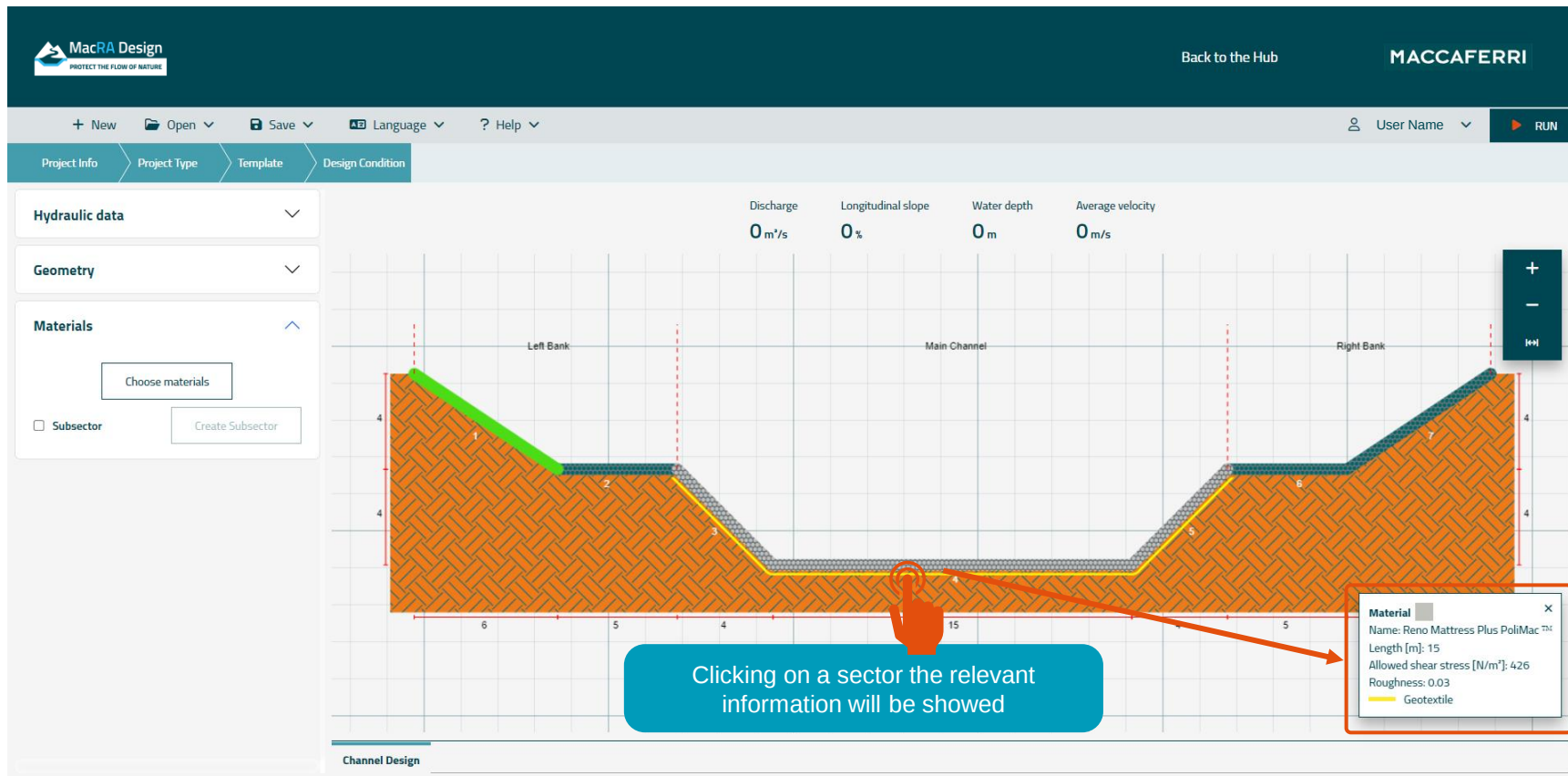
☐ Use material for all sectors

Allowed shear stress (N/m²): 10

Roughness: 0.04

Cancel Apply

2.2.3 CHANNEL AND BANK PROTECTION – MATERIALS



2.2.3 CHANNEL AND BANK PROTECTION – MATERIALS

MacRA Design
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Back to the Hub

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Project Info Project Type Template Design Condition

Hydraulic data

Discharge 0 m³/s Longitudinal slope 0 % Water depth 0 m Average velocity 0 m/s

Geometry

Materials

Choose materials

☒ Subsector Create Subsector

Left Bank Main Channel Right Bank

Channel Design

2.2.3 CHANNEL AND BANK PROTECTION – MATERIALS

- 1 Choose the sector that you would like to edit
- 2 Select the number of subsectors that you would like to create
- 3 Define the length of each subsector
- 4 Click on the button to choose for each subsector the material to be used and its characteristics

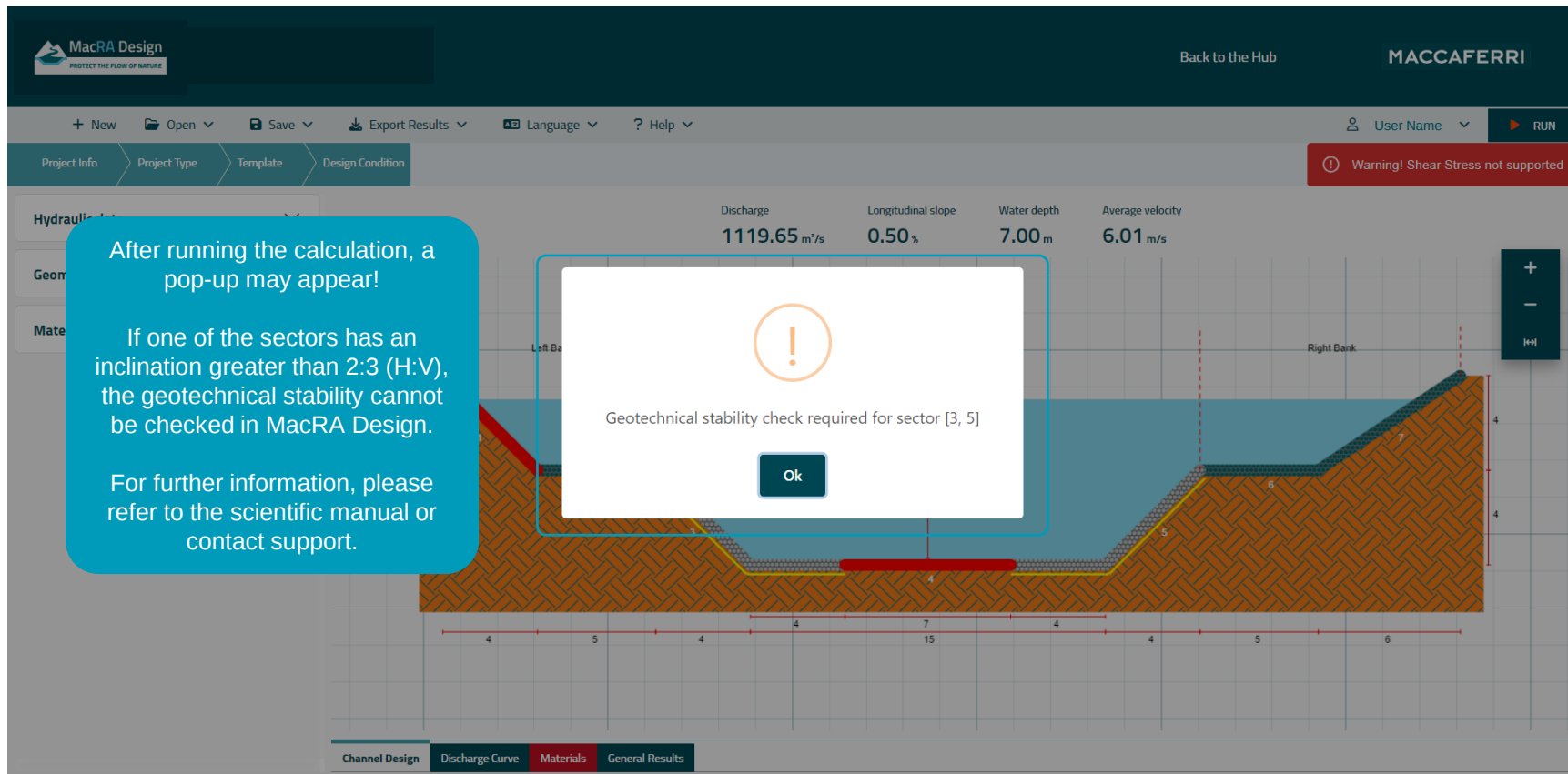
One tip: if you define the length of the right subsector and then the left one, the length of the central subsector will update automatically!

Click on “Confirm” and the selected materials for each subsector will be automatically shown in the cross-section

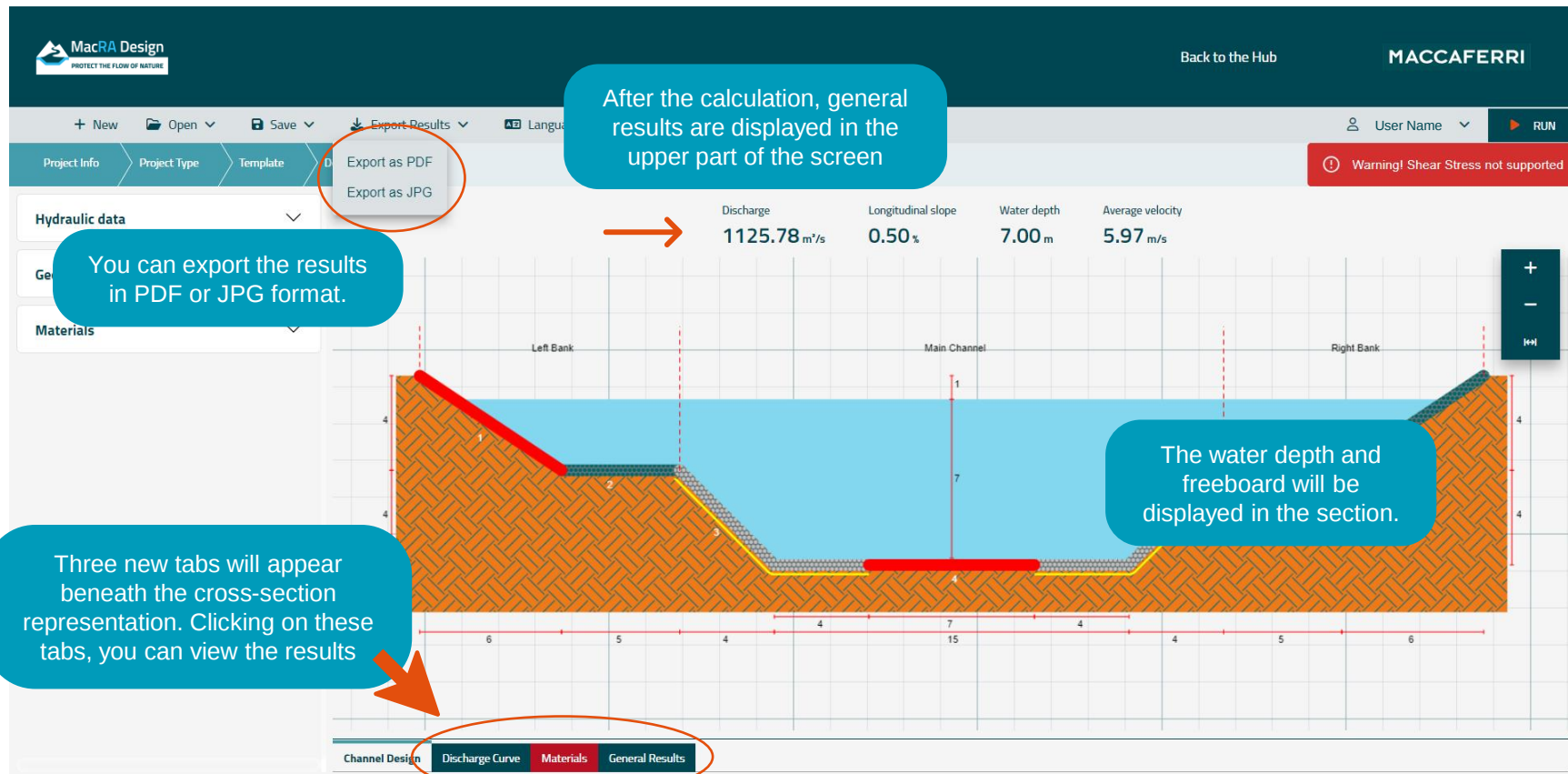
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29

2.4 CHANNEL AND BANK PROTECTION – OUTPUT RESULTS

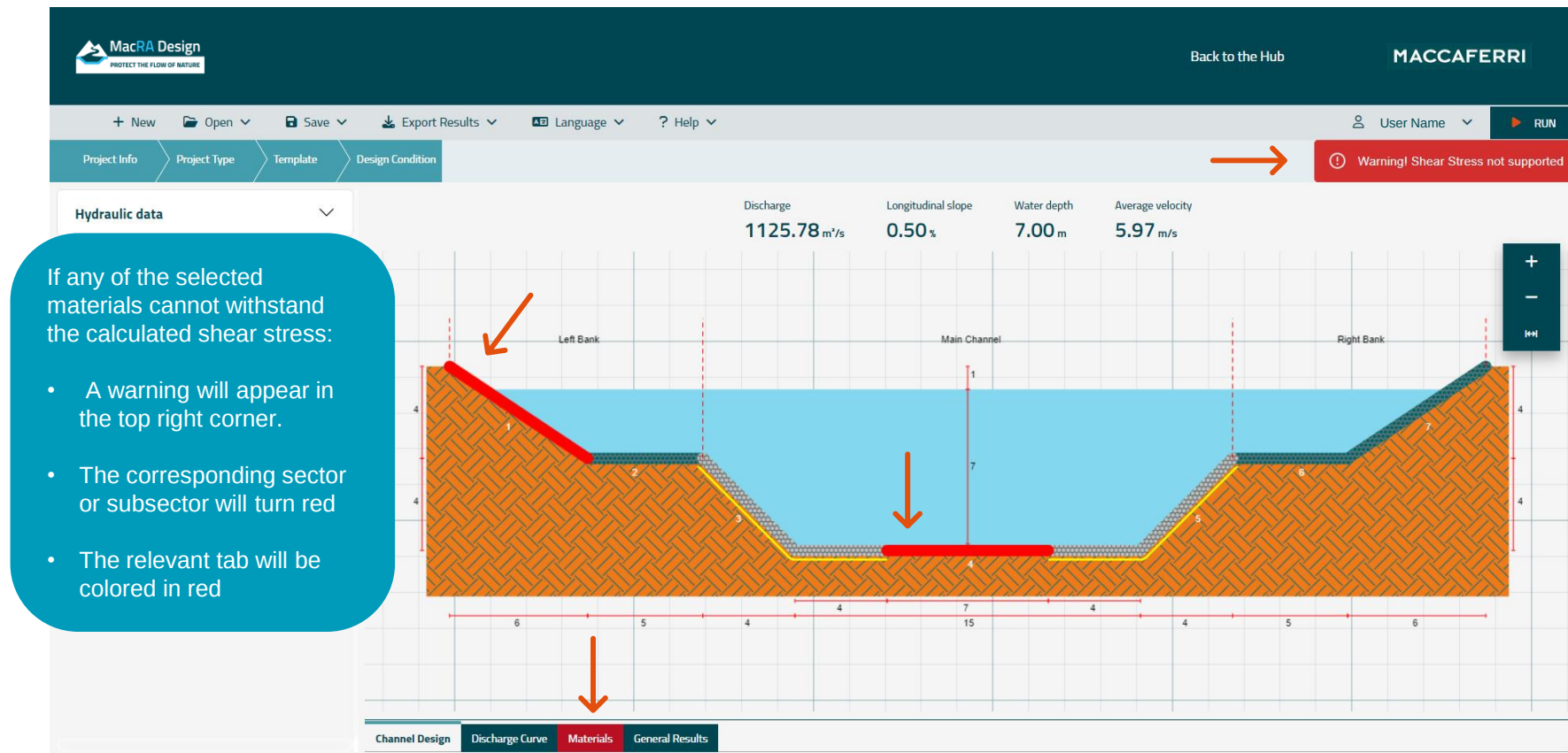


2.4 CHANNEL AND BANK PROTECTION – OUTPUT RESULTS



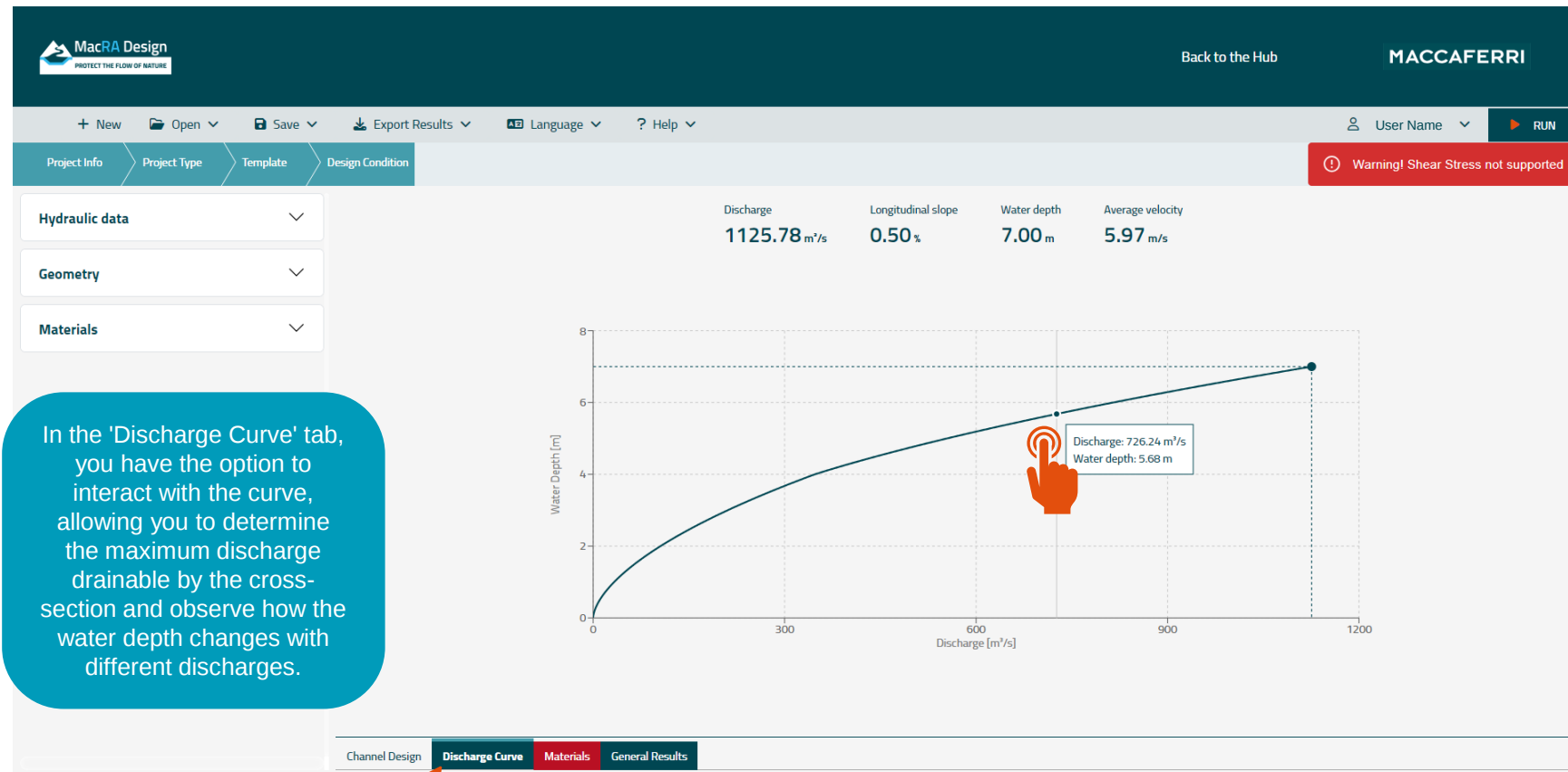
2.4 CHANNEL AND BANK PROTECTION – OUTPUT RESULTS

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2.4 CHANNEL AND BANK PROTECTION – OUTPUT RESULTS

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In the 'Discharge Curve' tab, you have the option to interact with the curve, allowing you to determine the maximum discharge drainable by the cross-section and observe how the water depth changes with different discharges.

2.4 CHANNEL AND BANK PROTECTION – OUTPUT RESULTS


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[Back to the Hub](#)
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+ New
Open
Save
Export Results
Language
Help
User Name
RUN

Project Info
Project Type
Template
Design Condition

Warning! Shear Stress not supported

Hydraulic data
Geometry
Materials

Discharge
1125.78 m³/s
Longitudinal slope
0.50 %
Water depth
7.00 m
Average velocity
5.97 m/s

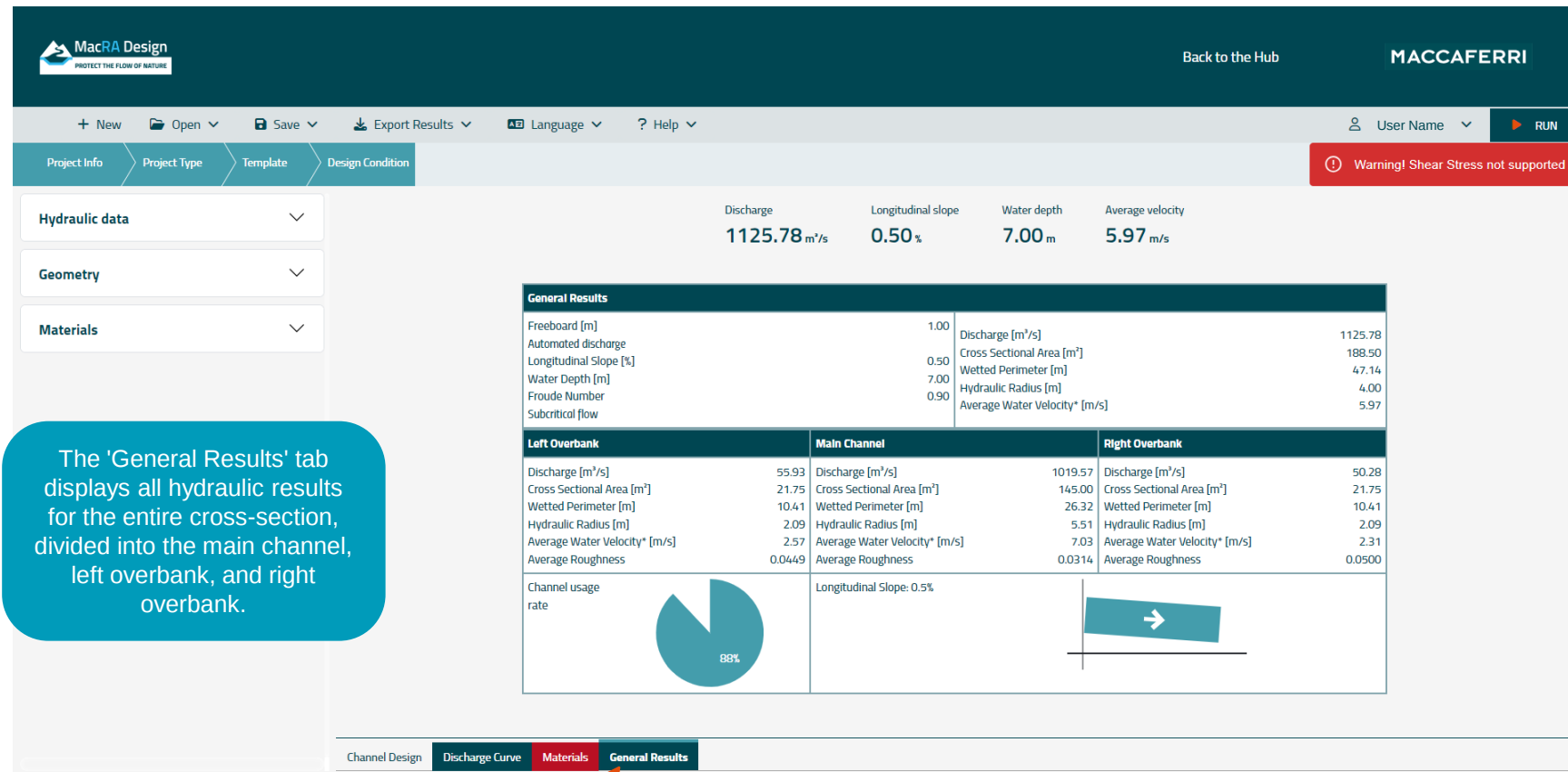
ID	Materials	Thickness [m]	Roughness	Rock d50 [m]	CU	Double diaphragm	X-Ties	Geotextile	Time [h]	Shear Stress [N/m ²]		Velocity Under Lining [m/s]		Length [m]	
										Allowed	Calculated				
1	Grass mats		0.04							10.00	61.42	X	-	-	7.21
2	Macmat R1 PoliMac™		0.05						30	196.58	104.48	✓	-	-	5.00
3	Reno Mattress Plus PoliMac™	0.3	0.03	0.1	1.5	YES	YES	YES		232.00	206.59	✓	0.16	✓	5.66
4.L	Reno Mattress Plus PoliMac™	0.23	0.03	0.09	1.5	YES	YES	YES		426.00	275.46	✓	0.15	✓	4.00
4.C	Cobbles and shingles		0.035							52.60	275.46	X	-	-	7.00
4.R	Reno Mattress Plus PoliMac™	0.23	0.03	0.09	1.5	YES	YES	YES		426.00	275.46	✓	0.15	✓	4.00
5	Reno Mattress Plus PoliMac™	0.23	0.03	0.09	1.5	YES	YES	YES		232.00	206.59	✓	0.15	✓	5.66
6	Macmat R1 PoliMac™		0.05						30	196.58	104.48	✓	-	-	5.00
7	Macmat R1 PoliMac™		0.05						30	196.58	61.42	✓	-	-	7.21

Channel Design
Discharge Curve
Materials
General Results

The 'Materials' tab displays a table with all material details, including calculated and allowed shear stress and velocity under the lining, along with corresponding checks.

If one of the checks is not satisfied, the relevant row will be highlighted in red

2.4 CHANNEL AND BANK PROTECTION – OUTPUT RESULTS



GRADE CONTROL STRUCTURES

3 GRADE CONTROL STRUCTURES

MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

Open ▾Language ▾? Help ▾

User Name ▾

Project InfoProject TypeTemplateDesign Condition

Here you can choose between two main project types



CHANNEL AND BANK PROTECTION

Cross section analysis for longitudinal works: free surface channels with steady uniform turbulent flow. The cross-section can be completely or partially lined with specific materials to evaluate the erosive processes, protect riverine structures, and assess flow capacity.



GRADE CONTROL STRUCTURES

Check many flow conditions and design different types of erosion control structures (vertical drops, stepped or sloped weirs) and their dissipation basins. Evaluate hydraulic performance and structural stability of gabion weirs and spillways.

Click "Next" to proceed to the Template selection

Next

3.1 GRADE CONTROL STRUCTURES - TEMPLATE

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Back to the Hub

MACCAFERRI

Open Language Help User Name

Project Info Project Type Template Design Condition

1 Choose the type of structure

Weir with vertical drop Stepped weir Sloped weir

Unit System Metric System

2 Select the unit system (Metric or Imperial)

3 Choose a pre-set template based on the project's characteristics.

Available templates

Vertical Drop - Simple drop without basin (H=3m)

Vertical drop - Ulined basin with counterweir (H=3m)

Vertical drop - Lined stilling basin with counterweir (H=3m)

Vertical Drop - Lined and excavated stilling basin (H=3m)

Next

4 Click "Next" to proceed to the design

GRADE CONTROL STRUCTURES

WEIRS WITH VERTICAL DROP

3.2.1 WEIRS WITH VERTICAL DROP – DESIGN CONDITION

MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

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Project Info Project Type Template **Design Condition**

Hydraulic data
Channel geometry
Weir geometry
Wings geometry

In the “Design Condition” tab you have the possibility to modify the project input data and run the calculation

Here you will find six menus to enter your data
Clicking on one of them will expand the relevant menu

Cross Section

5

10

Front View

You can adjust the zoom of the front view using the relevant buttons, move the front view on the screen by dragging it, and show/hide it using the 'eye' button.

3.2.1.1 WEIRS WITH VERTICAL DROP – HYDRAULIC DATA

MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

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Project Info Project Type Template Design Condition

Hydraulic data

Design discharge (m^3/s) 1 22

River bed gradient (m/m) 2 0.01

Roughness coefficient 3 0.03

Channel geometry

Weir geometry

Wings geometry

Stilling basin

Soil data

1 Enter the design discharge value

2 Define the average longitudinal slope for the selected channel stretch

3 Specify the roughness coefficient for the channel

NOTE: every change in the data will automatically be saved by the software

Front View

3.2.1.2 WEIRS WITH VERTICAL DROP – CHANNEL GEOMETRY

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Back to the Hub

MACCAFERRI

+ New | Open | Save | Language | ? Help | User Name | RUN

Project Info | Project Type | Template | Design Condition

Hydraulic data

Channel geometry

Bank top elevation (m) 1 8

Channel width (m) 2 10

Slope of left bank (°) 3 45

Slope of right bank (°) 4 45

Soil data

Modifying the data in 'Channel geometry' will automatically update the front view.

Cross Section

Front View

The screenshot displays the MacRA Design software interface for creating a weir with a vertical drop. The 'Channel geometry' settings are visible on the left, with four numbered callouts (1-4) corresponding to the input fields: Bank top elevation (8m), Channel width (10m), Slope of left bank (45°), and Slope of right bank (45°). The main workspace shows a 3D cross-section of the weir structure, which is a stepped concrete structure with a vertical drop of 3m. The channel width is 10m, and the bank top elevation is 8m. A callout box states: 'Modifying the data in 'Channel geometry' will automatically update the front view.' The bottom of the interface shows the 'Cross Section' and 'Front View' tabs, with the 'Front View' tab currently selected.

3.2.1.3 WEIRS WITH VERTICAL DROP – WEIR GEOMETRY

MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

+ New Open Save Language ? Help User Name RUN

Project Info Project Type Template Design Condition

Hydraulic data

Channel geometry

Weir geometry

N	Layer width (m)	Offset (m)	Layer height (m)
Wings 1		0	1
2	2	0	1
3	3	0	1
4	4	0	1
5	5	0	1

Foundation (m)

1

2

1

3

1

5

9

1

2

0.5

0.5

Modifying the 'Weir geometry' data will automatically update the cross-section and front view.

In "Weir geometry" the relevant data can be modified layer by layer.

- 1 To add/delete a layer use the relevant buttons.
- 2 Set the foundation depth from the dropdown menu

Cross Section

Front View

3.2.1.4 WEIRS WITH VERTICAL DROP – WINGS GEOMETRY

The screenshot displays the MacRA Design software interface. The top navigation bar includes 'MacRA Design' and 'MACCAFERRI'. The main menu has options like '+ New', 'Open', 'Save', 'Language', and 'Help'. The 'Design Condition' tab is active, showing a sidebar with 'Hydraulic data', 'Channel geometry', 'Weir geometry', and 'Wings geometry'. The 'Wings geometry' section is expanded, showing input fields for 'Width (m)' (10), 'Offset (m)' (0), 'Height (m)' (1), and 'Slope angle' (45). A 3D model of a weir with wings is shown in the center, with dimensions and a color-coded cross-section. A blue callout box explains that modifying the 'Wings geometry' data will automatically update the cross-section and front view. A 'Front View' button is visible at the bottom right.

Modifying the 'Wings geometry' data will automatically update the cross-section and front view.

In "Wings geometry" the relevant data can be modified layer by layer

- 1 The 'offset' adjusts the position of the wings in relation to the center of the channel
- 2 Adjusting the 'height' will result in a corresponding change in the gabion width

3.2.1.5 WEIRS WITH VERTICAL DROP – STILLING BASIN

MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

+ New Open Save Language ? Help User Name RUN

Project Info Project Type Template Design Condition

Hydraulic data
Channel geometry
Weir geometry
Wings geometry
Stilling basin

1 ☒ Counterweir
Elevation (m) 0,5
Pool Length (m) 9
Width (m) 10
☒ Stilling basin
Elevation (m) 0
Thickness (m) 0,3
Choose materials

Soil data

Cross Section

1 Counterweir:
Specify the elevation of the counterweir, the length of the pool, and the width of the counterweir (which corresponds to the width of the pool).

Front View

MACCAFERRI

46

3.2.1.6 WEIRS WITH VERTICAL DROP – SOIL DATA

MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

+ New Open Save Language ? Help User Name RUN

Project Info Project Type Template Design Condition

Hydraulic data
Channel geometry
Weir geometry
Wings geometry
Stilling basin
Soil data

1 Soil type
Friction angle (°)
Unit weight (kN/m³)
Granulometry in pool- ϕ 90 (mm)

2 Gabion data
Porosity
Friction angle soil-weir (°)
Coefficient soil-foundation
Rockfill unit weight

1 2

In the "Soil data" menu you can define the characteristics of:

1 Natural foundation soil
2 Gabion and rock filling

Cross Section

Front View

3.2.2 WEIRS WITH VERTICAL DROP – CALCULATION

MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

User Name

RUN

NOTE: After each run, the project will be automatically saved on the cloud. To prevent unintended modifications to a project, we recommended to use the 'save as' option before running a new calculation.

When you are done with the definition of all the inputs, click on RUN to start the calculation!

Save as cloud file
Save as local file

Hydraulic data

Channel geometry

Weir geometry

Wings geometry

Stilling basin

Soil data

Soil type: Fine ...

Friction angle (°): 32

Unit weight (kN/m³): 18

Granulometry in pool-d90 (mm): 100

Gabion data

Porosity: 0.3

Friction angle soil-weir (°): 10

Coefficient soil-foundation: 0.7

Rockfill unit weight: 26

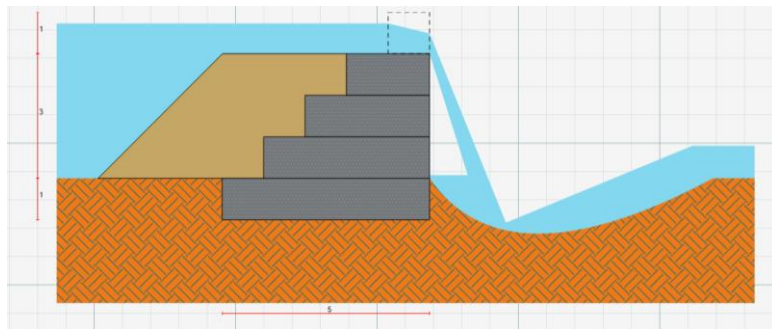
Cross Section

Front View

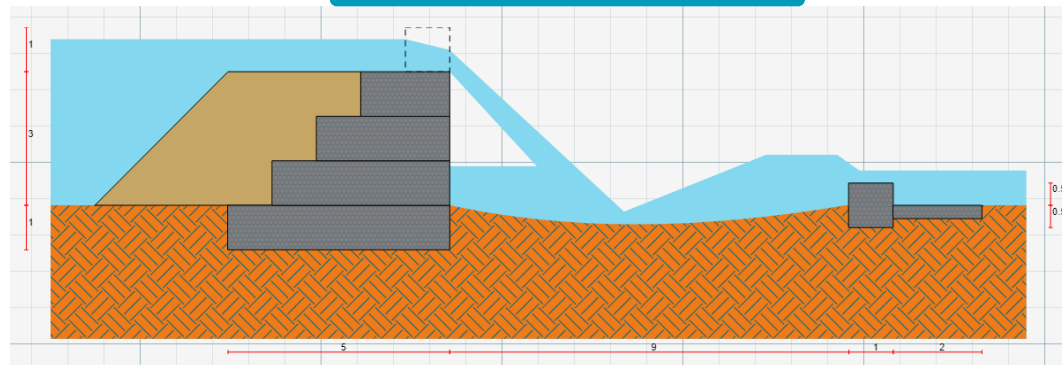
3.2.3 WEIRS WITH VERTICAL DROP – OUTPUT RESULTS

Depending on the design (presence or not of counterweir and lined stilling basin) the software returns different results: maximum expected scour depth or shear stress acting on the lining material and relative checks

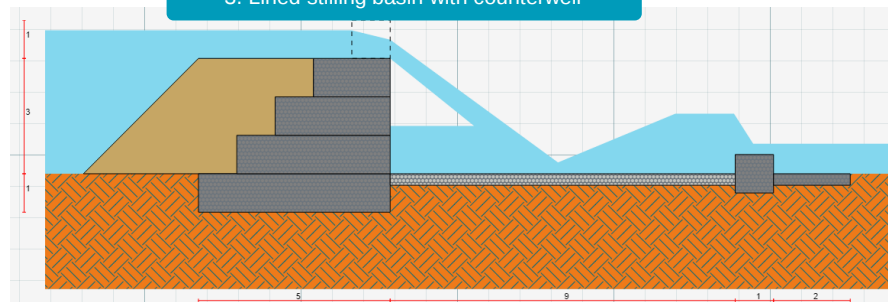
1. Simple drop without stilling basin



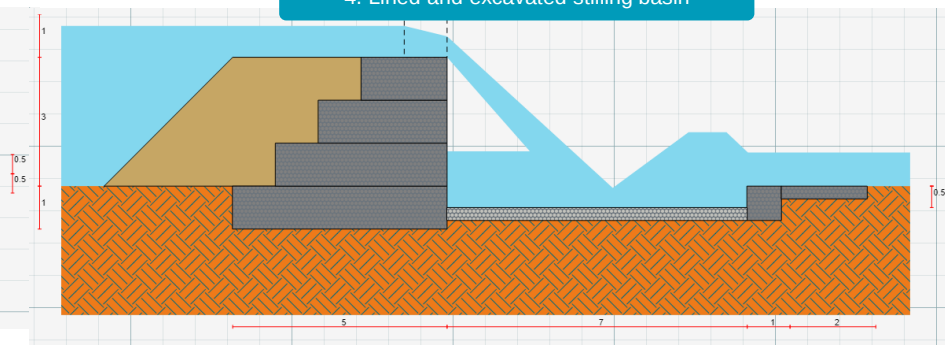
2. Unlined basin with counterweir



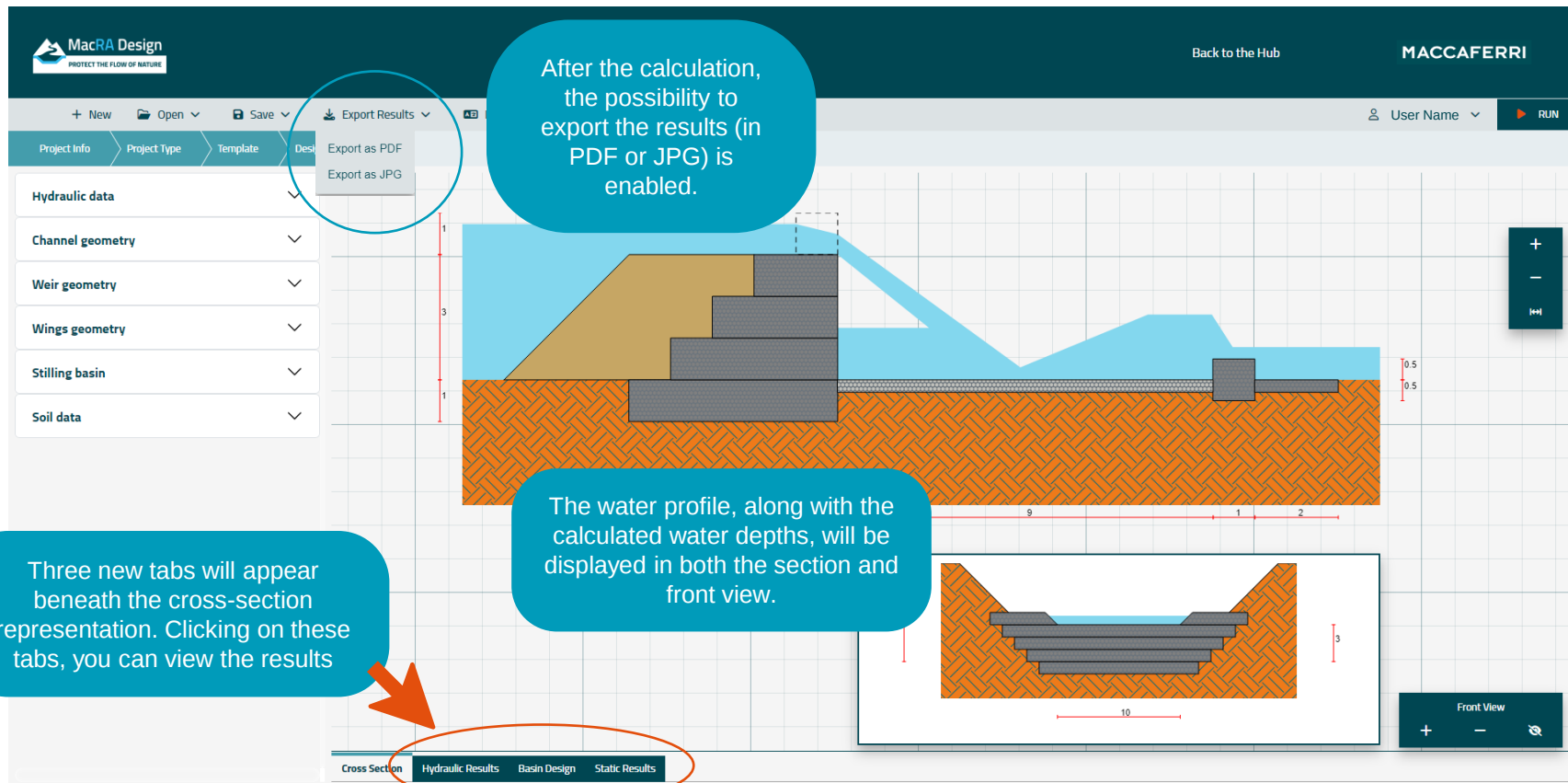
3. Lined stilling basin with counterweir



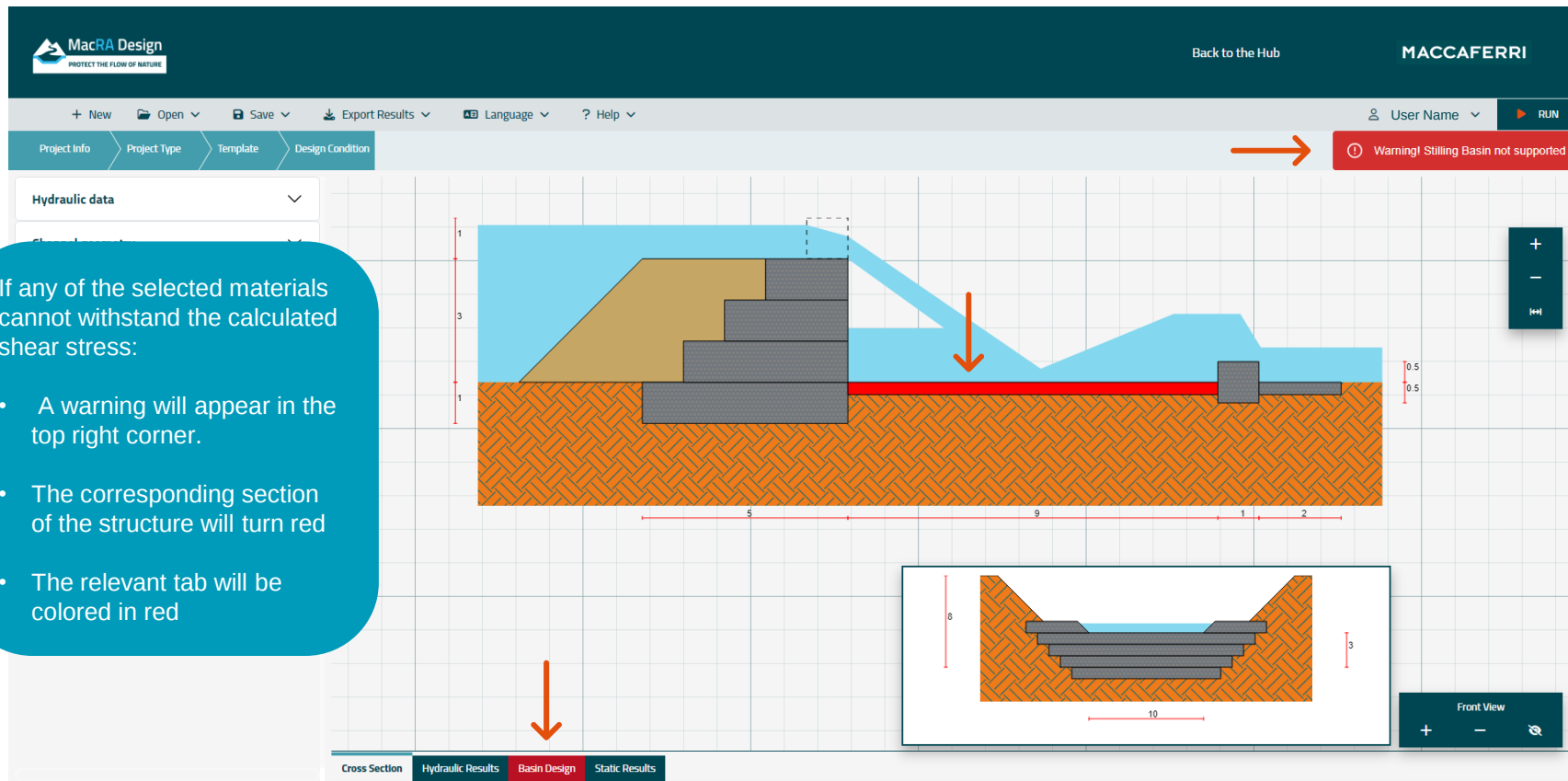
4. Lined and excavated stilling basin



3.2.3 WEIRS WITH VERTICAL DROP – OUTPUT RESULTS



3.2.3 WEIRS WITH VERTICAL DROP – OUTPUT RESULTS



3.2.3 WEIRS WITH VERTICAL DROP – OUTPUT RESULTS

 MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

+ New | Open | Save | Export Results | Language | Help

User Name | RUN

Project Info | Project Type | Template | Design Condition

Hydraulic data

Channel geometry

Weir geometry

Wings geometry

Stilling basin

Soil data

CASE 3 - LINED POOL + COUNTERWEIR ($f_b=0$)

INPUT DATA	Symbol	Value	Unit
Design discharge:	Q	22	m ³ /s
Manning roughness coefficient:	n	0.03	-
River gradient:	i	0.01	m/m
Channel width:	b	10	m
Channel height:	H	1	m
Bank slope on left side:	θ_1	45	deg
Bank slope on right side:	θ_r	45	deg
Weir crest elevation:	f_g	3	m
Weir crest width:	L_g	10	m
Crest side slope angle:	θ_g	45	deg
Granular material downstream:	d_{50}	100	mm
Counterweir elevation:	f_c	0.5	m
Counterweir width:	L_c	10	m
Basin length designed:	L_b	9	m

Hydraulic Results	Symbol	Value	Unit
Water depth on crest:	d_g	0.49	m
Water depth downstream the structure:	d_3	0.78	m
Backwater depth:	d_0	0.73	m
Main weir submerged?		NO	
Water cushion elevation at weir toe:	z_u	1.24	m
Water depth of supercritical flow:	d_1	0.3	m
Froude number of supercritical flow:	Fr_1	4.37	-
Counterweir submerged?		YES	
Minimum counterweir elevation:	f_{c_min}	0.38	m
Verified minimum counterweir elevation:		✓	
Tailwater depth due to counterweir:	d_2	1.56	m

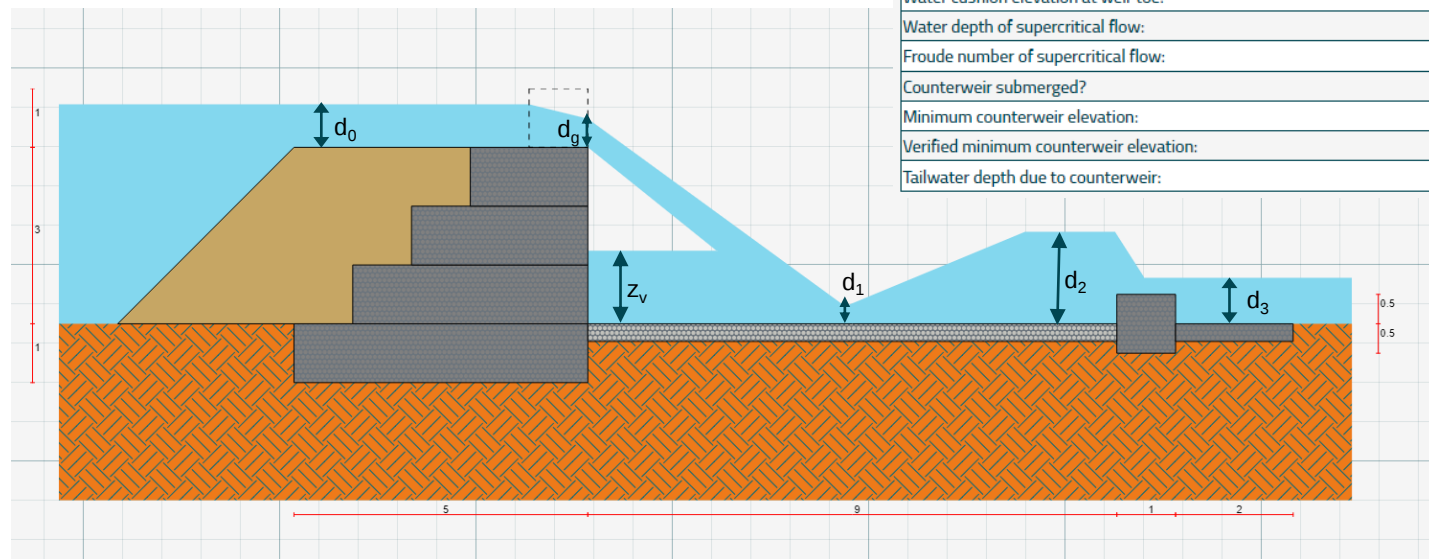
Cross Section | **Hydraulic Results** | Basin Design | Static Results

In the 'Hydraulic Results' tab, you can review both the Input Data and the Hydraulic Results.



3.2.3 WEIRS WITH VERTICAL DROP – OUTPUT RESULTS

NOTE: d_1 and d_2 also represent the conjugated depths of the hypothetical hydraulic jump to be confined in the basin. The graphical representation is theoretical and is provided for easy visualization of the relative depths. In practice, due to the turbulent nature of the hydraulic jump, distinguishing the depth d_1 could be challenging.



Hydraulic Results	Symbol	Value	Unit
Water depth on crest:	d_g	0.49	m
Water depth downstream the structure:	d_3	0.78	m
Backwater depth:	d_0	0.73	m
Main weir submerged?		NO	
Water cushion elevation at weir toe:	z_v	1.24	m
Water depth of supercritical flow:	d_1	0.3	m
Froude number of supercritical flow:	Fr_1	4.37	-
Counterweir submerged?		YES	
Minimum counterweir elevation:	f_{c_min}	0.38	m
Verified minimum counterweir elevation:		✓	
Tailwater depth due to counterweir:	d_2	1.56	m

3.2.3 WEIRS WITH VERTICAL DROP – OUTPUT RESULTS

 MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

+ New | Open | Save | Export Results | Language | Help

User Name | RUN

Project Info | Project Type | Template | Design Condition

Hydraulic data

The 'Basin Design' tab reports the following:

- Expected scour depth and location if the basin is not protected
- Lining material details
- Acting shear stress and relevant check if the basin is protected with a specific solution

BASIN DESIGN OUTPUT	Symbol	Value	Unit	Check
Scour depth:	f_b	0	m	-
Scour location:	X	1.71	m	-
Location of hydraulic jump start:	Lg1	4.38	m	-
Minimum basin length:	L_{bas_min}	8.97	m	✓
Lining material:	Reno Mattress Plus PoliMac™ - t=0.23 m - d50= 0.09 m - Cu= 1			
Basin lining thickness:	t_b	0.3	m	-
Shear Stress at downstream section:	τ_{bas_calc}	374.56	N/m ²	✓
Allowable shear stress of the lining:	τ_{all}	426	N/m ²	-

NOTE: If one of the checks is not satisfied, the relevant row will be highlighted in red

Cross Section | Hydraulic Results | **Basin Design** | Static Results

3.2.3 WEIRS WITH VERTICAL DROP – OUTPUT RESULTS


MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

+ New Open Save Export Results Language Help
User Name
▶ RUN

Project Info

Project Type

Template

Design Condition

The 'Static Result' tab displays all data relevant to the static checks.

The top-left table reports the main checks that need to be satisfied.

STABILITY CHECKS - OUTPUT	Symbol	Value
Safety factor against sliding:	FS _{sl}	1.47
Safety factor against overturning:	FS _{ov}	1.55
Safety factor against seepage* :	FS _{see}	1.42
Safety factor against uplift pressure:	FS _{up}	1.12

*note: the check against seepage is performed with the method of critical gradients. Other types of traditional checks against seepage or filtration are not applicable for a gabion weir as this is a porous medium. Please find more information in the technical manual.

SOIL THRUST - OUTPUT	Symbol	Value	Unit
Active thrust coefficient (Rankine):	K _a	0.31	-
Total height of the structure:	h _w	4	m
Soil thrust of the upstream backfill:	P _{am}	27.37	kN*m
Horizontal component of upstream thrust:	P _{amh}	26.95	kN*m
Lever arm of Pamh:	b _{amh}	1.33	m
Moment of horizontal upstream thrust:	b _{amh}	35.93	kN*m
Vertical component of upstream thrust:	P _{amv}	4.75	kN*m
Lever arm of Pamv:	b _{amv}	5	m
Moment of vertical upstream thrust:	b _{amv}	23.76	kN*m
Downstream soil active thrust:	P _{av}	1.71	kN*m
Lever arm of Pav:	b _{av}	0.33	m
Moment of downstream thrust:	M _{av}	0.57	kN*m

WEIGHTS	Symbol	Value	Unit
GABION WEIR			
Weir unit weight:	WG	267.86	kN*m
Lever arm of the weir weight:	b _{wg}	1.93	m
Moment of the weir weight:	M _{wg}	516.59	kN*m
Soil unit weight:	WS	66.8	kN*m

RESULTING FORCES AND MOMENTS - OUTPUT	Symbol	Value	Unit
Normal force on the foundation:	N	225.79	kN
Shear stress on the foundation:	T	107.67	kN
Sum of stabilizing moments:	M _{stab}	875.13	kN*m
Sum of destabilizing moments:	M _{ed}	564.76	kN*m

HYDROSTATIC PRESSURE - OUTPUT	Symbol	Value	Unit
Upstream Hydrostatic Pressure:	S _{am}	107.13	kN
Lever arm of Upstream Hydrostatic Pressure:	b _{sam}	1.51	m
Moment of upstream hydrostatic pressure:	M _{sam}	161.93	kN*m
Downstream Hydrostatic Pressure:	S _{av}	24.69	kN
Lever arm of downstream Hydrostatic Pressure:	b _{av}	0.75	m
Moment of downstream hydrostatic pressure:	M _{av}	18.47	kN*m

UPLIFT PRESSURE - OUTPUT	Symbol	Value	Unit
Filtration length:	L _f	13	m
Upstream uplift pressure:	S _{pm}	33.06	kN/m
Downstream uplift pressure:	S _{pav}	21.94	kN/m
Hydraulic uplift:	V _w	137.49	kN
Lever arm of hydraulic uplift:	b _{vw}	2.67	m
Moment of the Hydraulic uplift:	M _{vw}	366.89	kN*m

Cross Section
Hydraulic Results
Basin Design
Static Results

NOTE: If one of the four checks is not satisfied, the relevant row will be highlighted in red

**GRADE CONTROL
STRUCTURES**

**STEPPED WEIRS
(DROP STRUCTURES)**

3.3.1 STEPPED WEIRS – DESIGN CONDITION

The screenshot displays the MacRA Design software interface. The top navigation bar includes 'MacRA Design' logo, 'PROTECT THE FLOW OF NATURE', 'Back to the Hub', and 'MACCAFERRI'. Below this is a toolbar with '+ New', 'Open', 'Save', 'Language', and 'User Name' dropdown, followed by a 'RUN' button. The main menu on the left lists 'Project Info', 'Project Type', 'Template', 'Design Condition' (highlighted with a red circle), 'Hydraulic data', 'Channel geometry', 'Weir geometry', and 'Wings geometry'. A red hand icon points to the 'Design Condition' menu. A blue callout box contains the text: 'NOTE: For 'Stepped weirs,' the general input data are similar to those of vertical drops. Please refer to Par 3.2.1 for more details.' The main workspace shows a 'Cross Section' diagram of a stepped weir. The weir has a total height of 10 units and a total width of 10 units. The weir is composed of several steps, each with a height of 2 units and a width of 2 units. The weir is shown in a perspective view, with a 'Front View' button at the bottom right. The diagram includes dimension lines for height (10, 5, 0.5, 0.5) and width (3, 9, 1). A red dashed line indicates the water level. The weir is shown in a perspective view, with a 'Front View' button at the bottom right.

MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

+ New Open Save Language User Name RUN

Project Info Project Type Template **Design Condition**

Hydraulic data
Channel geometry
Weir geometry
Wings geometry

NOTE: For 'Stepped weirs,' the general input data are similar to those of vertical drops. Please refer to Par 3.2.1 for more details.

Here you will find five menus to enter your data

Clicking on one of them will expand the relevant menu

10 5 0.5 0.5 3 9 1

Cross Section

Front View

3.3.1.1 STEPPED WEIRS – HYDRAULIC DATA

MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

User Name

RUN

Project Info Project Type Template Design

Hydraulic data

Design discharge (m³/s) 22

River bed gradient (m/m) 0.01

Roughness coefficient 0.03

1 Dissipation α [%] 50

2 ☒ Automated dissipation α [%]

Channel geometry

Weir geometry

Wings geometry

Stilling basin

NOTE: every change in the data will automatically be saved by the software

1 Dissipation: This represents the percentage reduction of the total head upstream, a factor to consider for the dissipation rate on each drop.

2 You have the possibility to input a design value for the dissipation or select the 'automated dissipation' option to let the software estimate the value. For more details, please refer to Section 2.4 of the reference manual

10 5 10 3 9 1 0.5 0.5

Front View

Cross Section

3.3.1.2 STEPPED WEIRS – WEIR GEOMETRY

MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

User Name RUN

Project Info Project Type Template De

Hydraulic data

Channel geometry

Weir geometry

Step number 6

1 Step ratio 0,5

2 Gabion width (m) 3

Step Height (m) 1

Foundation layers 1

Wings geometry

Stilling basin

In 'Weir geometry,' you can define the geometric characteristics of the weir by adding/removing steps and modifying their height and the inclination of the structure.

- 1 You can select the 'step ratio' value (H:V) from a list of default values, or you have the option to type in a specific value.
- 2 The 'gabion width' will be automatically adjusted by the software to ensure a one meter overlap between each layer.

10 5 10

5 1 3 9 1

0.5 0.5

Front View

Cross Section

3.3.2 STEPPED WEIRS – CALCULATION

NOTE: After each run, the project will be automatically saved on the cloud. To prevent unintended modifications to a project, we recommended to use the 'save as' option before running a new calculation.

When you are done with the definition of all the inputs, click on RUN to start the calculation!

Project Settings:

- Hydraulic data
- Channel geometry
- Weir geometry
 - Step number: 6
 - Step ratio: 0,5
 - Gabion width (m): 3
 - Step Height (m): 1
 - Foundation layers: 1
- Wings geometry
- Stilling basin

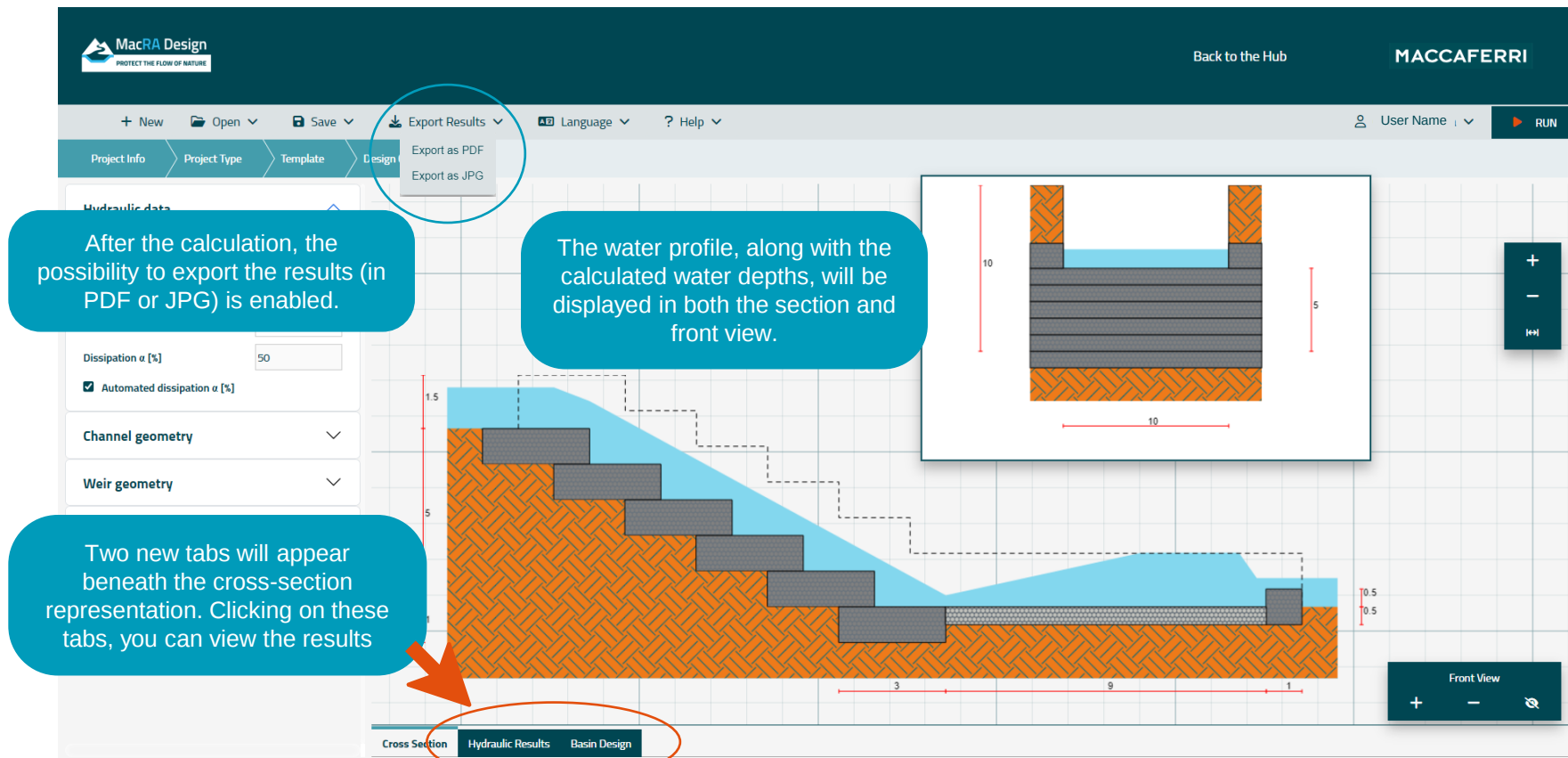
Dimensions (Cross Section):

- Step height: 1.5, 5, 1
- Step ratio: 0.5
- Foundation layers: 1
- Stilling basin: 0.5, 0.5
- Wings geometry: 3, 9, 1

Front View:

- Step height: 10
- Step ratio: 5
- Foundation layers: 10

3.3.3 STEPPED WEIRS – OUTPUT RESULTS



MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

+ New | Open | Save | Export Results | Language | Help

Export Results
Export as PDF
Export as JPG

Project Info | Project Type | Template | Design

Hydraulic data

Dissipation α [%] 50

☒ Automated dissipation α [%]

Channel geometry

Weir geometry

After the calculation, the possibility to export the results (in PDF or JPG) is enabled.

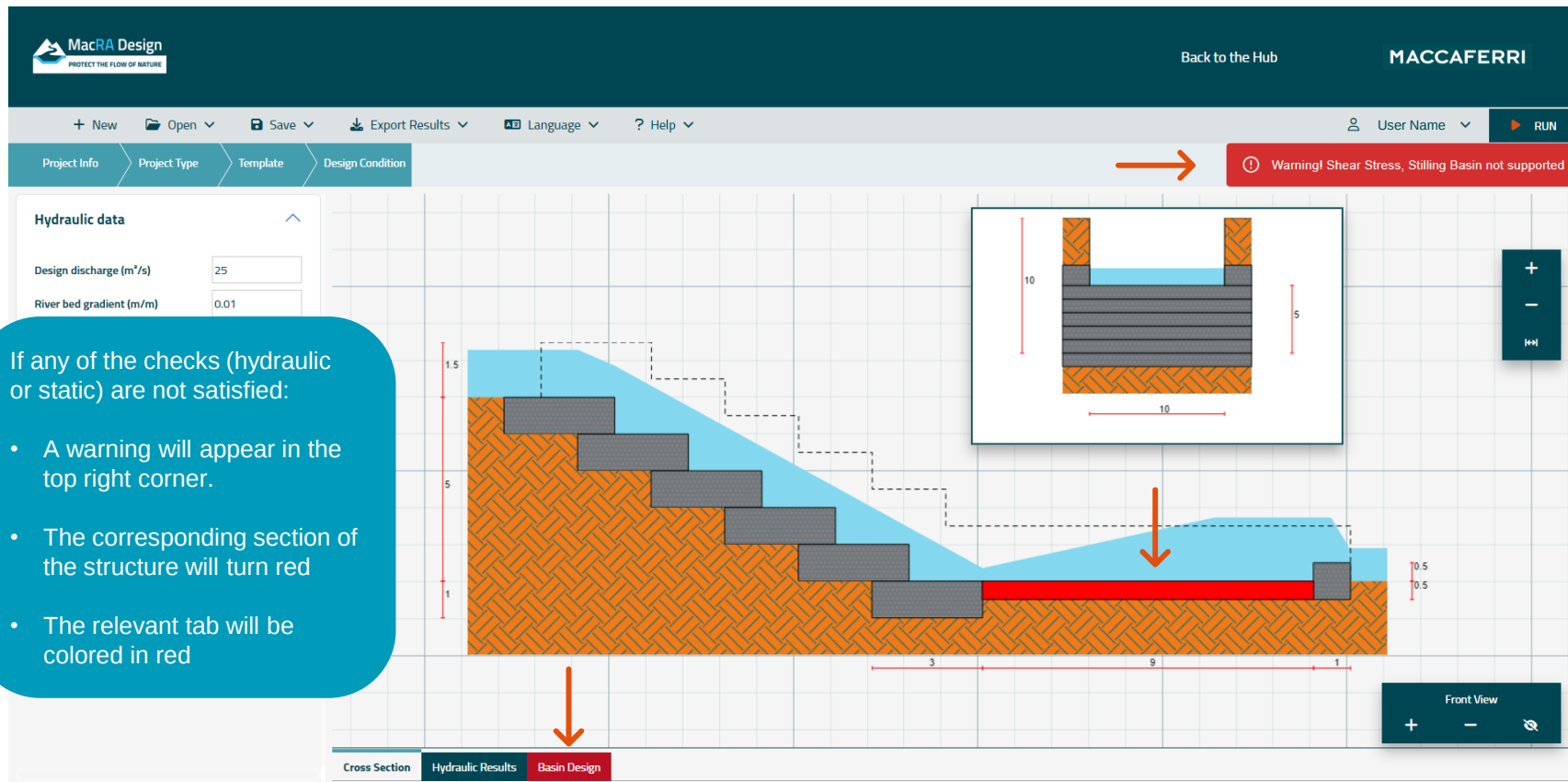
The water profile, along with the calculated water depths, will be displayed in both the section and front view.

Two new tabs will appear beneath the cross-section representation. Clicking on these tabs, you can view the results

Cross Section | Hydraulic Results | Basin Design

Front View

3.3.3 STEPPED WEIRS – OUTPUT RESULTS



3.3.3 STEPPED WEIRS – OUTPUT RESULTS

 MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

+ New | Open | Save | Export Results | Language | Help

User Name | RUN

Project Info | Project Type | Template | Design Condition

Hydraulic data

Channel geometry

Weir geometry

Wings geometry

Stilling basin

INPUT DATA	Symbol	Value	Unit
Crest width:	L_c	10	m
Toe width:	L_t	10	m
Step height:	h	1	m
Total height:	f_t	5	m
Discharge:	Q	21	m ³ /s
Specific discharge at crest:	q_c	2.1	m ³ /s/m
Specific discharge at toe:	q_t	2.1	m ³ /s/m
Discharge coefficient:	μ	0.385	-
Average slope:	V:H	0.5	-
Dissipation:	α	59.65	-
Roughness coefficient	n	0.03	-
River bed gradient:	i	0.01	-

UPSTREAM PARAMETERS	Symbol	Value	Unit
Backwater depth:	d_0	1.15	m
Critical depth:	d_c	0.77	m
Critical velocity:	V_k	2.74	m/s
Specific head on the crest:	H_s	1.15	m
Total head on the crest:	H_t	6.15	m
Type of Flow:	-	Skimming Flow	-

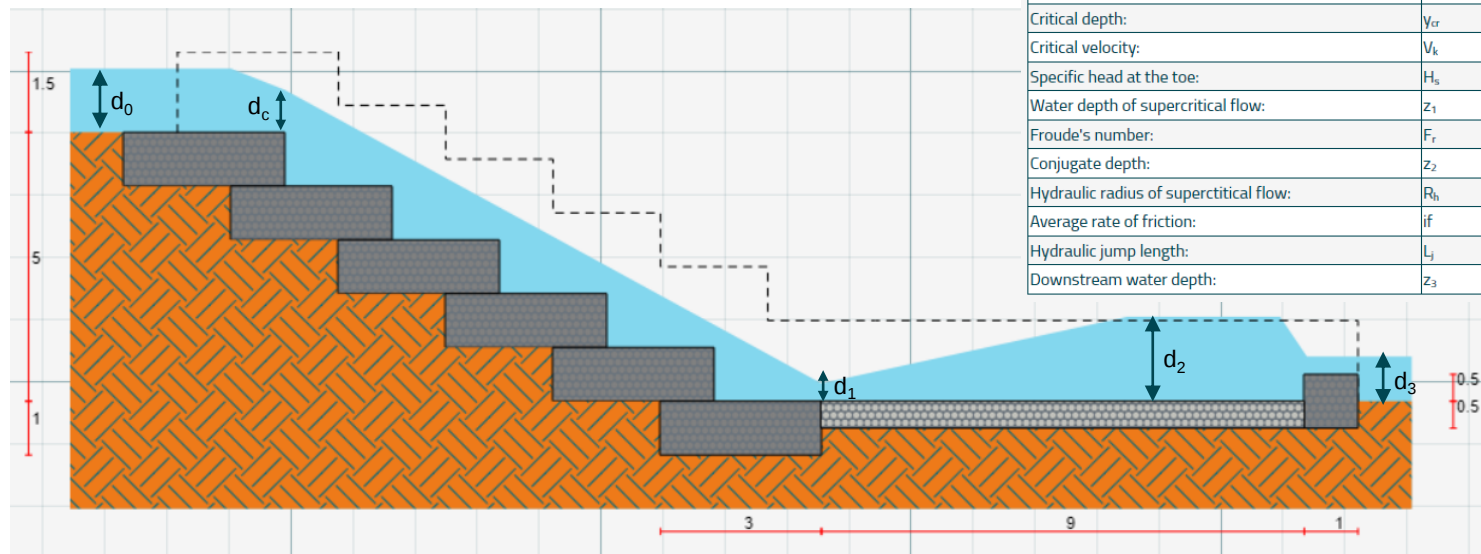
DOWNSTREAM PARAMETERS	Symbol	Value	Unit
Total head downstream:	H_t	2.48	m
Critical depth:	V_{cr}	0.77	m
Critical velocity:	V_k	2.74	m/s
Specific head at the toe:	H_s	1.15	m
Water depth of supercritical flow:	z_1	0.32	m
Froude's number:	F_r	3.66	-
Conjugate depth:	z_2	1.52	m
Hydraulic radius of supercritical flow:	R_h	0.3	m
Average rate of friction:	if	0.19	-
Hydraulic jump length:	L_j	8.23	m
Downstream water depth:	z_3	0.8	m

Cross Section | **Hydraulic Results** | Basin Design

In the 'Hydraulic Results' tab, you can review both the Input Data and the Hydraulic Results.

3.3.3 STEPPED WEIRS – OUTPUT RESULTS

NOTE: d_1 and d_2 also represent the conjugated depths of the hypothetical hydraulic jump to be confined in the basin. The graphical representation is theoretical and is provided for easy visualization of the relative depths. In practice, due to the turbulent nature of the hydraulic jump, distinguishing the depth d_1 could be challenging.



UPSTREAM PARAMETERS	Symbol	Value	Unit
Backwater depth:	d_0	1.19	m
Critical depth:	d_c	0.79	m
Critical velocity:	V_k	2.78	m/s
Specific head on the crest:	H_s	1.19	m
Total head on the crest:	H_t	6.19	m
Type of Flow:	-	Skimming Flow	-

DOWNSTREAM PARAMETERS	Symbol	Value	Unit
Total head downstream:	H_t	2.59	m
Critical depth:	y_{cr}	0.79	m
Critical velocity:	V_k	2.78	m/s
Specific head at the toe:	H_s	1.19	m
Water depth of supercritical flow:	z_1	0.33	m
Froude's number:	F_r	3.69	-
Conjugate depth:	z_2	1.57	m
Hydraulic radius of supercritical flow:	R_{h1}	0.31	m
Average rate of friction:	i_f	0.19	-
Hydraulic jump length:	L_j	8.55	m
Downstream water depth:	z_3	0.83	m

3.3.3 STEPPED WEIRS – OUTPUT RESULTS

 MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

+ New | Open | Save | Export Results | Language | Help

User Name | RUN

Project Info | Project Type | Template | Design Condition

Hydraulic data

Design discharge (m³/s): 22

River bed gradient (m/m): 0.01

Roughness coefficient: 0.03

Dissipation α [%]: 50

☒ Autom...

Channel...

Weir...

Wings...

Stilling...

The 'Basin Design' tab includes:

- Required geometry of the basin
- Lining material details
- Acting shear stress and relevant checks

Basin design output	Symbol	Value	Unit	Check
Min length of the crest:	L_{crest}	1.5	m	-
Min length of the stilling basin:	L_{bac}	9	m	✓
Stilling basin width:	W_b	10	m	-
Min counterweir height:	fc_min	0.38	m	✓
Water velocity:	v_1	6.65	m/s	-
Lining material:	Reno Mattress Plus PoliMac™ - $t=0.3$ m - $d50=0.12$ m - $Cu=1$			
Shear Stress at downstream section:	τ	576.83	N/m ²	✓
Allowable shear stress of the lining:	τ_{all}	591	N/m ²	-

NOTE: If one of the checks is not satisfied, the relevant row will be highlighted in red

Cross Section | Hydraulic Results | **Basin Design**

**GRADE CONTROL
STRUCTURES**

**SLOPED WEIRS
(CHUTES & SPILLAWAYS)**

3.4.1 SLOPED WEIRS – DESIGN CONDITION

MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

+ New | Open | Save | Language | User Name | RUN

Project Info | Project Type | Template | **Design Condition**

Hydraulic data
Channel geometry
Weir geometry
Wings geometry

NOTE: For 'Sloped weirs,' the general input data are similar to those of vertical drops. Please refer to Par 3.2.1 for more details.

Here you will find six menus to enter your data

Clicking on one of them will expand the relevant menu

The diagram shows a cross-section of a sloped weir on a grid. The structure consists of a sloped upstream face, a horizontal crest, and a vertical downstream face. Dimensions are indicated with red lines and numbers: the upstream slope has a vertical height of 1 and a horizontal base of 2; the crest has a horizontal length of 6; the downstream slope has a vertical height of 3 and a horizontal base of 6; the downstream vertical face has a height of 0.5 and a base of 1. A smaller inset diagram shows the 'Front View' of the weir, with a crest width of 28 and a height of 9. The main diagram is labeled 'Cross Section' at the bottom left.

3.4.2 SLOPED WEIRS – CALCULATION

MacRA Design
PROTECT THE FLOW OF NATURE

NOTE: After each run, the project will be automatically saved on the cloud. To prevent unintended modifications to a project, we recommended to use the 'save as' option before running a new calculation.

Project Info | Project Type | **Save as cloud file** | Condition

Save as local file

Hydraulic data

Channel geometry

Weir geometry

Wings geometry

Stilling basin

When you are done with the definition of all the inputs, click on RUN to start the calculation!

1
3
0.3

2 6 6 1

0.5
0.5

9 3

28

Front View

Cross Section

3.4.3 SLOPED WEIRS – OUTPUT RESULTS

MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

+ New | Open | Save | Export Results | Language | Help

Export Results
Export as PDF
Export as JPG

Project Info | Project Type | Template | Design

Hydraulic data
Wings geometry
Stilling basin

The water profile, along with the calculated water depths, will be displayed in both the section and front view.

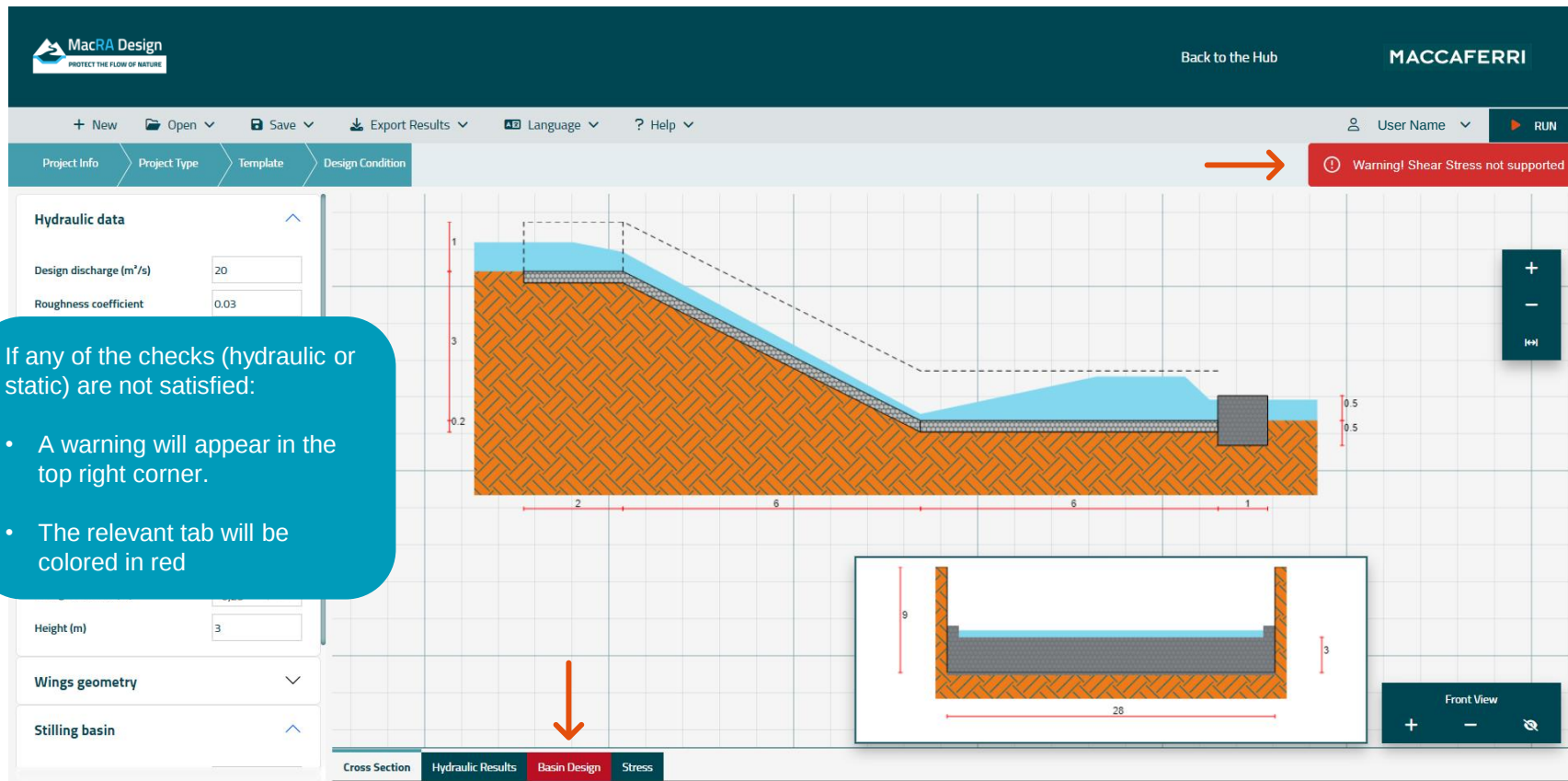
After the calculation, the possibility to export the results (in PDF or JPG) is enabled.

Three new tabs will appear beneath the cross-section representation. Clicking on these tabs, you can view the results

Cross Section | Hydraulic Results | Basin Design | Stress

Front View

3.4.3 SLOPED WEIRS – OUTPUT RESULTS



If any of the checks (hydraulic or static) are not satisfied:

- A warning will appear in the top right corner.
- The relevant tab will be colored in red

3.4.3 SLOPED WEIRS – OUTPUT RESULTS

 MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

+ New | Open | Save | Export Results | Language | Help

User Name | RUN

Project Info | Project Type | Template | Design Condition

Hydraulic data

Channel geometry

Weir geometry

Wings geometry

Stilling basin

INPUT DATA	Symbol	Value	Unit
Discharge:	Q	20	m ³ /s
Riverbed gradient	i	0.01	-
Roughness coefficient	n	0.03	-
Chute Width:	W	26	m
Chute Slope:	S ₀	0.5	-
Chute Height:	H _c	3	m
Crest length:	L _c	2	m

UPSTREAM PARAMETERS	Symbol	Value	Unit
Unit discharge:	q	0.77	m ³ /s/m
Backwater depth upstream:	Z ₀	0.59	m
Critical height at crest:	h _g	0.39	m
Critical velocity at crest:	v _g	1.96	m/s
Critical head at crest:	H _g	0.59	m

DOWNSTREAM PARAMETERS	Symbol	Value	Unit
Velocity at downstream section:	v ₁	5.76	m/s
Water depth at downstream section:	Z ₁	0.13	m
Froude's number:	Fr	5.03	-
Conjugated height:	Z ₂	0.89	m
Hydraulic jump length:	L _j	5.33	m
Water depth downstream the structure:	Z ₃	0.42	m

Cross Section

Hydraulic Results

Basin Design

Stress

In the 'Hydraulic Results' tab, you can review both the Input Data and the Hydraulic Results.



3.4.3 SLOPED WEIRS – OUTPUT RESULTS

 MacRA Design
PROTECT THE FLOW OF NATURE

Back to the Hub

MACCAFERRI

+ New | Open | Save | Export Results | Language | Help

User Name | RUN

Project Info | Project Type | Template | Design Condition

Hydraulic data

Channel geometry

Weir geometry

Wings geometry

Stilling basin

The 'Basin Design' tab includes:

- Required geometry of the basin
- Lining material details
- Acting shear stress and relevant checks

CHUTE AND BASIN DESIGN OUTPUT	Symbol	Value	Unit	Check
Stilling Basin Width:	W_b	26	m	-
Chute lining thickness:	t_c	0.3	m	-
Minimum length of the stilling basin:	L_{b_min}	4.36	m	✓
Minimum counterweir height:	f_{c_min}	0.21	m	✓
Lining material:	Reno Mattress Plus PoliMac™ - $t=0.3$ m - $d50=0.1$ m - $Cu=1$			
Basin lining thickness:	t_b	0.3	m	-
Velocity under the lining:	v_1	0.52	m/s	✓
Shear Stress at downstream section:	τ_c	451.56	N/m ²	✓
Allowable shear stress of the lining:	τ_{all}	532	N/m ²	-

NOTE: If one of the checks is not satisfied, the relevant row will be highlighted in red

Cross Section | Hydraulic Results | **Basin Design** | Stress

3.4.3 SLOPED WEIRS – OUTPUT RESULTS

