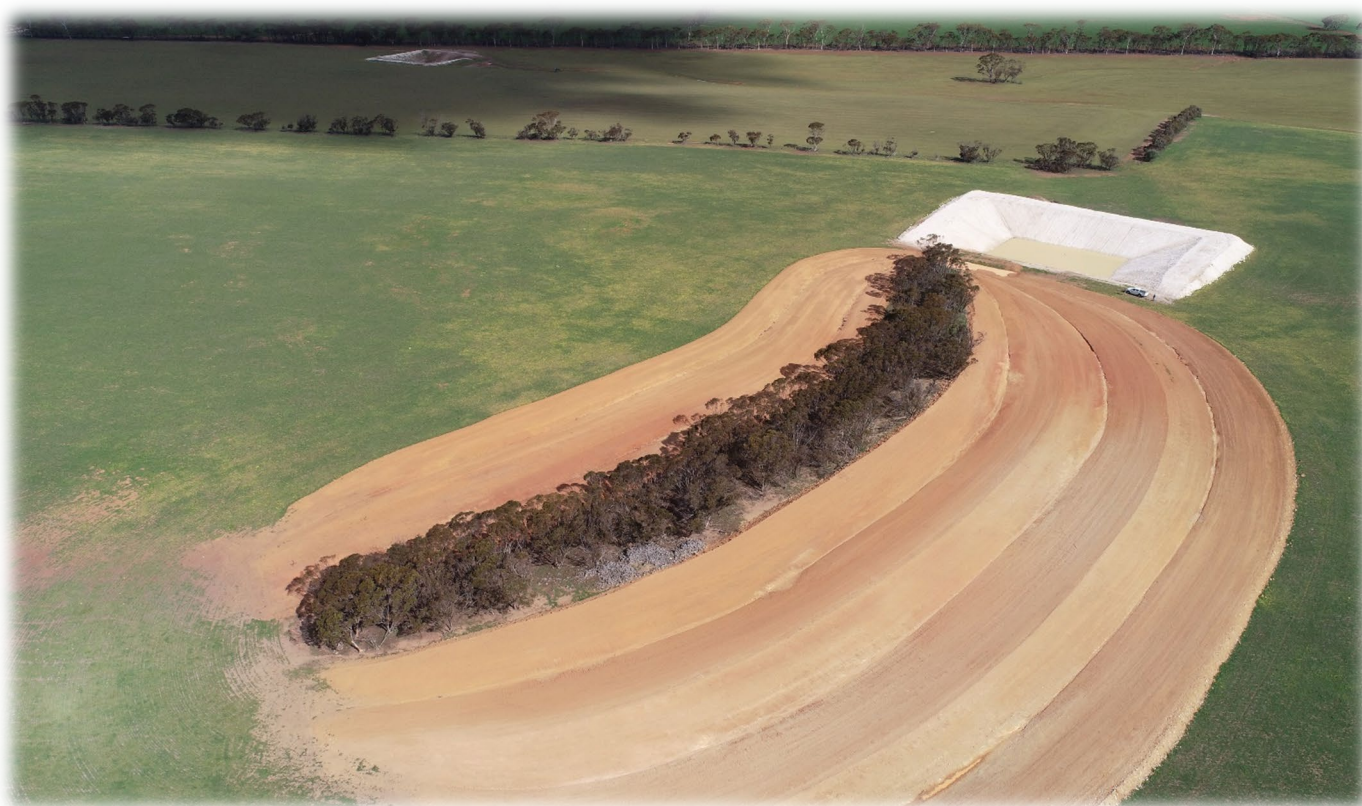


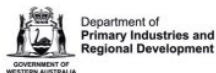
# Water Evaluation Platform Workbook

WEP is an interface to dam water modelling tools to explore the performance and costs associated with different dams, roaded catchments, and evaporation treatments on your farm.



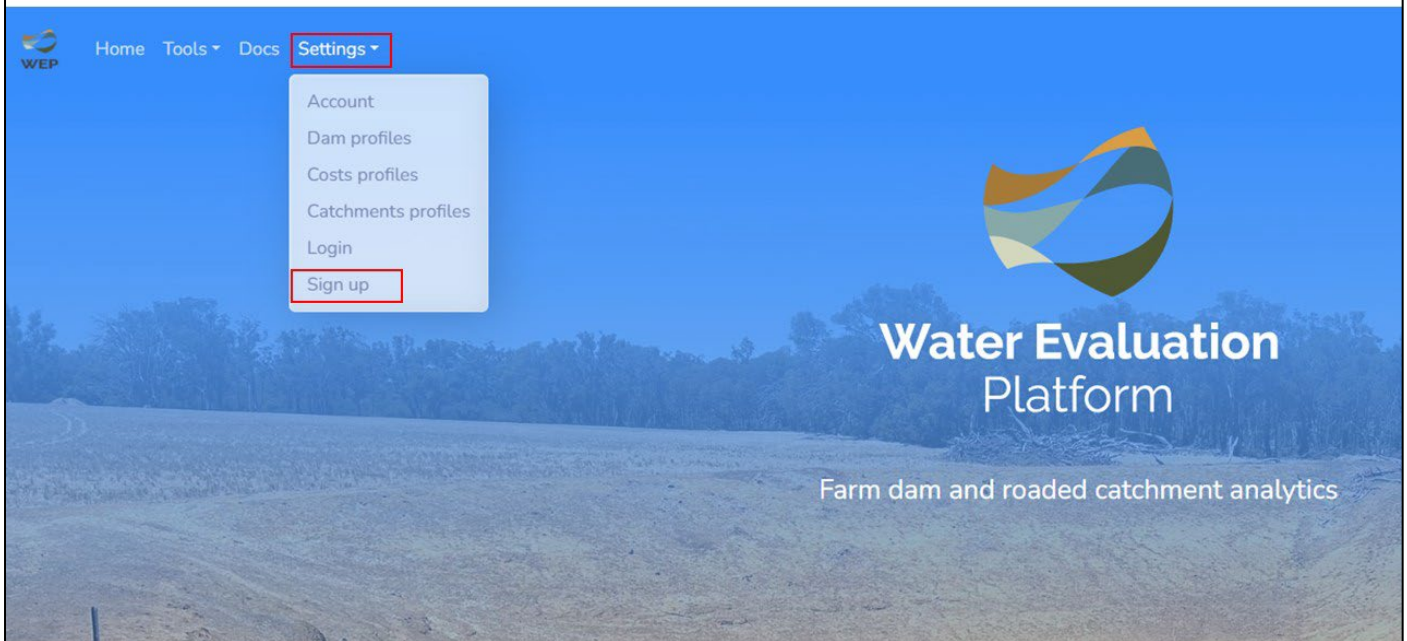
<https://waterevaluationplatform.app/dam/>

The Water Evaluation Platform is jointly funded through the Australian Government's Future Drought Fund and the Western Australian state government's Agriculture Climate Resilience Fund.

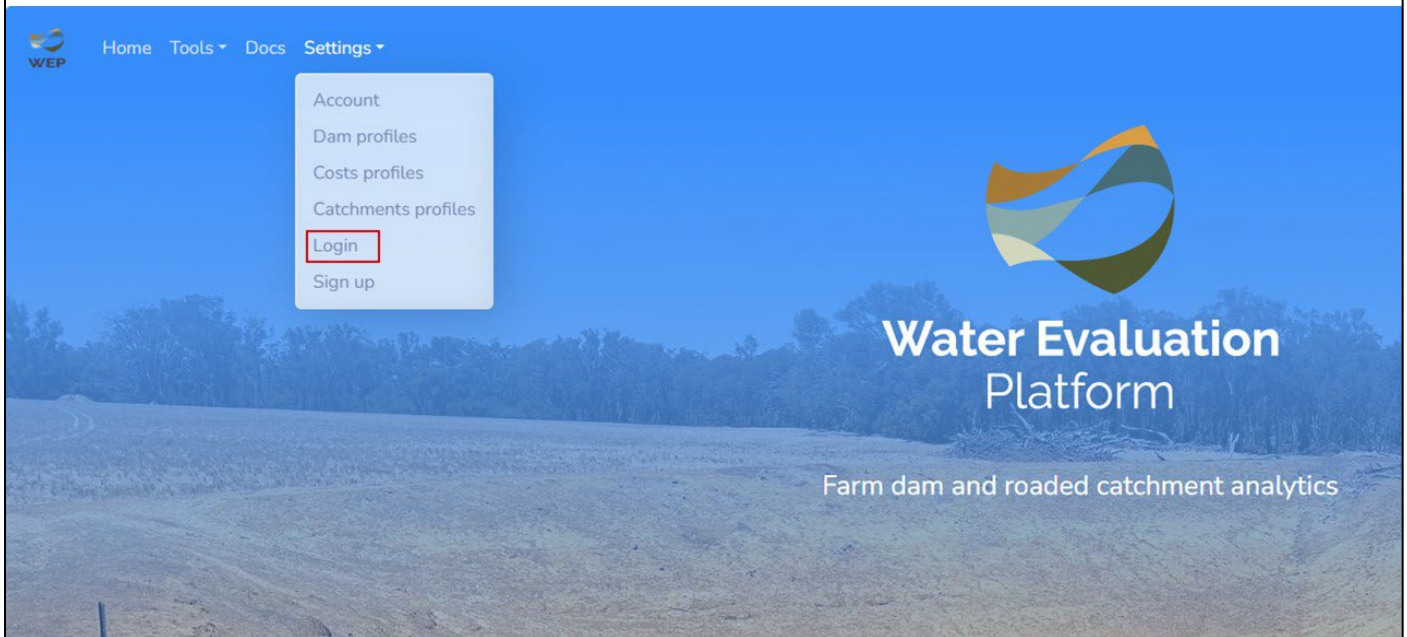


This workbook was developed by South West NRM's FEaST2030 project, supported by the Australian Government through funding from the Natural Heritage Trust under the Climate Smart Agriculture Program.

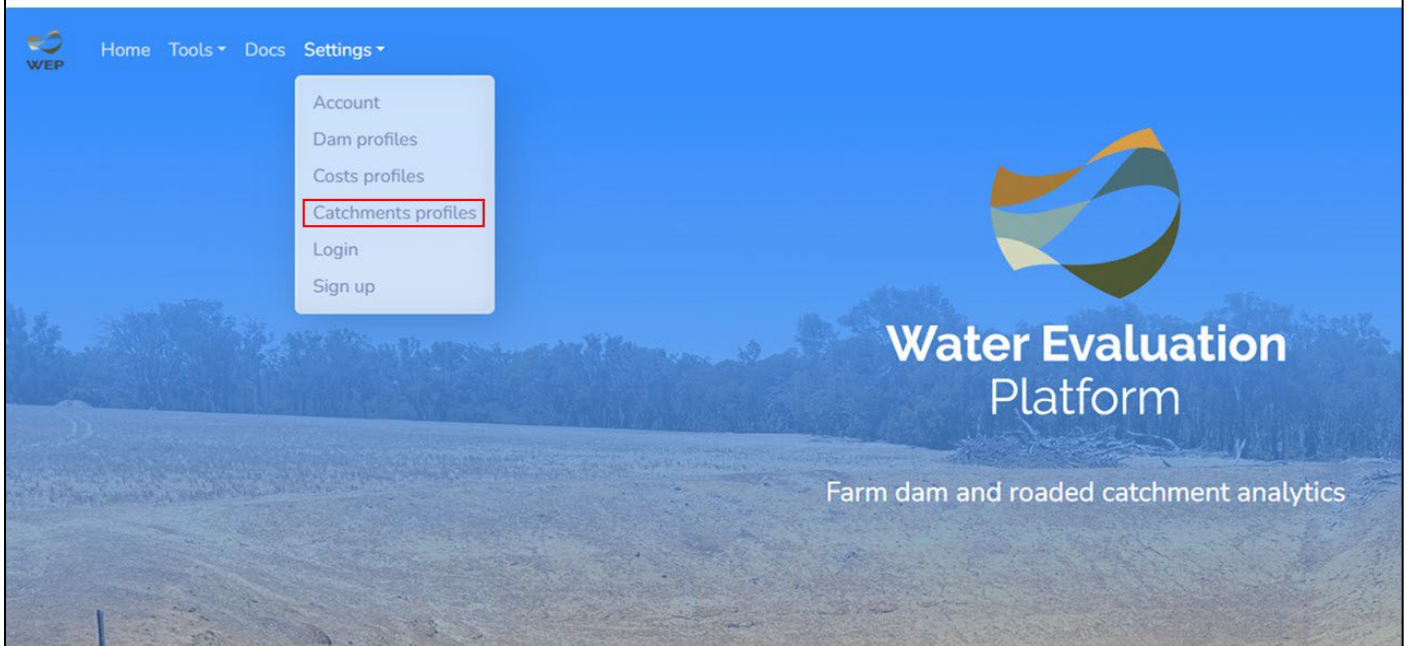
## 1. Create an account: Click on settings and sign up




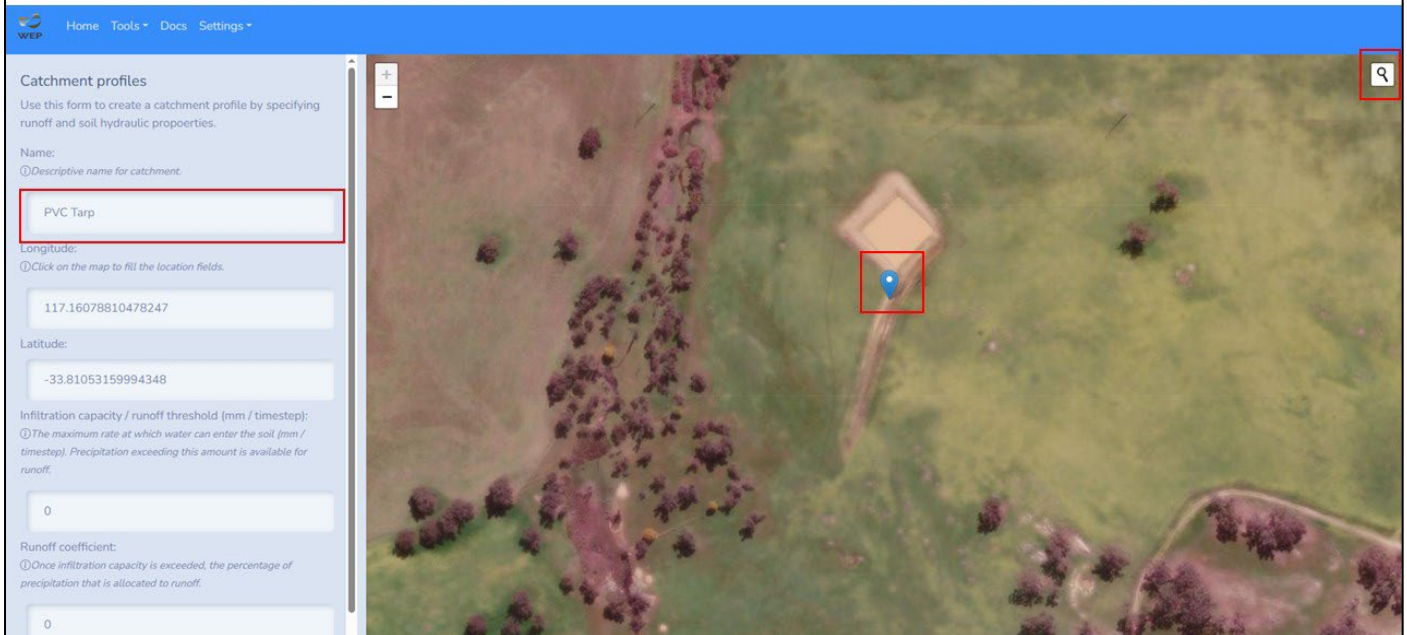
## 2. Login



### 3. Create a catchment profile.



4. Use search  or pan map to your farm (click and drag) and click location of planned catchment. Coordinates generate automatically.
5. Name the catchment.





## 9. Create a Dam Profile

10. Name the profile (e.g. Sheep in summer),

11. Click on “Livestock demand”.

The screenshot shows the WEPA interface. On the left, the 'Settings' dropdown menu is open, with 'Dam profiles' highlighted. On the right, the 'Dam profile configuration' page is shown, with the 'Dam profile name' field containing 'Sheep in summer' and the 'Livestock demand' option selected under 'Dam water demand'.

12. Specify the number of animals drinking from the dam in each month of the year.

Month	Sheep number	Pig number	Cattle number
January	0	0	0
February	0	0	0
March	0	0	0
April	0	0	0
May	0	0	0
June	0	0	0
July	0	0	0

### 13. Specify demand from crop and other uses.

### 14. When done, click on “Save dam profile” at top of page

December

**Crop and other uses demand**

Set monthly estimates of additional sources of water demand such as irrigation, domestic uses, or spray water. Irrigation and other water uses should be entered as kL per-month demand on the dam.

Spray rate (L/ha):  Sprayed area (ha):

Month	Irrigation (kL)	Number of sprays	Other water use (kL)
January	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
February	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
March	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
April	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>

Note: You can also specify if water is added to the dam such as via other dams or drains.

**Practice:** Assume 800 sheep drink from your dam in January, February and March each year.

### 15. Define a Cost Profile

WEP Home Tools Docs Settings

- Account
- Dam profiles
- Costs profiles**
- Catchments profiles
- Login
- Sign up

**Water Evaluation Platform**

Farm dam and roaded catchment analytics

Note: Default values are provided.  
 16. Customise default values based on local knowledge  
 17. Click “Save dam costs profile”

Name for dam costs profile:

dam costs profile name

Silt trap and piped inlet costs (\$): 2000

Interest rate (e.g. enter 5 for 5% ): 5

Roaded catchment 1 construction costs (\$ / ha): 4200

Roaded catchment 2 construction costs (\$ / ha): 4200

Years of catchment 1 operation: 50

Years of catchment 2 operation: 50

Catchment 1 maintenance multiplier (\$ / ha): 175

Catchment 2 maintenance multiplier (\$ / ha): 175

Dam construction costs (\$ / m<sup>3</sup>): 3

Dam site drilling costs (\$): 200

**Practice:** Assume plastic PVC – construction cost \$29,400/ha; years of operation = 7; maintenance multiplier \$769/ha; Silt trap and piped inlet costs \$2,000; Dam construction costs \$3/m<sup>3</sup>; dam site drilling cost \$200; cost to line dam \$12/m<sup>2</sup>; evaporation cover treatment costs \$12.50/m<sup>2</sup>; interest rate 0.05%.

**Analysis tools** – Find under “Tools”, or scroll down home page.  
 18. Click on “Dam and catchment simulation”

The screenshot shows the WEPA website interface. At the top, there is a navigation bar with 'Home', 'Tools', 'Docs', and 'Settings'. The 'Tools' menu is open, showing a list of options: 'Dam and catchment simulation', 'Dam design', 'Catchment analysis', 'Leaky dam analysis', and 'Evaporation reduction analysis'. The 'Dam and catchment simulation' option is highlighted with a red box. Below the navigation bar, there is a large blue banner with a stylized wave logo. Underneath the banner, there is a section titled 'The Water Evaluation Platform' which contains a grid of tool icons and descriptions. The 'Dam and catchment simulation' icon is also highlighted with a red box. The grid includes the following tools and descriptions:

- Dam and catchment simulation:** Simulate a dam's performance and water demand using historical weather data.
- Dam design:** Find the optimum and cheapest reliable dam for your catchment and water demand.
- Catchment analysis:** Find the optimum and cheapest reliable catchment surface and area for your water demand.
- Leaky dam analysis:** Fix a leaky dam and see how dam performance improves.
- Dam costs explorer:** Query the costs of building different dams and catchments. Coming soon!
- Evaporation reduction analysis:** Cover a dam and see how dam performance improves.

## 19. Dam and catchment simulation - Simulates costs, reliability, performance and water demand using historical weather data

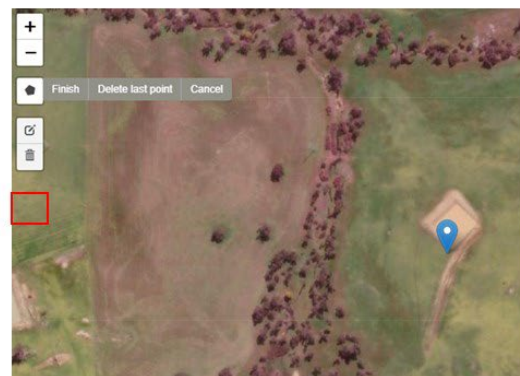
- Reload a previous configuration, or use “New config”.
- Name the simulation.
- Select a dam profile (water demand, see step 9).
- Select a dam cost profile (see step 15).
- Select duration of simulation (make it long).
- Select location of dam (or proposed) (click map).
- Select dam morphology (shape and dimensions).
- Select starting water level (% full) and if it leaks.
- Draw catchment area (or input hectares) and select catchment type (e.g. tarp). [Note step 20]
- Repeat for Catchment 2, or set area to zero if n/a
- Run simulation.

**Practice:** Click on map to locate the dam. Make sure blue marker is in the centre of the dam. Measure dimensions based on maximum water level (i.e. spillway). Start duration from 2000. Assume a morphology of 55 x 55 m, 5 m deep with 33% side slope; starting level of 60% (January commencement). Assume Catchment 1 is a 0.45 ha plastic tarp, and Catchment 2 is a natural catchment of 30 ha. Assume no leaks.

## 20. Drawing a catchment

- To draw a catchment area, find location and click “Draw”

- Click on the polygon and start drawing, then click “Finish”



Note: Natural catchment areas can also be drawn or area estimated.  
If there is no second catchment, set “Catchment 2 area” to 0

# 21. View results

The screenshot shows the WEPA simulation report interface. On the left, a sidebar lists simulation parameters: Summary (Simulating dam water levels and volume), Sim name (Waters sim), Start (2000-01-01), Stop (2023-12-31), Sim mode (Basic), Catchment 1 (PVC Tarp, 1.0 ha), Catchment 2 (Natural, 25 mm RT, 10.0 ha), Dam volume (2586.03 m³), Reliability (100%), Weather data (Observed), and Weather data source (SILO). The main area displays 'Analysis views' with options for Time-series, Dam performance, and Water demand. Three callout boxes provide context: 'Time-series charts: Monthly dam level, volume, inflow and evaporation' points to a line chart showing volume (m³) over time; 'Dam performance heat maps: Monthly volume, evap, inflow and failure' points to a heatmap of evaporation (m³) from 2000 to 2020; and 'Water demand heat maps: Monthly use by livestock and other uses' points to a heatmap of livestock use (m³) over the same period. A 'Reliability: % of months water demand was met' callout points to the 100% reliability value. An 'Estimated costs: dam and catchment construction and maintenance' callout points to the 'Dam economics' section.

Note: Aim for at least 95% reliability, ideally > 98%. Heat maps that show maximum water inflow may suggest risk of erosion and infrastructure damage.

# Analysis tools – Dam design

## 22. Click on “Dam design”

The screenshot shows the WEPA 'Tools' menu with options: Dam and catchment simulation, Dam design (highlighted), Catchment analysis, Leaky dam analysis, and Evaporation reduction analysis. Below, the 'The Water Evaluation Platform' interface is shown, featuring six tool cards: Dam and catchment simulation, Dam design (highlighted), Catchment analysis, Leaky dam analysis, Dam costs explorer, and Evaporation reduction analysis. Each card includes a brief description of the tool's function.

## 23. Dam design simulation - Uses an existing catchment and dam (water demand) profile to design cheapest, reliable dam.

- Reload a previous configuration, or use “New config”.
- Name the simulation.
- Configure dam design: desired reliability; search steps (4 is ideal and maximum); shape; depth.
- Select a dam profile i.e. water needs (see step 9).
- Select a dam cost profile (see step 15).
- Select duration of simulation (make it long).
- Select location of dam (or proposed) (click map).
- Draw catchment area (or just input hectares) and select catchment type (e.g. tarp, road, natural).
- Repeat for Catchment 2, or set area to zero if n/a
- Run simulation.

## 24. Dam Design results

- Results will be sent by email.
- Once saved, results can be accessed in settings.

- Results include:
  - Storage capacity.
  - Costs.
  - Affect of design change on reliability.

### Smallest reliable dam

Volume (m<sup>3</sup>): 252.38

Cost of flow generated by the catchment (\$/kL): 1.18

Cost of available water generated by the dam and catchment (\$/kL): 0.03

## Analysis tools – Catchment design

### 25. Click on “Catchment analysis”

The Water Evaluation Platform

WEP is an interface to dam water modelling tools to explore the performance and costs associated with different dams, roaded catchments, and evaporation treatments on your farm.

Click on the links below to access dam analytics tools or sign up for an account for advanced features.

To see the Water Evaluation Platform user guide, please follow this [link](#).

- Dam and catchment simulation**  
Simulate a dam's performance and water demand using historical weather data
- Dam design**  
Find the optimum and cheapest reliable dam for your catchment and water demand
- Catchment analysis**  
Find the optimum dam profile, dam location and area for your water demand
- Leaky dam analysis**  
Fix a leaky dam and see how dam performance improves
- Dam costs explorer**  
Query the costs of building different dams and catchments  
Coming soon!
- Evaporation reduction analysis**  
Cover a dam and see how dam performance improves

## 26. Catchment design analysis - Uses an existing dam and (water demand) to design cheapest, reliable catchment.

Catchment analysis

Find the smallest reliable catchment to construct for your dam.

① Sim configuration:  
New config

① Name:

Save analysis:

- ▶ Catchment analysis configuration
- ▶ Dam profile
- ▶ Simulation duration
- ▶ Dam location
- ▶ Dam morphometry
- ▶ Dam water conditions

Check all form elements have been configured correctly before running the simulation.

- Reload a previous configuration, or use “New config”.
- Name the simulation.
- Configure catchment: desired reliability; search steps (4 is ideal and maximum); and type.
- Select a dam profile i.e. water needs (see step 9).
- Select duration of simulation (make it long).
- Select location of dam (or proposed) (click map).
- Add dam shape and dimensions.
- Set the starting depth of the dam (%).
- Run simulation.
  - You will be notified when results are ready
  - See settings > account > project > catchment analysis

## Analysis tools – Leaky dam

### 27. Click on “Leaky dam analysis”

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- Dam design**  
Find the optimum and cheapest reliable dam for your catchment and water demand
- Catchment analysis**  
Find the optimum and cheapest reliable catchment surface and area for your water demand
- Leaky dam analysis**  
Fix a leaky dam and see how dam performance improves
- Dam costs explorer**  
Query the costs of building different dams and catchments  
Coming soon!
- Evaporation reduction analysis**  
Cover a dam and see how dam performance improves

## 28. Leaky dam analysis - Cost:benefit tool to see how a dam's performance improves by fixing leaks.

Leaky dam analysis  
Simulate the effects of fixing a leaky dam.

① Sim configuration:  
New config

① Name:

Save analysis:

- ▶ Dam profile
- ▶ Dam costs
- ▶ Simulation duration
- ▶ Dam location
- ▶ Dam morphometry
- ▶ Dam water conditions
- ▶ Catchment 1
- ▶ Catchment 2

- Reload a previous configuration, or use “New config”.
- Name the simulation.
- Select a dam profile i.e. water needs (see step 9).
- Select a dam cost profile to estimate repair cost.
- Select duration of simulation (make it long).
- Select location of dam (or proposed) (click map).
- Add dam shape and dimensions.
- Set the starting depth of the dam (%).
- Draw catchment area (or just input hectares) and select catchment type (e.g. tarp, road, natural).
- Run simulation.

Note: leaks are incorporated into dam analyses based on size of wall/water interface. They are completely removed in this scenario

# 29. View results

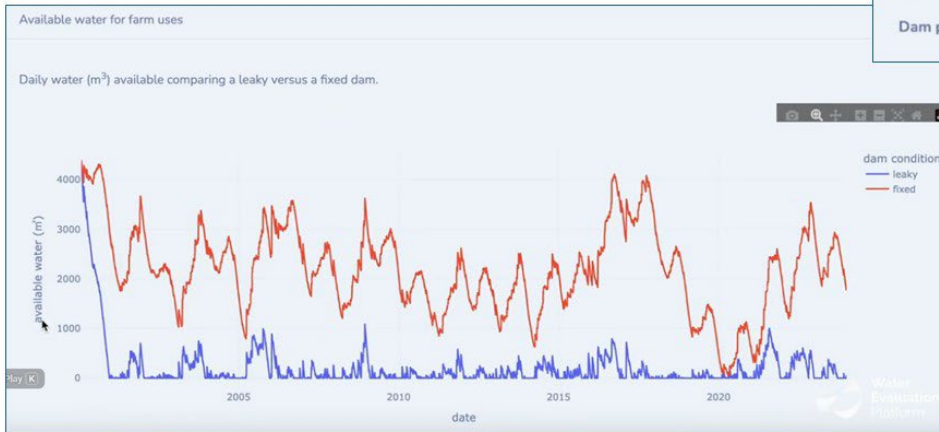
**Reliability:** % of months water demand was met before and after fix.

**Costs:** Cost of lining v cost of water saved

## Fixing a leaky dam report

Reliability and costs of fixing the leaky dam

- Leaky dam reliability (%): 31.71
- Fixed dam reliability (%): 100
- Cost to line dam (\$): 46971.39
- Cost of water saved by lining the dam (\$/kL): 0.0
- Cost profile: Plastic (C1) and natural (C2)
- Dam profile: Small sheep



# Analysis tools – Evaporation reduction

## 30. Click on “Evaporation reduction analysis”

The Water Evaluation Platform

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Click on the links below to access dam analytics tools or sign up for an account for advanced features.

To see the Water Evaluation Platform user guide, please follow this [link](#).

- Dam and catchment simulation**  
Simulate a dam's performance and water demand using historical weather data
- Dam design**  
Find the optimum and cheapest reliable dam for your catchment and water demand
- Catchment analysis**  
Find the optimum and cheapest reliable catchment surface and area for your water demand
- Leaky dam analysis**  
Fix a leaky dam and see how dam performance improves
- Dam costs explorer**  
Query the costs of building different dams and catchments  
Coming soon!
- Evaporation reduction analysis**  
Cover a dam and see how dam performance improves

## 31. Evaporation reduction analysis – Simulates the effect of putting evaporation covers on part of a dam.

Evaporation reduction analysis  
Simulate the effect of using evaporation covers.

① Sim configuration:  
New config

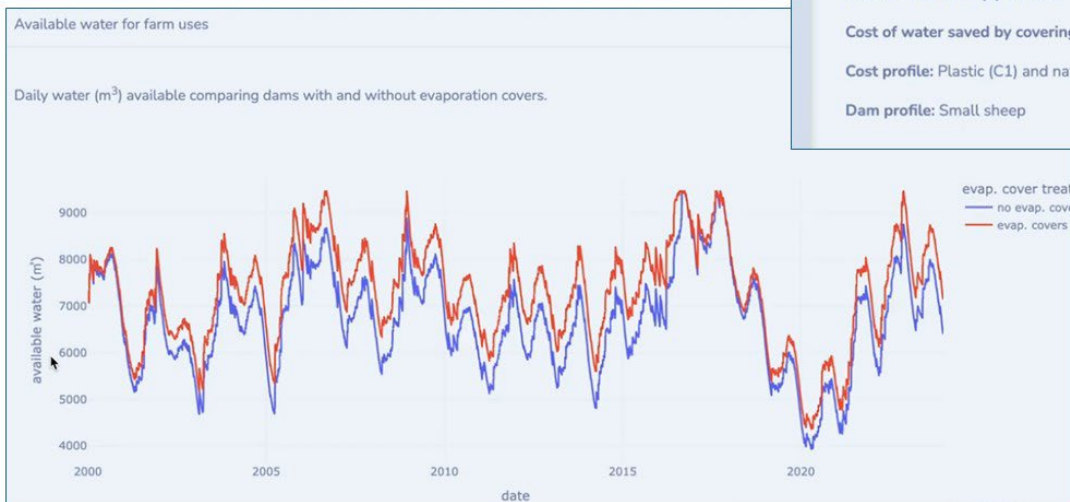
② Name:

Save analysis:

- ▶ Evaporation covers
- ▶ Dam profile
- ▶ Dam costs
- ▶ Simulation duration
- ▶ Dam location
- ▶ Dam morphometry
- ▶ Dam water conditions
- ▶ Catchment 1
- ▶ Catchment 2

- Reload a previous configuration, or use “New config”.
- Name the simulation.
- Describe evaporation cover: effectiveness and area of cover.
- Select a dam profile i.e. water needs (see step 9).
- Select a dam cost profile to estimate repair cost.
- Select duration of simulation (make it long).
- Select location of dam (click map).
- Add dam shape and dimensions.
- Set the starting depth of the dam (%).
- Draw catchment area (or just input hectares) and select catchment type (e.g. tarp, road, natural).
- Run simulation.

## 32. View results



### Evaporation covers report

Reliability and costs of covering the dam

Uncovered dam reliability (%): 100

Covered dam reliability (%): 100

Cost to cover dam (\$): 6250.0

Cost of water saved by covering the dam (\$/kL): 0.0

Cost profile: Plastic (C1) and natural (C2)

Dam profile: Small sheep

See more at <https://docs.waterevaluationplatform.app/getting-started.html>