

Project reference

ILISU

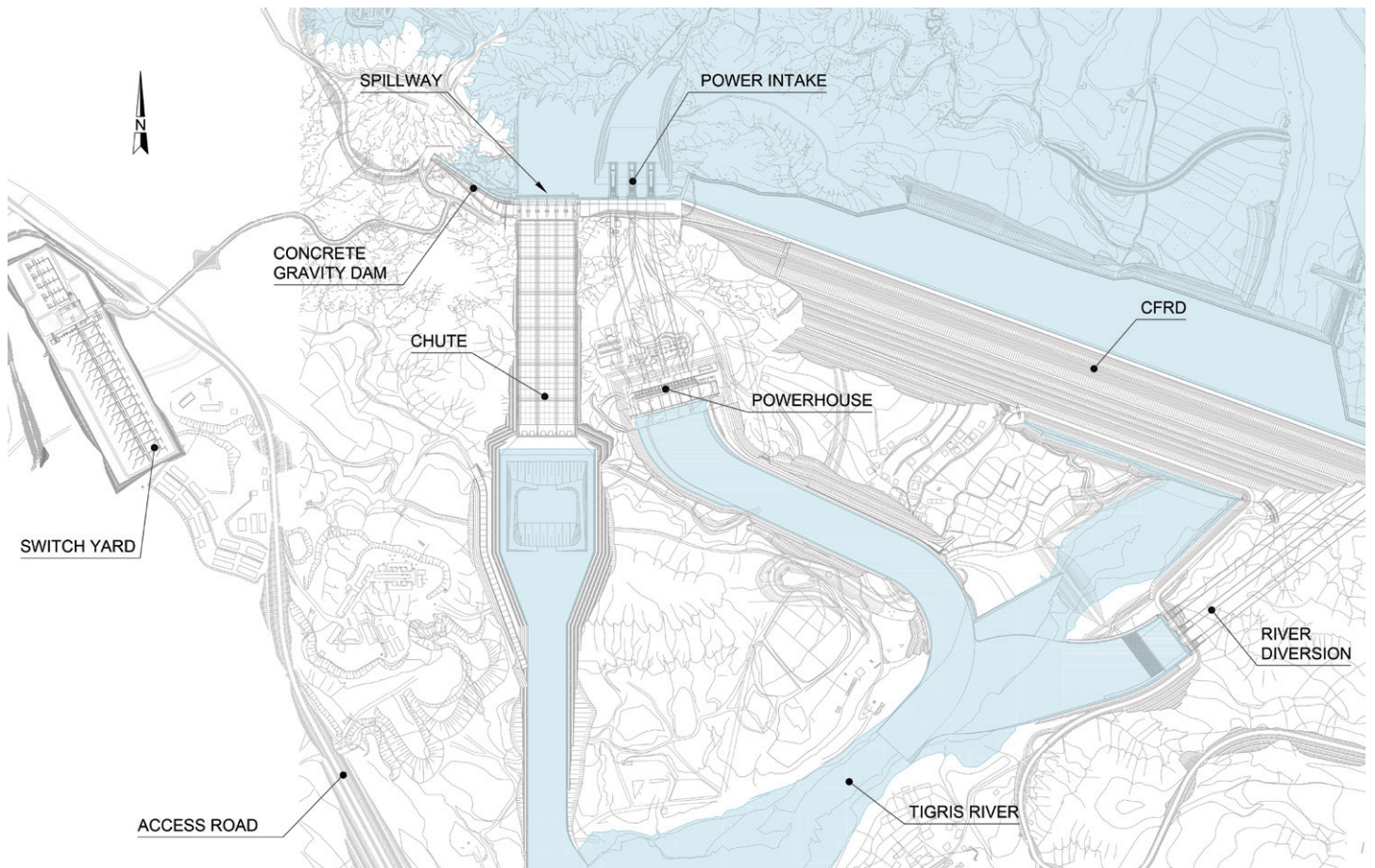
DAM

&

HEPP

Turkey





General layout

## THE DAM

The concrete faced rockfill dam (CFRD), designed by Stucky is one of the largest in Turkey. It is seated on a rock foundation consisting mainly of limestone which contained some faults that were grouted during the dam construction. An 80 m deep grout curtain was provided to prevent water leakage through foundation. The CFRD is connected to a concrete dam section which incorporates the overflow spillway on the right bank linked by a transition structure. The concrete dam has a maximum height of 51.50 m and a crest length of 522 m including the overflow spillway section. A network of instruments is installed in the CFRD and the concrete dam which monitor the behaviour of the dam at all times.

## OVERFLOW SPILLWAY

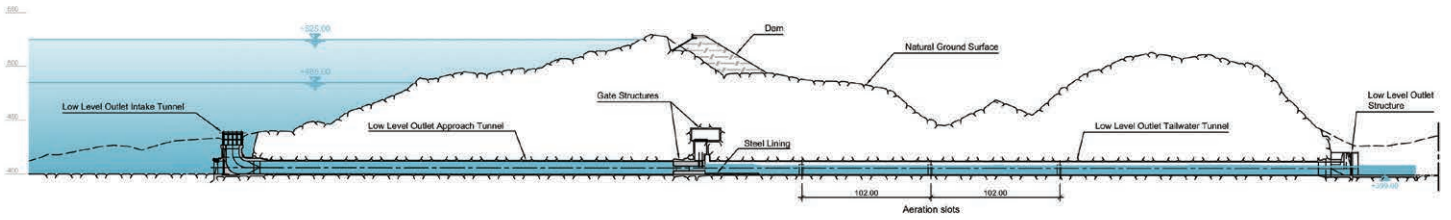
The overflow spillway is located on the right bank and situated in the concrete dam section. The ogee overflow has an elevation of 510 m.a.s.l., an overall length of 120 m and is controlled by 6 radial gates. The ogee section is followed by a chute spillway composed of 3 sections which terminate in a flip bucket. The spilled water leaving the flip bucket falls into a plunge pool from which it is conveyed to the original river course by means of an outlet-channel. The maximum inflow to the reservoir during the PMF is 25'813 m<sup>3</sup>/s whereas the maximum discharge capacity of the spillway is 14'799 m<sup>3</sup>/s. The remaining flood water will be routed within the reservoir.



Overflow spillway flip bucket, plunge pool and tailrace channel

### Figures:

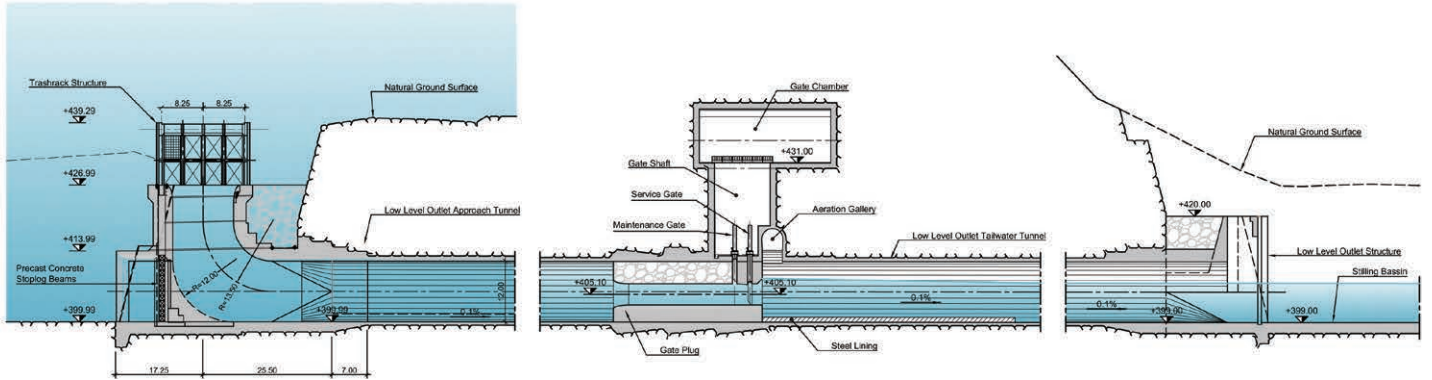
> Maximum discharge	14'799 m <sup>3</sup> /s
> Gates (6 no.)	15 m x 16 m
> Ogee level	510 m.a.s.l.
> Chute length	432.70 m
> Flip bucket elevation	440 m.a.s.l.
> Plunge pool depth	25 m
> Plunge pool dimensions	70 m x 124 m
> Outlet channel	950 m x 80 m



BOTTOM OUTLET INTAKE STRUCTURE

GATES STRUCTURES

BOTTOM OUTLET STRUCTURE



Bottom outlet, section and details

### BOTTOM OUTLET AND DIVERSION SCHEME

A 12 m dia. tunnel, located in the middle of the three tunnels, is transformed into a bottom outlet, which is used to control the impounding and for flushing the reservoir sediments during the startup and operations of the scheme. The bottom outlet is controlled by sliding gates operated from a valve chamber accessed from the left bank.

#### Figures:

- > Maximum discharge 802 m<sup>3</sup>/s
- > Number of openings 2
- > Number of gates 2 service, 2 maintenance
- > Size of the gates 2.65 m x 4 m



Powerhouse viewed from the upstream



Upstream cofferdam



Powerhouse manifolds erection



Powerhouse in construction

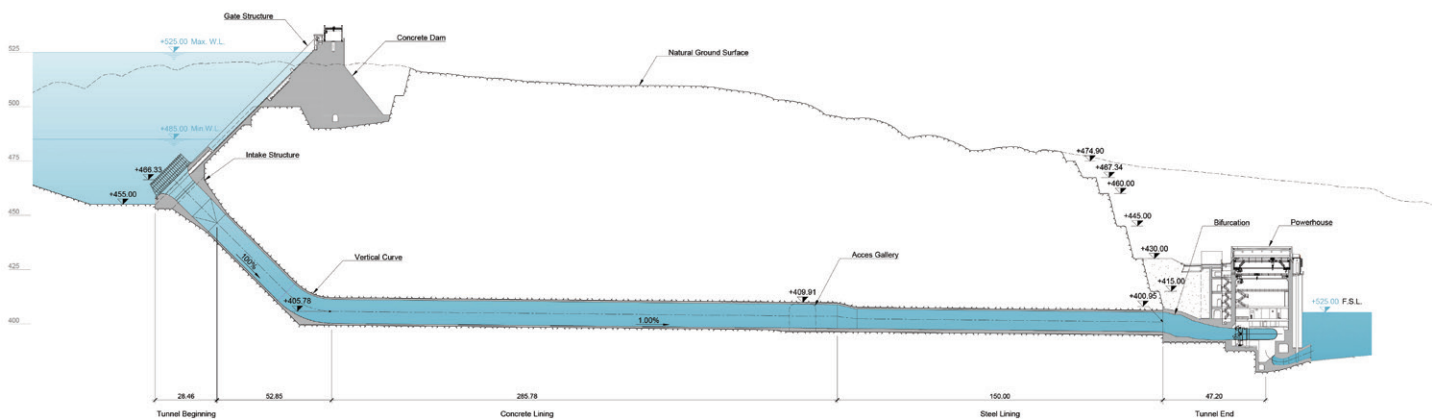
## POWERHOUSE

The six turbine generator units are located in a semi-underground powerhouse. They are equipped with vertical axis Francis turbines of 200 m<sup>3</sup>/s rated flow each (1'200 m<sup>3</sup>/s in total) and have a total installed capacity of 1'200 MW. The turbined water is conveyed to the original river course by means of a trapezoidal tailrace channel with length and base width of 1'080 m and 90 m respectively.

### Figures:

> Length	180 m
> Width	47 m
> Height	58 m
> Number of units	6
> Turbine type	Francis
> Power per unit	200 MW
> Total power	1'200 MW
> Yearly energy	4'120 GWh

POWER TUNNEL NO: 2 LONGITUDINAL SECTION  
1:1000



## POWER INTAKE

The power intake is located on the right bank below the concrete dam and beside the overflow spillway. The three bellmouth intake structures convey water from the approach channel to three 11 m dia. concrete lined energy tunnels having lengths of 318, 329 and 340 m respectively. The concrete lined section is followed by 9 m dia. penstocks which are 150 m long. Each of the three penstocks is bifurcated just upstream of the powerhouse and then connected to the inlet valves of two units.

## LOCATION AND PURPOSE

The Ilisu Dam & HEPP is located on the Dicle (Tigris) River, approximately 45 km upstream of the border between Turkey and Syria. It is the largest of four hydropower schemes on the Dicle River which will provide energy and flood control as well as a regulating reservoir for the downstream Cizre Dam & HEPP. The powerhouse has six units with a total installed capacity of 1200 MW. The construction started in 2008 and is planned for completion in 2016.



Concrete dam and spillway section

## THE SCHEME

The Ilisu scheme will cost over €1 billion and will produce more than 3'800 GWh of electricity each year. The Ilisu powerhouse is located on the right bank immediately downstream of the dam and reservoir. The reservoir, which has a total volume of nearly 10.4 billion m<sup>3</sup> and an active storage capacity of about 7.5 billion m<sup>3</sup>, is used to regulate the high spring water inflow due to snow melt during the dryer summer season, as well as providing storage for power generation.



### The Ilisu HEPP is comprised of the following elements:

> Diversion tunnels (3 no.) dimensions	12 m dia., 925 to 1'060 m long
> Concrete faced rockfill dam	131 m high
> Reservoir volume	10.41 x 10 <sup>6</sup> m <sup>3</sup>
> Overflow spillway capacity	14'799 m <sup>3</sup> /s
> Plunge pool dimensions	124 m x 70 m x 25 m (L x W x D)
> Bottom outlet capacity	802 m <sup>3</sup> /s
> Power intake (3 no.) type	Roller gated bellmouth
> Power tunnels (3 no.) diameter	11 m
> Outdoor powerhouse dimensions	180 m x 47 m x 58 m (L x W x H)
> Production units (6 no.)	1'200 MW total installed power
> Tailwater channel dimensions	1'080 m x 90 m



Overview of the dam site

### The main characteristics of Ilisu CFRD are:

> Maximum height above foundation	131 m
> Elevation of crest	530 m.a.s.l.
> Minimum elevation of foundation	399 m.a.s.l.
> Maximum height above thalweg	131 m
> Crest length (including concrete dam)	2'327 m
> Crest width	9 m
> Volume of fill	23.7 · 10 <sup>6</sup> m <sup>3</sup>
> Area of face slab	244'438 m <sup>2</sup>
> Volume of concrete dam (excluding spillway)	212'064 m <sup>3</sup>

# WE VOUCH FOR QUALITY

## Certifications

- > Quality management system:  
**ISO 9001 : 2015**
- > Environmental management system:  
**ISO 14001 : 2015**
- > Occupational health and safety management system:  
**ISO 45001 : 2018**

All of our contracts have to comply with the directives of our quality management system (QMS) and are supervised by a Project Supervision Committee.

This allows us to guarantee the required quality standards, identify and mitigate risks in advance, develop interdisciplinary solutions, promote ideas and experience sharing between Project Engineers, Experts and our Clients.

Our code of ethics obliges us to enforce the following principles:

- > **Integrity**
- > **Provision of first-class services and quality**
- > **Sustainability, social and environmental responsibility**
- > **Personal responsibility and accountability**
- > **Compliance with laws and international standards**

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