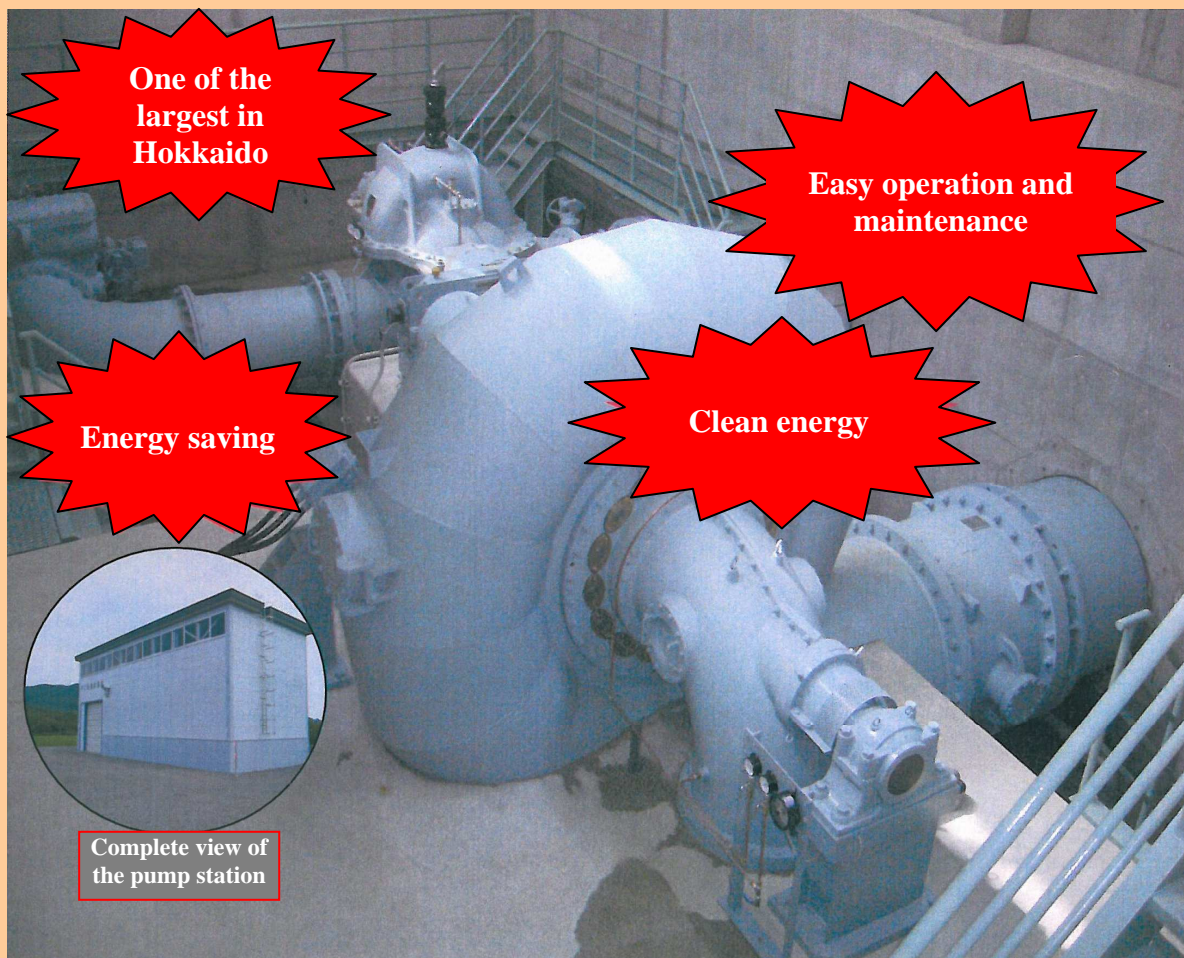


7-chome Irrigation Pump Station

Hydraulically driven agricultural pump

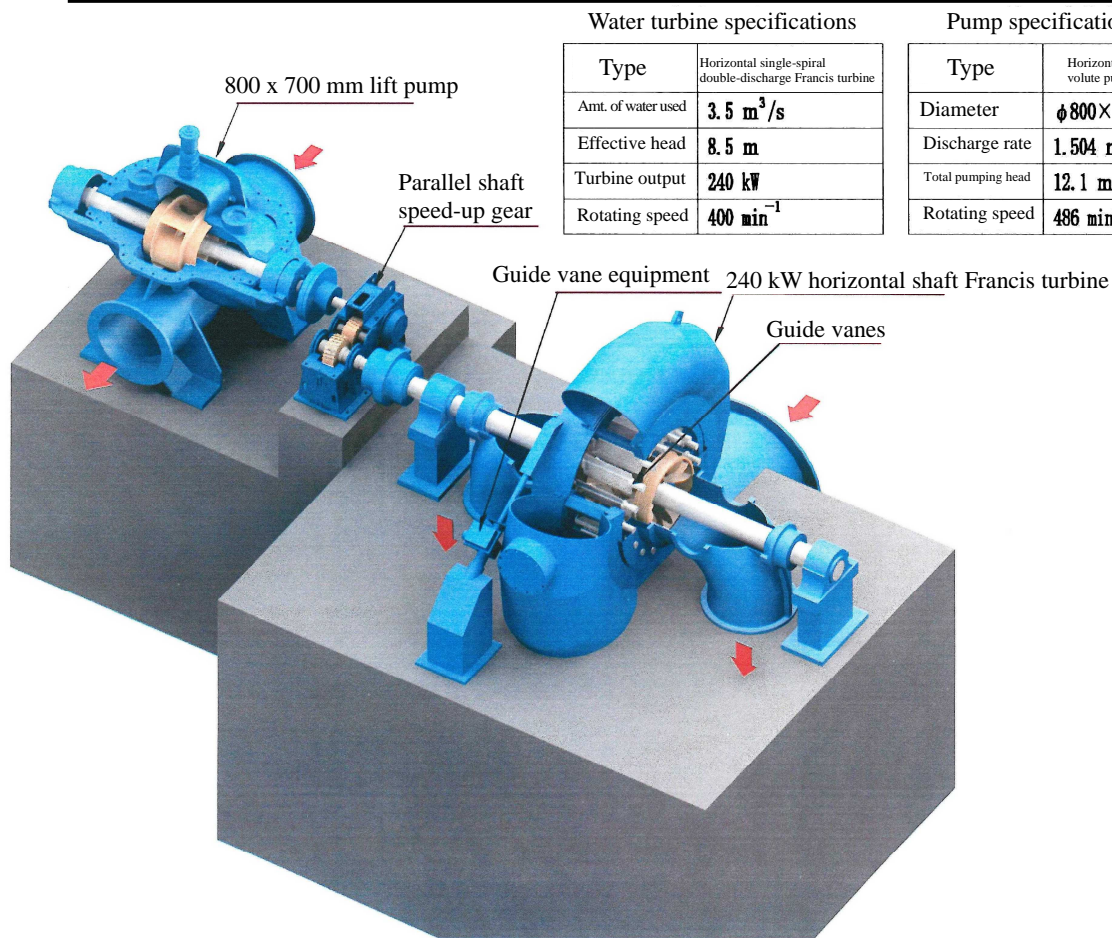


Midori Network

Water and farmland protection

Midori Network Shinryu

Conceptual scheme (inside the pump station)



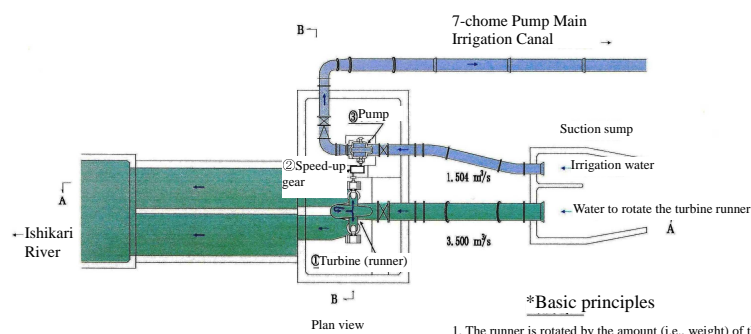
Water turbine specifications

Type	Horizontal single-spiral double-discharge Francis turbine
Amt. of water used	3.5 m³/s
Effective head	8.5 m
Turbine output	240 kW
Rotating speed	400 min⁻¹

Pump specifications

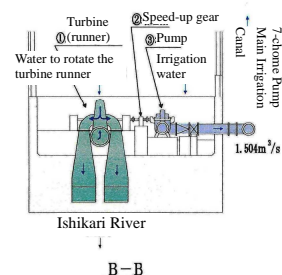
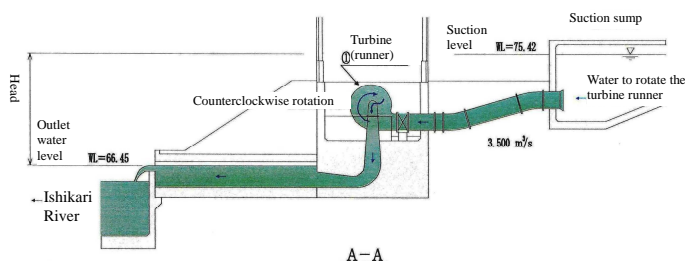
Type	Horizontal double suction volute pump
Diameter	$\phi 800 \times \phi 700$
Discharge rate	$1.504 \text{ m}^3/\text{s}$
Total pumping head	12.1 m
Rotating speed	486 min^{-1}

Conceptual scheme (inside the pump station)



*Basic principles

1. The runner is rotated by the amount (i.e., weight) of the water (to be used to rotate the runner) and the head, and the power generated is transferred to the main shaft.
2. The power transferred to the main shaft is sent to the speed-up gear to achieve the optimum rotation rate.
3. The power at the optimum rotation rate operates the pump, and water is pumped.



③

Facility outline

The 7-chome Irrigation Pump Station uses a hydraulically driven pumping system. The water from the Shinryu Main Irrigation Canal ($3.500 \text{ m}^3/\text{s}$) is discharged in the Ishikari River, taking advantage of a height difference of approximately **8.5 meters** there. This generates hydropower, which is then used to rotate the turbine runner. The energy obtained as a result is increased to achieve the optimum rotation rate through a speed-up gear and then transferred to the lift pump. The water ($1.504 \text{ m}^3/\text{s}$) is pumped up to the level necessary for the 7-chome Pump Main Irrigation Canal (**vertical drop: 12.1 meters**) to irrigate about **572-ha** of rice paddies in the high-ground Osamunai and Ichiyari districts in Fukagawa.

Equivalent to the height of a 4-story building

Equivalent to 7.5 oil drums per second

The area of beneficiary paddies (572 ha) is equivalent to 800 soccer fields.

④

Facility characteristics

Energy saving & clean energy

The hydraulically driven pump with a water turbine does not incur fuel costs and electricity bills because it uses neither an internal combustion engine nor an electric motor. This enables **significant running cost reduction**. Furthermore, the pump station is **environmentally friendly** since it uses natural energy generated by falling water as a power source and hence generates no CO_2 emissions – a greenhouse gas that causes global warming.

Easy operation and management

The water turbine has a simpler structure than an electric motor, so few breakdowns occur and **operation and maintenance is easy**.

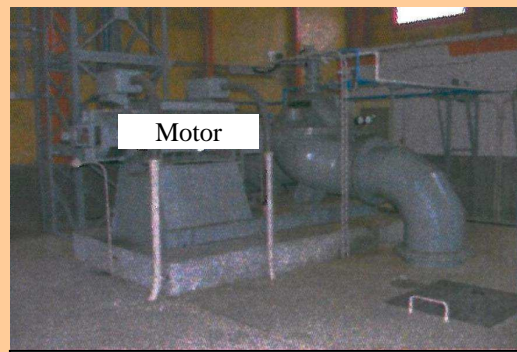
One of the largest in Hokkaido

Currently, three hydraulically driven pumps are in operation in Hokkaido, and the one at the 7-chome Irrigation Pump Station has **one of the prefecture's largest pumping yields ($1.504 \text{ m}^3/\text{s}$) and power outputs (240 kW)**.

Reference (comparison)



7-chome Irrigation Pump Station

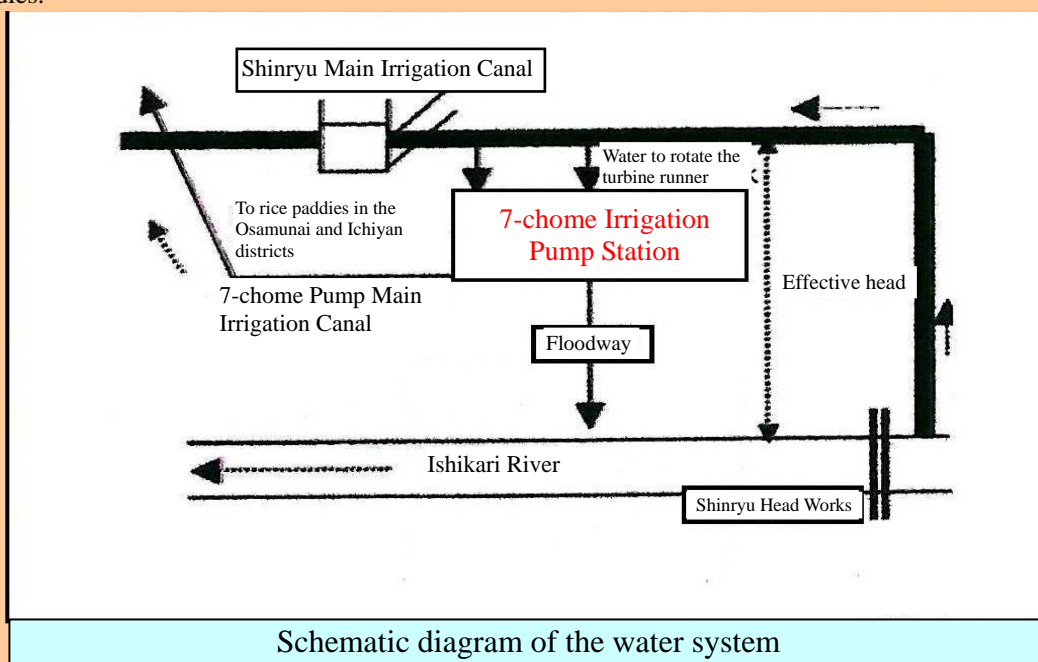


Ordinary irrigation pump station

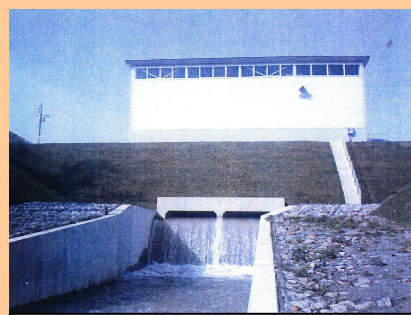
⑤

Facility history

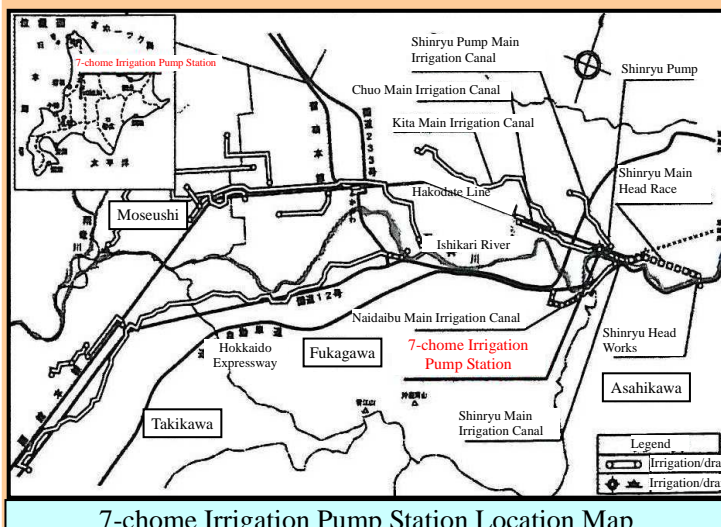
The first 7-chome Irrigation Pump Station, designed by the then Hokkaido Government chief engineer Mr. Shunji Koiwa, was completed in four years from 1924. After it began operation in May 1927, it ran for 35 years until it was retrofitted in 1962. Approximately four decades later, in 2005, a second retrofitting was undertaken because of superannuation. The current facility is in its third incarnation. The pump station, which was retrofitted twice and harnesses natural energy, has been continuously fulfilling its functions of irrigating local rice paddies.



Discharge chamber/7-chome Pump Main Irrigation Canal



Floodway to the Ishikari River Station



7-chome Irrigation Pump Station Location Map



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