

Small & Micro Hydropower

TAPPING THE ENERGY POTENTIAL WITHIN WATER SUPPLY SYSTEMS

CONDUIT HYDROPOWER FOR MUNICIPAL WATER SYSTEMS

HARNESSING ENERGY POTENTIAL

Our small hydro solutions can help you achieve higher operating efficiencies, meet your sustainability objectives, reduce your carbon footprint, and maintain system reliability.

WHAT IS MUNICIPAL WATER SYSTEM (MWS) HYDRO?

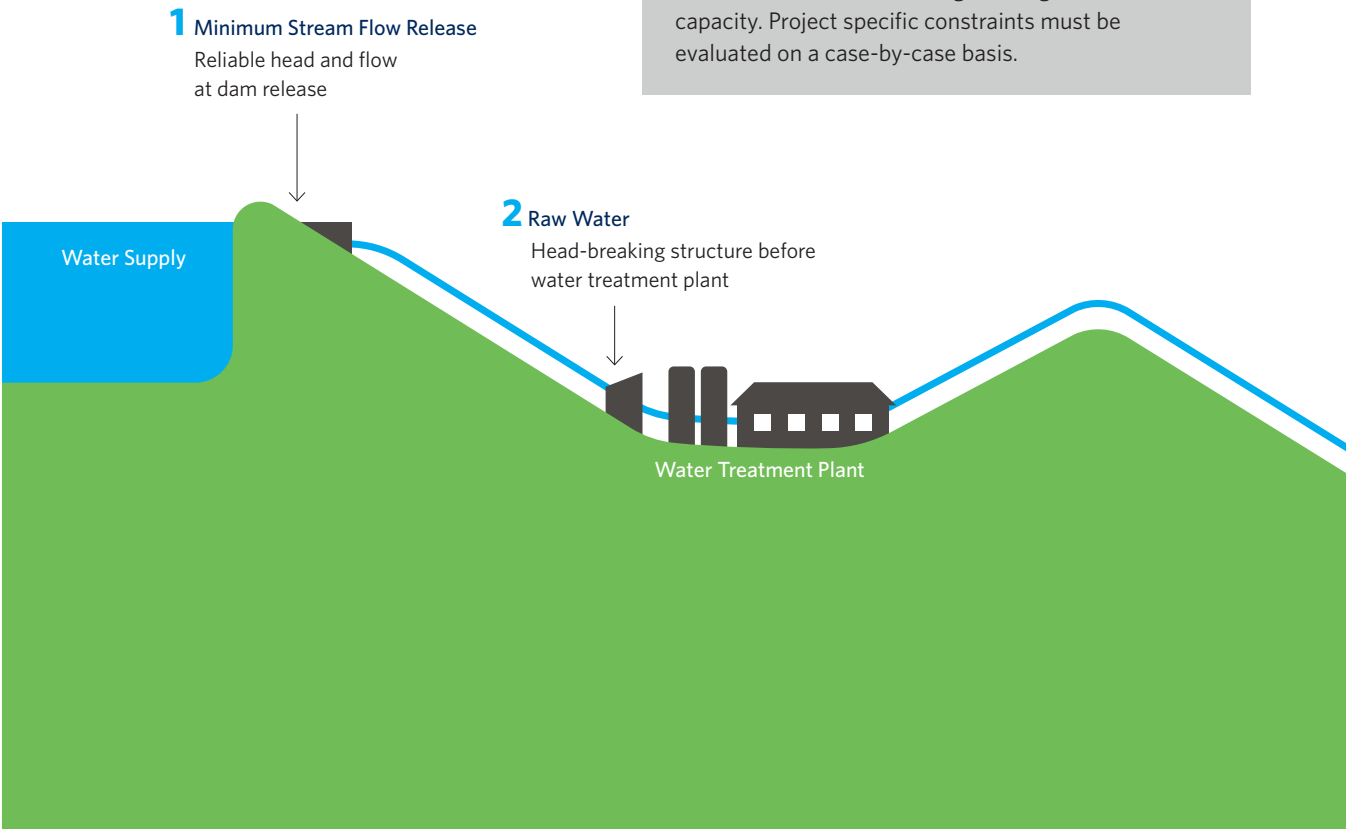
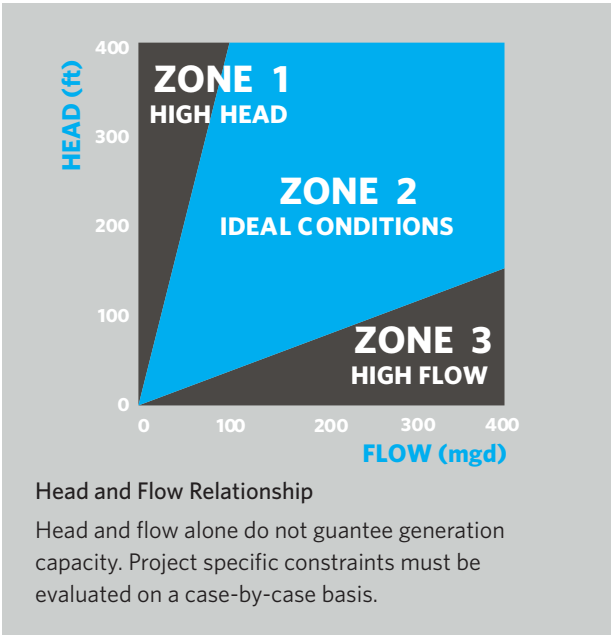
- Built within the existing system
- Usually considered small or micro hydro
 - Small hydro <10 MW
 - Micro hydro <250 kW

IDEAL CONDITIONS FOR MWS HYDRO

- Existing pressure reduction facilities
- Large-diameter transmission pipes
- Zone 2 head and flow
 - Reliable and predictable flow and head
 - Zones 1 and 3 may be feasible in certain circumstances

BENEFITS OF MWS HYDRO

- Offsets power consumption for water utility
 - Extra power to be sold
- Federal and state financial incentives may be available
- Renewable energy source
- Reliable generation capacity
- Limited community impact
- Limited ecological impact since water is already in treatment system
- Technology continues to develop and increase zone of feasibility



EXPERIENCE

1 MINIMUM STREAM FLOW RELEASE

Reliable head and flow at dam release

Robert V. Trout Hydropower Project

Discharge from raw water reservoir

- Part of Colorado Big Thompson Project
- Head = 150 ft.
- Flow = 160 mgd
- Output = 2.6 MW
- Construction cost = \$5,300,00

2 RAW WATER

Head-breaking structure before water treatment plant

Rancho Penasquitos Pressure Control and Hydroelectric Facility

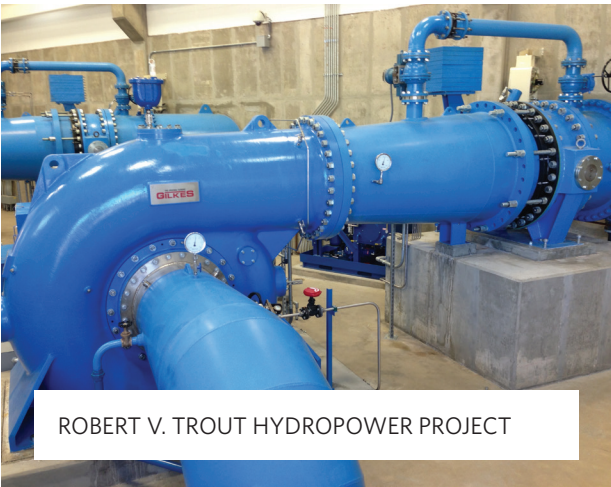
Located along 108-inch raw water pipeline

- Single turbine in parallel with four pressure control valves
- Head = 173 ft.
- Flow = 225 mgd
- Output = 4.5 MW
- Construction cost = \$21,000,000

Arlington Outlet Hydroelectric Project

48-inch raw water outlet

- Head = 154 ft.
- Flow = 80 mgd
- Output = 1.3 MW
- Power sold to the grid
- Construction cost = \$3,500,000



ROBERT V. TROUT HYDROPOWER PROJECT

3 POTABLE WATER

Topography creates need for pressure reduction

Hillcrest Hydroelectric Project

On 60-inch diameter treated water transmission pipeline

- Transmission pipeline
- Head = 170 ft.
- Flow = 103 mgd
- Output = 2.0 MW
- Used to power pump station
- Construction cost = \$6,100,000

4 TREATED EFFLUENT

Energy recovery structure at outfall

- Many projects evaluated
- Costs not currently feasible

3 Potable Water

Topography creates need for pressure reduction

4 Treated Effluent

Energy recovery structure at outfall

