# AquaNES Water Treatment Site India

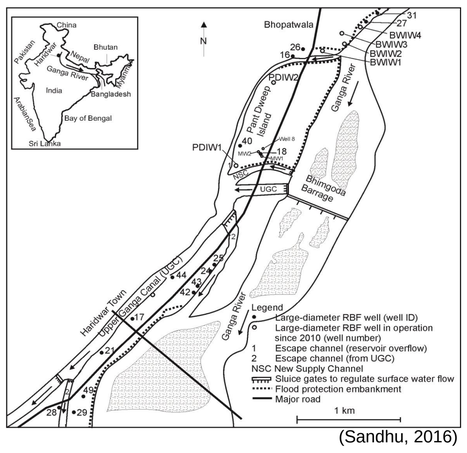
Philipp Otter, Alexander Goldmaier - AUTARCON GmbH
Rico Bartak, Thomas Grischek - HTW Dresden
P.C. Kimothi, Pooran Patwal - Uttarakhand Jal Sansthan

## Scope of Working Package 1 – Bank Filtration combined with electro-chlorination

In Uttarakhand two different small scale solar driven electro-chlorination units will be installed. Their main feature is the electrolytic and chemical free production of disinfectant for the supply of safe drinking water for remote villages. The first unit will receive filtrate that has passed the banks of the river and infiltrated into a large diameter bottom entry well. The second unit will receive filtrate that has passed the river bed and infiltrated into a Koop-well.

### Bottom entry well setup

HTWD

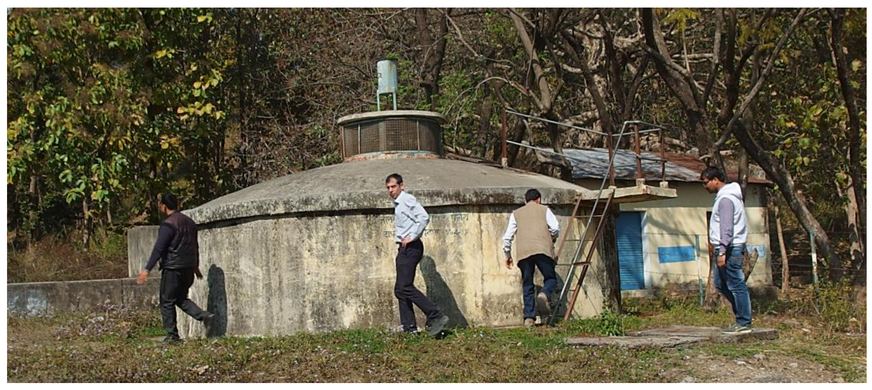



(Sandhu, 2016)

(Wikipedia.org, 2016)

Figures 1- 3: Haridwar demo site for bottom entry well

### Koop-well setup



Figures 6-7: Koop-well demo site in Julo, near Haridwar

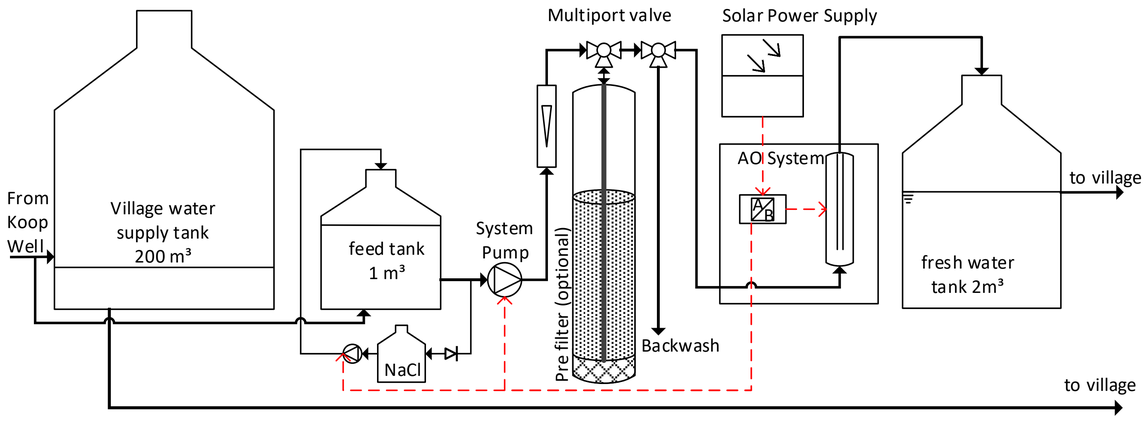
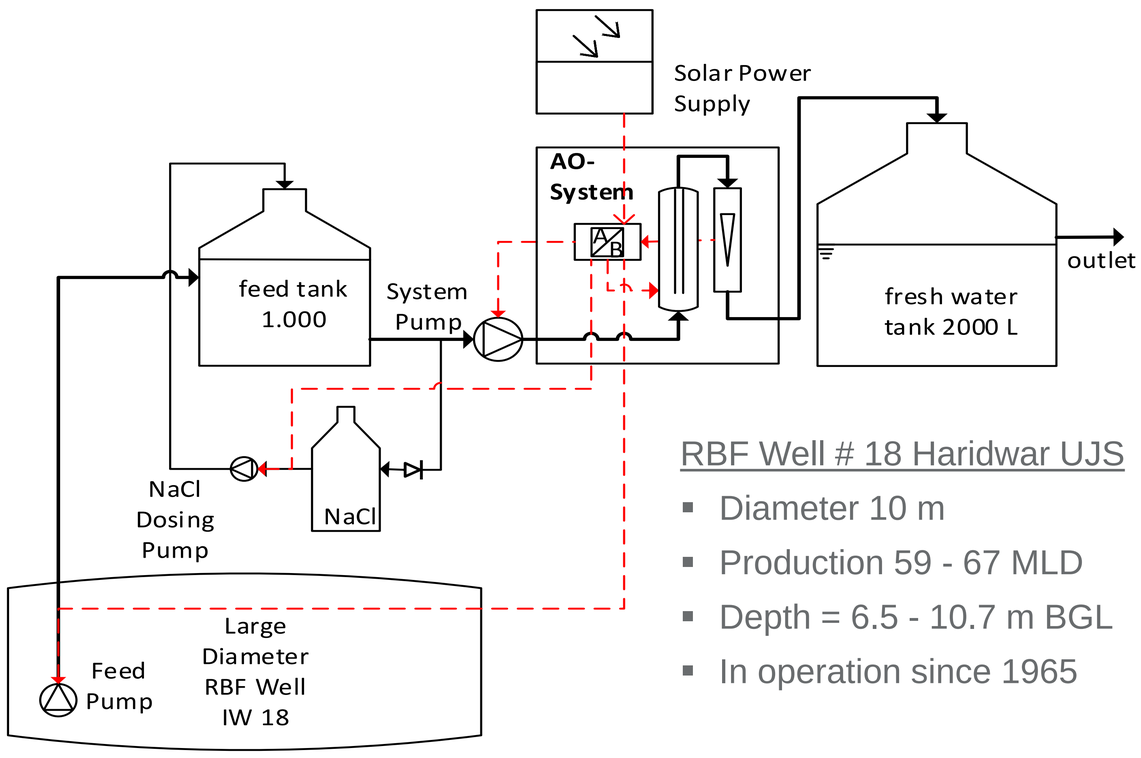



Figure 8: Proposed flow chart for Koop-well site




RBF Well # 18 Haridwar UJS

- Diameter 10 m
- Production 59 - 67 MLD
- Depth = 6.5 - 10.7 m BGL
- In operation since 1965

Figure 4: Proposed flow chart for bottom entry infiltration well site

## Data of infiltration wells

Table 1: Water quality parameters

| Parameter | Bottom entry well | Koop Well |
|---|---|---|
| EC[µS/cm] | 384 | 332 |
| pH | 7.8 | 7.6 |
| Chloride [mg/L] | 6.1 (NaCl dosing may be required) | 2.7 (NaCl dosing required) |
| Iron [mg/L] | 0.05 | 0.06 |
| Manganese [mg/L] | 0.02 | < 0.002 |
| Phosphate [mg/L] ($PO_4$-P) | -- | -- |
| Total Hardness (calc.) [°dH] | 4.9 | 6.0 |
| Arsenic [µg/L] | 2.2 | 1.1 |
| Calcium [mg/L] | 22.3 | 31.7 |
| Nitrate $NO_3$-N [mg/L] | 3.3 | 0.2 |

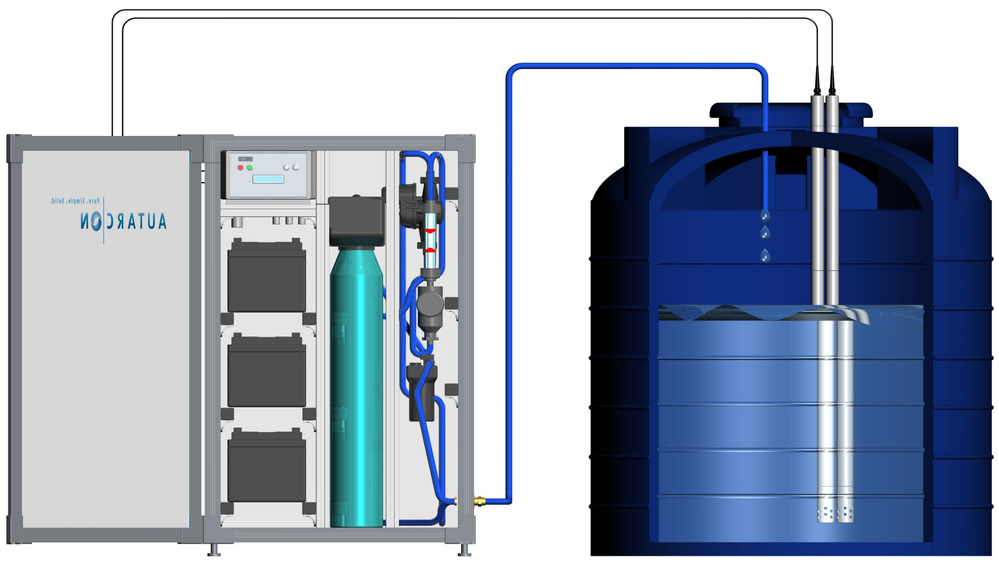



Figure 5: Planned system setting

### Targets

- Market-ready coupling of BF with small scale solar driven on-site electro-chlorination modules for disinfection (TRL 6-8).
  a. Bank Filtrate
  b. Koop Well
  c. Pre-Filtration unit
- Minimization of chloride dosing
- Evaluation of ORP measurements
- Implementation of online monitoring in India

### Pilot plant setup

- Flow rate: Q= 300 - 500 L/h
- Residual chlorine 0.3 - 0.6 mg/L
- Pre-filtration
- BF and Koop-well supply

### Performance Evaluation

- Energy consumption
- Water quantity
- Removal of turbidity and pathogens

**Literature**
Sandhu C (2015) A Concept for the Investigation of Riverbank Filtration Sites for Potable Water Supply in India. PhD thesis, TU Dresden, Faculty of Environmental Sciences, Dresden, in cooperation with University of Applied Sciences (HTW) Dresden, Faculty of Civil Engineering & Architecture, Division of Water Sciences, Dresden, Germany

www.aquanes.eu

AquaNES

The project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 689450