



Summary

Work package WP 5.2 “Combination of Managed Aquifer Recharge (MAR) and adjusted conventional treatment processes for an Integrated Water Resources Management” within the European Project TECHNEAU (“Technology enabled universal access to safe water”) investigates bank filtration (BF) + post-treatment as a MAR technique to provide sustainable and safe drinking water supply to developing and newly industrialised countries.

This report aims at assessing the possible post-treatment options for three investigated field sites in Delhi (India). Field investigations and analysis of source water and bank filtrate yielded data for resulting raw water quality, which was then taken to identify a potential post-treatment scheme for each site.

First, a catalogue of conventional drinking water treatment techniques, that are commonly used in combination with riverbank filtration, was established. These techniques comprise aeration & filtration (for iron and manganese removal), neutralization, oxidation processes (e.g. ozonation), activated carbon and disinfection (usually via chlorination).

In a second step a possible scheme was proposed for each of the three field sites:

- a) Palla well field: addition of activated alumina filters for fluoride removal,
- b) Nizamuddin Field Site: extensive conventional waste-water post-treatment (biological treatment for nitrification and denitrification combined with activated carbon or membrane filtration, biofiltration with aeration - e.g. BIOSTYR®). An alternative would be the OBM (oxidation, biofiltration, membrane filtration) process developed during the TECHNEAU project.
- c) Najafgarh Field Site: reverse osmosis (RO) to handle high salinity.

Concluding it can be stated that the strong technological requirements for Nizamuddin and Najafgarh seem inadequate to be currently implemented. Nevertheless a feasibility study for implementing the OBM process at Nizamuddin is recommended and will be carried out in TECHNEAU WP 7.9. The priority in Delhi would be to develop an integrated water and wastewater management, in order to reduce contamination in the surface water and thereby lower the technological requirements for drinking water production.

Contact

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TKI Categorisation

Classification									
Supply Chain		Process Chain		Process Chain (cont'd)		Water Quality		Water Quantity (cont'd)	
Source		Raw water storage		Sludge treatment		Legislation/regulation		- Leakage	
- Catchment		- Supply reservoir		- Settlement		- Raw water (source)	X	- Recycle	
- Groundwater	X	- Bankside storage	X	- Thickening		- Treated water	X		
- Surface water		Pretreatment		- Dewatering		Chemical			
- Spring water		- Screening		- Disposal		- Organic compounds	X		
- Storm water		- Microstraining		Chemical dosing		- Inorganic compounds	X		
- Brackish/seawater		Primary treatment		- pH adjustment		- Disinfection by-products	X		
- Wastewater		- Sedimentation		- Coagulant		- Corrosion			
Raw water storage		- Rapid filtration		- Polyelectrolyte		- Scaling			
- Supply reservoir		- Slow sand filtration		- Disinfectant		- Chlorine decay			
- Bankside storage	X	- Bank filtration	X	- Lead/plumbosolvency		Microbiological			
Water treatment		- Dune infiltration		Control/instrumentation		- Viruses		Consumers / Risk	
- Pretreatment		Secondary treatment		- Flow		- Parasites			
- Primary treatment	X	- Coagulation/flocculation	X	- Pressure		- Bacteria		Trust	
- Secondary treatment	X	- Sedimentation		- pH		- Fungi		- In water safety/quality	
- Sludge treatment		- Filtration		- Chlorine		Aesthetic		- In security of supply	
Treated water storage		- Dissolved air flotation(DAF)		- Dosing		- Hardness / alkalinity		- In suppliers	
- Service reservoir		- Ion exchange		- Telemetry		- pH		- In regulations/regulators	
Distribution		- Membrane treatment	X	Analysis		- Turbidity		Willingness-to-pay/accept	
- Pumps		- Adsorption	X	- Chemical		- Colour		- For safety	
- Supply pipe / main		- Disinfection	X	- Microbiological		- Taste		- For improved taste/odour	
Tap (Customer)		- Dechlorination		- Physical	X	- Odour		- For infrastructure	
- Supply (service) pipe		Treated water storage						- For security of supply	
Internal plumbing		- Service reservoir				Water Quantity		Risk Communication	
- Internal storage		Distribution						- Communication strategies	
		- Disinfection				Source		- Potential pitfalls	
		- Lead/plumbosolvency				- Source management		- Proven techniques	X
		- Manganese control				- Alternative source(s)			
		- Biofilm control				Management			
		Tap (Customer)				- Water balance			
		- Point-of-entry (POE)				- Demand/supply trend(s)			
		- Point-of-use (POU)				- Demand reduction			

TKI Categorisation (continued)

Contains		Constraints		Meta data				
Report	X	Low cost		<i>Gesche Grützmacher</i>				
Database		Simple technology		<i>KompetenzZentrum Wasser Berlin</i>				
Spreadsheet		No/low skill requirement		<i>gesche.gruetzmacher@kompetenz-wasser.de</i>				
Model		No/low energy requirement						
Research		No/low chemical requirement						
Literature review	X	No/low sludge production						
Trend analysis		Rural location						
Case study / demonstration	X	Developing world location	x					
Financial / organisational								
Methodology								
Legislation / regulation								