



Introduction

Delhi, the capital city of India is facing issues of water shortage as a result of high natural population growth, urbanization, industrialization and migration. As part of work package 5.2 of the TECHNEAU integrated project, an analysis has been done on the function and relevance of managed aquifer recharge (MAR) techniques with a main focus on Riverbank Filtration (RBF) to enable sustainable water resources management, especially in developing and newly industrialized countries. Results from one field site close to Nizamuddin Bridge have shown that the bank filtrate needs additional post-treatment before it can be used as potable water. As part of the TECHNEAU's WP2.2, NTNU (Norwegian University of Science and Technology) has been developing a new process concept combining oxidation, biodegradation and membrane filtration (OBM) for drinking water treatment. In the current report a study on the feasibility of the OBM process as a cost-effective multi-barrier RBF post treatment has been investigated.

Approach and Results

The removal of the different contaminants present in the river bank filtered water is assessed step by step within the OBM. The results of the assessment show that except for fluoride, all the contaminants have the potential of being removed by the OBM. However, with additional treatment such as activated alumina filtration or coagulation, possible treatment improvements could be achieved to provide a safe drinking water.

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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)		- Recycle	
- Groundwater	X	- Bankside storage	X	- Thickening		- Treated water	X		
- Surface water	X	Pretreatment		- Dewatering		Chemical			
- Spring water		- Screening		- Disposal		- Organic compounds	X		
- Storm water	X	- 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		- Lead/plumbosolvency		Microbiological			
Water treatment		- Dune infiltration		Control/instrumentation		- Viruses		Consumers / Risk	
- Pretreatment		Secondary treatment		- Flow		- Parasites			
- Primary treatment		- Coagulation/flocculation		- Pressure		- Bacteria	X	Trust	
- Secondary treatment	X	- Sedimentation		- pH		- Fungi		- In water safety / quality	
- Sludge treatment		- Filtration	X	- Chlorine		Aesthetic		- In security of supply	X
Treated water storage		- Dissolved air flotation(DAF)		- Dosing		- Hardness / alkalinity		- In suppliers	
- Service reservoir		- Ion exchange		- Telemetry		- pH		- In regulations and regulators	
Distribution		- Membrane treatment	X	Analysis		- Turbidity	X	Willingness-to-pay/acceptance	
- Pumps		- Adsorption		- Chemical		- Colour		- For safety	X
- Supply pipe / main		- Disinfection	X	- Microbiological		- Taste		- For improved taste/odour	X
Tap (Customer)		- Dechlorination		- Physical		- 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	X	- Proven techniques	
		- Manganese control			- Alternative source(s)	X		
		- Biofilm control			Management			
		Tap (Customer)			- Water balance	X		
		- Point-of-entry (POE)			- Demand/supply trend(s)	X		
		- Point-of-use (POU)			- Demand reduction			

TKI Categorisation (continued)

Contains		Constraints		Meta data				
Report	x	Low cost		<i>Kamal Azrague, Stein W. Osterhus</i>				
Database		Simple technology		<i>SINTEF</i>				
Spreadsheet		No/low skill requirement		<i>Kamal Azrague</i>				
Model		No/low energy requirement		<i>Kamal.Azrague@sintef.no</i>				
Research		No/low chemical requirement						
Literature review	X	No/low sludge production		<i>KWB</i>				
Trend analysis		Rural location						
Case study / demonstration		Developing world location						
Financial / organisational								
Methodology								
Legislation / regulation								