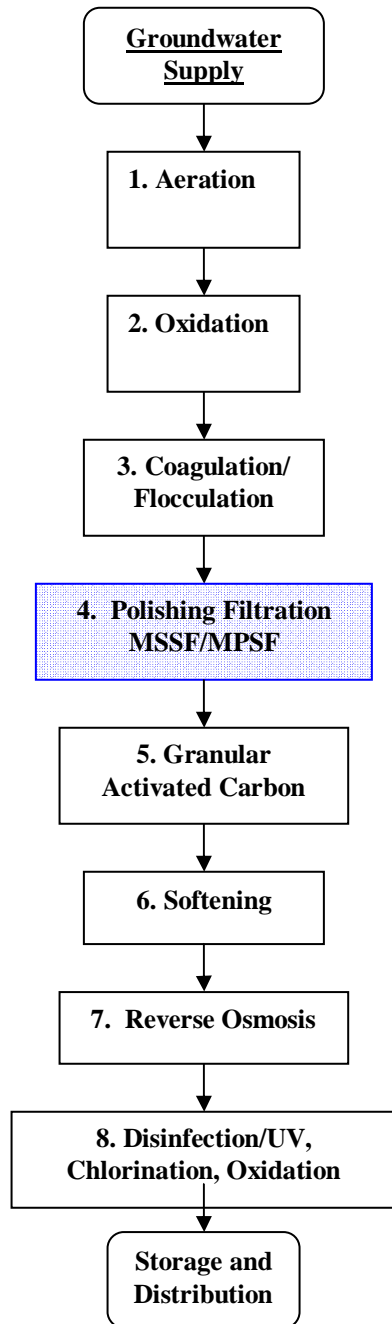


Examples of Application in Treatment of Complex Groundwater

Illustrative Example of the Potential Role of the Manz Slow Sand Filter™ (MSSF) or Manz Polishing Sand Filter™ (MPSF) in Treatment of Complex Groundwater

Groundwater may contain small amounts of particulate material, significant dissolved organic carbon, color, chemical oxygen demand (COD), iron, manganese, hydrogen sulfide, arsenic, fluoride, hardness, dissolved solids and pathogens (when it is considered groundwater under the direct influence of surface water). The MSSF/MPSF provides a wide variety of effective technical solutions that are low cost and simple to operate.



Different processes will be used to treat different qualities of raw water. The treatment train may include as few as two or as many as seven of the processes illustrated. The purpose of this figure is to clearly indicate the role of the Manz Slow Sand Filter™ (MSSF) and the Manz Polishing Sand Filter™ (MPSF) when the groundwater is not under the direct influence of surface water.

Typical Applications of the MSSF/MPSF Technology for Treating Groundwater

Scenario	Processes Used in Treatment (Disinfection may or may not be included.)
1. Clear water with pathogen hazard.	4
2. Silt laden water.	4
3. Silt with pathogens.	4
4. High total dissolved solids.	7
5. Silt and/or pathogens with high total dissolved solids.	4 and 7
6. Iron – not organically complexed.	1 and 4
7. Iron – organically complexed.	2 and 4
8. Hydrogen sulfide.	1, 2 and 4
9. Iron and hydrogen sulfide.	2 and 4
10. Manganese.	2 and 4
11. Manganese and hydrogen sulfide.	2 and 4
12. Iron and high total dissolved solids.	1 or 2, 4 and 7
13. Hard with high total dissolved solids.	4, 6 and 7
14. Hydrogen sulfide with high total dissolved solids.	2, 4 and 7 4, 5 and 7
15. Iron, manganese, hard with high total dissolved solids.	2, 4, 6 and 7
16. Colloidal particulate.	3, 4, 6 and 7
17. Colloidal particulate, hard with high total dissolved solids.	2, 4, 6 and 7
18. Colour/ high dissolved organic carbon.	2 and 4 // 3 and 4 // or 4 and 5
19. Colloidal particulate, colour, hard with high total dissolved solids.	3, 4, 6 and 7
20. Arsenic.	2, 3 and 4
21. Iron and arsenic.	2, 3 and 4
22. Iron, arsenic, high dissolved organic carbon.	2, 3 and 4
23. Fluoride.	3 and 4
24. Fluoride.	4 and 7
25. High COD.	2, 4 and 5
26. Colloidal particulate with high COD.	3, 4 and 5
27. Heavy metals such as lead, mercury.	3 and 4
28. Organic toxins.	2 and 4 // 4 and 5 // 2, 4 and 5
29. Hard.	4 and 6
30. Hard with high total dissolved solids.	4, 6 and 7