

ATTACHMENT C

COMPARISON OF BIOLOGICAL NUTRIENT  
REMOVAL PROCESSES

**SOUTH MIDDLETON TOWNSHIP MUNICIPAL AUTHORITY  
COMPARISON OF BIOLOGICAL NUTRIENT REMOVAL (BNR) PROCESSES**

Treatment Process	Anticipated Effluent Total Nitrogen (mg/L)	Anticipated Effluent Total Phosphorus (mg/L)	Opinion of Capital Costs (Treatment Equipment Only)	Opinion of Construction Costs	Opinion of Annual Electrical Costs	20 Year Amortization @ 4.00%
4-Stage Bardenpho Process	6	1	\$500,000	\$1,000,000	\$80,000	\$190,400
5-Stage Bardenpho Process	3	0.6	\$500,000	\$1,500,000	\$85,000	\$232,200
Modified Ludzack-Ertinger Process	6	1	\$755,000	\$850,000	\$110,000	\$228,128
Wuhrman Process	6	2	\$825,000	\$850,000	\$118,000	\$241,280
Oxidation Ditch Process	6	1	\$650,000	\$1,000,000	\$110,000	\$231,440
Vertical Loop Reactor Process	5	0.8	\$1,000,000	\$825,000	\$105,000	\$239,320
3-Stage Phoredox Process (A2O)	6	1	\$1,000,000	\$785,000	\$115,000	\$246,376
Modified UCT Process	6	1	\$1,025,000	\$850,000	\$125,000	\$263,000
Integrated Fixed Film Activated Sludge Process	3	0.4	\$825,000	\$850,000	\$89,000	\$212,280
Westbank Process	6	1	\$1,275,000	\$800,000	\$125,000	\$277,720
Modified SBR Process	8	1	\$1,510,000	\$850,000	\$105,000	\$278,696
Step Feed Process	6	1	\$1,450,000	\$800,000	\$130,000	\$295,600
Moving Bed Biofilm Reactor Process	3	0.4	\$825,000	\$850,000	\$89,000	\$212,280
Membrane Biological Reactor Process	3	0.6	\$3,400,000	\$550,000	\$88,000	\$378,720