

Plumsted Municipal Utilities Authority

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September 9, 2014



THE STATE'S CENTER

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Ms. Nancy Kempel
Supervising Environmental Engineer
Bureau of Surface Water Quality
Division of Water Quality
P.O. Box 402
Trenton, NJ 08625-0402

RE: NJPDES Discharge Permit NJ 0226271
Plumsted Township Wastewater treatment Plant

Dear Ms. Kempel:

As discussed at our July 22, 2014 meeting, we are submitting this Addendum to the Socio Economic Analysis for the Plumsted Township Wastewater Treatment Plant (NJPDES Discharge Permit NJ 0226271) dated May 30, 2014. This Addendum responds to comments we received at our July meeting and subsequent conversations, particularly in regard to providing supporting information related to additional wastewater treatment options, in addition to the Advanced Membrane Filtration process with Reverse Osmosis, which may be less costly to construct and operate and which are capable of achieving the non degradation limits specified in the Department's letter dated January 13, 2014. At our July meeting it was agreed the Analysis did provide sufficient justification for the lowering of the non degradation water quality limit for Total Dissolved Solids (TDS). As also noted at the July meeting, we accept the non-degradation limits for CBOD₅, Total Suspended Solids, Dissolved Oxygen, Phosphorous and pH.

As suggested at our July 2014 meeting, we contacted Harrison Township to obtain information on their wastewater treatment system (STP). In Harrison Township, an Oxi-Ditch wastewater treatment process is used. We also include in this Addendum a modified Bardenpho wastewater treatment system which is in use at the Joint Base McGuire-Dix-Lakehurst (Joint Base). We did not consider any treatment system that could not achieve the reductions in phosphorous, ammonium and nitrate that are required. For both the above treatment processes, construction and operating costs were developed by Van Cleef Engineering for the initial 0.3 mgd discharge and the ultimate 0.6 mgd discharge and are included as attachments to this Addendum. A brief description of each treatment process is provided below (please refer to our May 30, 2014 submission for a description of the Advanced Membrane Filtration process):

Bardenpho System:

The Bardenpho wastewater treatment process is a rather complex system that utilizes biological means (with chemical additions) to achieve low N and P effluent values. It typically includes a four stage (as opposed to two stage) activated sludge treatment process. Due to the number of tanks involved in this treatment process, it is not only land intensive but the capital costs are greatly increased. The process is not designed to remove metals.

Oxidation Ditch System:

The Oxi-Ditch wastewater treatment process is a variation of the activated sludge process and typically operates in an extended aeration mode with long solids retention times. The process can be designed to achieve specific objectives including nitrification, denitrification and/or biological phosphorous removal. As with the Bardenphol system, the process is also not designed to remove metals and is land intensive.

To remove metals to the non-degradation limits specified, a separate metals removal process will be required. This will increase the construction costs of any treatment process that ultimately is selected. The Redevelopment Project is the financing mechanism for the proposed wastewater infrastructure (see May 30, 2014 Analysis). This increase in cost is not likely to be financeable as part of the planned Redevelopment project for New Egypt and this cost would have to be added to the annual user fees to operate and maintain the planned wastewater infrastructure including the wastewater treatment facility.

In summary, the estimated annual user costs without including any increase in construction costs for the anti-degradation scenario for the Bardenpho and Oxi-Ditch wastewater treatment systems, as were the average annual user costs for the MBR/ Reverse Osmosis wastewater treatment system, are significantly higher than they are for the "Best Achievable" option (see Tables 1 and 2 attached). The average annual user fee, based on Jackson Township, Pemberton Township, Wrightstown Borough and the Jensen's Deep Run development in Plumsted Township) is \$450.00. For the Oxi-Ditch wastewater treatment process, the average annual user costs increase from \$601 per user (Best Available Technology) to \$1,219 per user for the 0.3 mgd discharge. For the Bardenpho Modified wastewater treatment process, the average annual user fee increases from \$601 per user (Best Achievable) to \$1,246 per user for the 0.3 mgd discharge. The construction costs for the Oxi-Ditch wastewater treatment plant increase from approximately \$4,112,000 (Best Achievable) to \$5,875,000 for the 0.3 mgd discharge. The construction costs for the Bardenpho Modified wastewater treatment plant increase from approximately \$4,112,000 to \$ 6,187,500 (see Tables 3 and 4 attached). As provided by the Department, we have completed and enclose the Tables that your office provided to us on August 14, 2014 (see Tables 5 and 6).

Given the above, we feel the lowering of the water quality limits for TDS as agreed to by the Department at our meeting of July 22, 2014 and the lowering of the water quality limits for Ammonia, Nitrate, Copper, Lead, Nickel and Zinc to be a reasonable and justified request and consistent with the anti-degradation policy contained in the Surface Water Quality Standards at N.J.A.C. 7:1.9.

We are hopeful this Addendum to our Socio-Economic Analysis will complete our submission and the Department will proceed to issue a draft permit for the proposed surface water discharge to the Crosswicks Creek. We are available to meet with you at any time that is convenient if you should have any additional comments.

Sincerely,


Peter Ylvisaker

Cc: PMUA
Municipal Clerk
Chris Jepson, Van Cleef

Tables 1 and 2

Non-Degradation Annual Operations Cost Summary

Table 1: Non-Degradation Annual Operations Cost Summary 0.3 mgd Discharge

Treatment System	Annual Operating Cost	Annual User Cost*
MBR w/ Reverse Osmosis	\$1,106,594	\$1,006
Oxi-Ditch	\$1,340,983	\$1,219
Bardenpho Modified	\$1,370,433	\$1,246
_ MBR (Best Achievable)	\$ 671,594	\$ 611

* Annual User Cost = Annual Operating Cost/1100

Notes: Average Annual User Fee = \$450

Table 2: Non-Degradation Annual Operations Cost Summary 0.6 mgd Discharge

Treatment System	Annual Operating Cost	Annual User Cost*
MBR w/ Reverse Osmosis	\$1,770,425	\$ 805
Oxi-Ditch	\$2,147,608	\$ 976
Bardenpho Modified	\$2,277,583	\$1,035
_ MBR (Best Achievable)	\$ 921,424	\$ 419

* Annual User Cost = Annual Operating Cost/2200 Units

Notes: Average Annual User Fee = \$450

Tables 3 and 4

Non-Degradation Treatment System Construction Cost

Table 3: Non-Degradation Treatment System Construction Cost 0.3 mgd Discharge

Treatment System	Construction Cost	Increase Cost*
MBR w/ Reverse Osmosis	\$4,706,250	\$ 593,750
Oxi-Ditch	\$5,875,000	\$ 1,762,500
Bardenpho Modified	\$6,187,500	\$ 2,075,000
_ MBR (Best Achievable)	\$ 4,112,500	\$ 0

* Increase = to Construction Cost - \$4,112,500 (Best Achievable)

Table 4: Non-Degradation Treatment System Construction Cost 0.6 mgd Discharge

Treatment System	Construction Cost	Increase Cost*
MBR w/ Reverse Osmosis	\$6,925,000	\$ 1,062,500
Oxi-Ditch	\$9,725,000	\$ 3,862,500
Bardenpho Modified	\$9,518,750	\$ 3,656,250
_ MBR (Best Achievable)	\$ 5,862,500	\$ 0

* Increase = to Construction Cost - \$5,862,500 (Best Achievable)

Table 5

Plumsted WUA WWTP									
= 5 cfs, 7Q10 = 6 cfs, 30Q10 = 8 cfs, ambient upstream hardness = 59.9 mg/L, plant flow = 0.3 mgd									
Parameter	Non-Degradation Limits - Average Monthly Limit	Effluent limits and costs associated with various wastewater treatment processes					Water Quality Based Effluent Limits - Average Monthly Limits		
		MBR/chemical addition *	Cost per user \$	Oxidizch/chemical add	Cost per user \$	Bardenpho/chemical add	Cost per user \$	(Maximum allowable)	
mg/L									
CBOD ₅	1.0	1.0	\$611	2	\$1,219	1.5	\$1,246	1.0	
Total Suspended Solids	6.01	6.01	\$611	8	\$1,219	7	\$1,246	6.01	
Dissolved Oxygen	8.0 (Minimum)	8.0	\$611	8.0	\$1,219	8.0	\$1,246	8.0 (Minimum)	
Phosphorus	0.1	0.1	\$611	0.3	\$1,219	0.1	\$1,246	0.1	
pH (standard units)	4.5 Minimum / 7.5 Maximum	4.5 Min/7.5 Max	\$611	4.5 Min/7.5 Max	\$1,219	4.5 Min/7.5 Max	\$1,246	4.5 Minimum / 7.5 Maximum	
Total Dissolved Solids	163	1900	\$611	3100	\$1,219	2600	\$1,246	4856.8	
Nitrate	0.35	5	\$611	7	\$1,219	5	\$1,246	134.9	
Ammonia, Total as N	0.25	1	\$611	2	\$1,219	1	\$1,246	736.5	
µg/L									
Copper, Total Recoverable	2.54	25	\$611	85	\$1,219	75	\$1,246	48.9	
Lead, Total Recoverable	1.52	20	\$611	85	\$1,219	65	\$1,246	30.9	
Nickel, Total Recoverable	0.85	25	\$611	100	\$1,219	90	\$1,246	456.5	
Zinc, Total Recoverable	21.5	35	\$611	100	\$1,219	90	\$1,246	394.4	

* Planned MUA to provide treatment processes evaluated and costs associated with those processes.

These effluent limits were calculated assuming the following:

assuming an effluent hardness of 100 mg/L.

assuming the ambient metals data was presented as from the report as dissolved

using the sample frequency specified for this size discharger in N.J.A.C. 7:14A-14

All processes have chemical addition and tertiary filtration also for Dui-Nich and Bardenheer. All plants are equipped with a disinfection system. The disinfection system for the Dui-Nich and Bardenheer plants are complete replacement for this and disinfection system. The Dui-Nich and Bardenheer plants are equipped with a disinfection system.

TABLE 6

Plumsted MUA WWTP 1Q10 = 5 cfs, 7Q10 = 6 cfs, 30Q10 = 8 cfs, ambient upstream hardness = 59.9 mg/L, plant flow = 0.6 mgd							
Parameter	Non-Degradation Limits - Average Monthly Limit	Effluent limits and costs associated with various wastewater treatment processes					
	(No socio-economic analysis required)	MBR/chemical addition	Cost per user \$	Oxid ditch/chemical add	Cost per user \$	Bardenpho/chemical add	Cost per user \$
mg/L							
CBOD ₅	1.0	1.0	\$419	2	\$978	1.5	\$1,035
Total Suspended Solids	6.01	6.01	\$419	8	\$978	7	\$1,035
Dissolved Oxygen	8.0 (Minimum)	8.0	\$419	8.0	\$978	8.0	\$1,035
Phosphorus	0.1	0.1	\$419	0.3	\$978	0.2	\$1,035
pH (standard units)	4.5 Minimum / 7.5 Maximum	4.5 Min/7.5 Max	\$419	4.5 Min/7.5 Max	\$978	4.5 Min/7.5 Max	\$1,035
Total Dissolved Solids	163	1900	\$419	3100	\$978	2600	\$1,035
Nitrate	0.35	5	\$419	7	\$978	5	\$1,035
Ammonia, Total as N	0.25	1	\$419	2	\$978	1	\$1,035
µg/L							
Copper, Total Recoverable	2.54	25	\$419	85	\$978	75	\$1,035
Lead, Total Recoverable	1.52	16	\$419	85	\$978	65	\$1,035
Nickel, Total Recoverable	0.85	25	\$419	100	\$978	90	\$1,035
Zinc, Total Recoverable	21.5	35	\$419	100	\$978	90	\$1,035
Water Quality Based Effluent Limits - Average Monthly Limit							
(Risk limit allowable)							
1.0							
1.0							
8.0 (Minimum)							
0.1							
4.5 Minimum / 7.5 Maximum							
2678.4							
72.4							
124.0							

* Plumsted MUA to provide treatment processes evaluated and costs associated with those processes.

(Examples of Treatment Processes: Biological Treatment, Biological/Chemical Treatment, Biological/Chemical Treatment with Filtration...)

** These effluent limits were calculated assuming the following:

assuming an effluent hardness of 100 mg/L

assuming the ambient metals data was presented as from the report as dissolved

using the sample frequency specified for this size discharger in N.J.A.C. 7:14A-14

... .. addition and tertiary filtration for Oxid-Ditch and Bardenpho. MBR no tertiary filtration.

Attachment 1

Operating and Construction Cost Estimates



Plumsted Township MUA
Operational Cost Estimate

4/2/14

MBR Wastewater Treatment Facility (300,000 GPD)

Generator Fuel

Pumping station generator fuel costs.=	975
1 hr/wk exercise x 52 wks x 4 gal/hr x \$4/gal.=	\$832
3/4 Load - 24 hrs/yr x 7 gal/hr x \$4/gal.=	\$672
Total Cost per Year =	\$2,479

Operator Costs

20 hrs/week x 52 weeks/yr x \$80/hr =	\$83,200
Total Cost per Year =	\$83,200

Laboratory Costs

Monthly influent & effluent samples to outside lab. =	\$1,900
Monthly influent & effluent samples - onsite testing =	\$500
Annual sludge testing =	\$200
Annual effluent volatile organics & heavy metals =	\$1,000
Total Cost per Year =	\$3,600

Chemical Costs

Alum for phosphorus removal - 77 lbs/day x 365 days x \$0.3/lb =	\$8,432
MBR cleaning (sodium hypochlorite)	\$3,506
Alkalinity adjustment - \$5/day x 365 days =	\$1,825
Total Cost per Year =	\$13,763

Sludge Removal & Disposal

(4% solids) 1554 gal/day x 365 days/yr x \$0.2/gal =	\$113,442
Total Cost per Year =	\$113,442

Electrical Costs

MBR System	\$68,800
WWTP.	15,979
Pumping station	9,500

Membrane Replacement Costs

MBR	28,800
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Odor Control

Activated Carbon - 2,000 lb unit x 2/yr x \$2.5/lb =	\$10,000
Total Cost per Year =	\$10,000

Total Operation Costs = \$339,563 Per Year

Per Month



Plumsted Township MUA
Operational Cost Estimate

4/2/2014

MBR Wastewater Treatment Facility (300,000 GPD)
with Supplemental Reverse Osmosis System

Generator Fuel

Pumping station generator fuel costs =	975
1 hr/wk exercise x 52 wks x 4 gal/hr x \$4/gal. =	\$832
3/4 Load - 24 hrs/yr x 7 gal/hr x \$4/gal. =	\$672
Total Cost per Year =	\$2,479

Operator Costs

20 hrs/week x 52 weeks/yr x \$80/hr =	\$83,200
Total Cost per Year =	\$83,200

Laboratory Costs

Monthly influent & effluent samples to outside lab. =	\$1,900
Monthly influent & effluent samples - onsite testing =	\$500
Annual sludge testing =	\$200
Annual effluent volatile organics & heavy metals =	\$1,000
Total Cost per Year =	\$3,600

Chemical Costs

Alum for phosphorus removal - 77 lbs/day x 365 days x \$0.3/lb =	\$8,432
RO chemical cleaner (acid and caustic) =	\$579
RO anti-scalant =	\$2,201
MBR cleaning (sodium hypochlorite) =	\$3,506
Alkalinity adjustment - \$5/day x 365 days =	\$1,825
Total Cost per Year =	\$16,543

Sludge Removal & Disposal

(4% solids) 1554 gal/day x 365 days/yr x \$0.2/gal =	\$113,442
Total Cost per Year =	\$113,442

Electrical Costs

MBR System	\$68,800
WWTP	15,879
Reverse Osmosis System	24,339
Pumping station	9,500

Membrane Replacement Costs

MBR, RO, RO concentrator	53,900
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RO Reject Water Disposal (100% flow treated)

6000 GPD x 365 x \$0.17/gal	372,300
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Odor Control

Activated Carbon - 2,000 lb unit x 2/yr x \$2.5/lb =	\$10,000
Total Cost per Year =	\$10,000

Total Operation Costs = \$774,082 Per Year
Per Month



Plumsted Township MUA
Operational Cost Estimate

4/2/2014

MBR Wastewater Treatment Facility (600,000 GPD)

Generator Fuel

Pumping station generator fuel costs =	975
1 hr/wk exercise x 52 wks x 4 gal/hr x \$4/gal. =	\$832
Full Load - 24 hrs/yr x 10 gal/hr x \$4/gal. =	\$896
Total Cost per Year =	\$2,703

Operator Costs

20 hrs/week x 52 weeks/yr x \$80/hr =	\$83,200
Total Cost per Year =	\$83,200

Laboratory Costs

Monthly influent & effluent samples to outside lab. =	\$1,900
Monthly influent & effluent samples - onsite testing =	\$500
Annual sludge testing =	\$200
Annual effluent volatile organics & heavy metals =	\$1,000
Total Cost per Year =	\$3,600

Chemical Costs

Alum for phosphorus removal - 154 lbs/day x 365 days x \$0.3/lb =	\$16,864
MBR cleaning (sodium hypochlorite) =	\$3,506
Alkalinity adjustment - \$10/day x 365 days =	\$3,650
Total Cost per Year =	\$24,020

Sludge Removal & Disposal

(4% solids) 3108 gal/day x 365 days/yr x \$0.2/gal =	\$226,884
Total Cost per Year =	\$226,884

Electrical Costs

MBR System	\$137,600
WWTP	21,305
Pumping Station	12,000

Membrane Replacement Costs

MBR	57,600
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Odor Control

Activated Carbon - 2,000 lb unit x 4/yr x \$2.5/lb =	\$20,000
Total Cost per Year =	\$20,000

Total Operation Costs = \$588,912 Per Year

Per Month



Plumsted Township MUA
Operational Cost Estimate

4/2/14

MBR Wastewater Treatment Facility (600,000 GPD)

With Supplemental Reverse Osmosis System

Generator Fuel

Pumping station generator fuel costs.=	975
1 hr/wk exercise x 52 wks x 4 gal/hr x \$4/gal.=	\$832
Full Load - 24 hrs/yr x 10 gal/hr x \$4/gal.=	\$896
Total Cost per Year =	\$1,728

Operator Costs

20 hrs/week x 52 weeks/yr x \$80/hr =	\$83,200
Total Cost per Year =	\$83,200

Laboratory Costs

Monthly influent & effluent samples to outside lab. =	\$1,900
Monthly influent & effluent samples - onsite testing =	\$500
Annual sludge testing =	\$200
Annual effluent volatile organics & heavy metals =	\$1,000
Total Cost per Year =	\$3,600

Chemical Costs

Alum for phosphorus removal - 154 lbs/day x 365 days x \$0.3/lb =	\$16,864
RO chemical cleaner (acid and caustic)	\$1,157
RO anti-scalant	\$4,411
MBR cleaning (sodium hypochlorite)	\$3,506
Alkalinity adjustment - \$10/day x 365 days =	\$3,650
Total Cost per Year =	\$29,588

Sludge Removal & Disposal

(4% solids) 3109 gal/day x 365 days/yr x \$0.2/gal =	\$226,884
Total Cost per Year =	\$226,884

Electrical Costs

MBR System	\$137,600
WWTP	21,305
Reverse Osmosis System	48,678
Pumping Station	12,000

Membrane Replacement Costs

MBR, RO, RO concentrator	107,800
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RO Reject Water Disposal (100% flow treated)

12000 GPD x 365 x \$0.17/gal	744,600
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Odor Control

Activated Carbon - 2,000 lb unit x 4/yr x \$2.5/lb =	\$20,000
Total Cost per Year =	\$20,000

Total Operation Costs = \$1,437,913 Per Year

Per Month



2-24-14

**Plumsted Township MUA
Construction Cost Summary for Phase 1 & 2
MBR Wastewater Treatment Systems**

	Dynatec MBR 300,000 GPD	Dynatec MBR 600,000 GPD
Building	\$235,000	\$235,000
Concrete Bldg. Floor & foundation	\$40,000	\$40,000
Concrete for Steel Tank Foundations	\$65,000	\$65,000
Concrete Tankage	-	-
Electrical & Genset	\$300,000	\$300,000
Interconnecting Pipe & Pipe Insulation	\$80,000	\$80,000
Tanks & equipment	\$1,800,000	\$3,100,000
Construction Installation	\$500,000	\$600,000
Flow Equalization Tanks	\$270,000	\$270,000
25% contingency	\$822,500	\$1,172,500
	<u>\$4,112,500</u>	<u>\$5,862,500</u>

1. Steel fabricated tanks - membrane filtration

All include chemical feed systems for phosphorus removal



2-24-14

**Plumsted Township MUA
Cost Summary for Phase 1 & 2
MBR Wastewater Treatment Systems
with Supplemental Reverse Osmosis**

	Dynatec MBR 300,000 GPD	Dynatec MBR 600,000 GPD
Building	\$235,000	\$235,000
Concrete Bldg. Floor & foundation	\$40,000	\$40,000
Concrete for Steel Tank Foundations	\$65,000	\$65,000
Concrete Tankage	-	-
Electrical & Genset	\$300,000	\$300,000
Interconnecting Pipe & Pipe Insulation	\$80,000	\$80,000
Tanks & equipment	\$1,800,000	\$3,100,000
Construction Installation	\$500,000	\$600,000
Reverse Osmosis System	\$375,000	\$700,000
Construction Installation	\$100,000	\$150,000
Flow Equalization Tanks	\$270,000	\$270,000
25% contingency	\$941,250	\$1,385,000
	\$4,706,250	\$6,925,000

1. Steel fabricated tanks - membrane filtration

All include chemical feed systems for phosphorus removal



Plumsted Township MUA
Operational Cost Estimate

8/15/14

Oxi-ditch Wastewater Treatment Facility (300,000 GPD)

Generator Fuel

1 hr/wk exercise x 52 wks x 7 gal/hr x \$4/gal. =	\$1,456
Full Load - 24 hrs/yr x 15 gal/hr x \$4/gal. =	\$1,440
Total Cost per Year =	\$2,896

Operator Costs

25 hrs/week x 52 weeks/yr x \$80/hr =	\$104,000
Total Cost per Year =	\$104,000

Laboratory Costs

Monthly influent & effluent samples to outside lab. =	\$1,900
Monthly influent & effluent samples - onsite testing =	\$750
Annual sludge testing =	\$800
Annual effluent volatile organics & heavy metals =	\$1,000
Total Cost per Year =	\$4,450

Chemical Costs

Alum for phosphorus removal - 200 lbs/day x 365 days x \$0.3/lb =	\$21,900
Acid (metals removal)	\$2,000
Base (metals removal)	\$2,000
Neutralizer (metals removal)	\$2,500
Alkalinity adjustment - \$45/day x 365 days =	\$16,425
Total Cost per Year =	\$44,825

Sludge Removal & Disposal

(4% solids) 3150 gal/day x 365 days/yr x \$0.2/gal =	\$229,950
Total Cost per Year =	\$229,950

Electrical Costs

Oxidation Ditch System	\$41,000
WWTP (blowers, etc.)	140,000
Pumping Stations	38,000

Effluent Disk Replacement Cost

12,000

Metals Sludge Disposal

3000 GPD x 365 x \$0.33/gal	361,350
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Odor Control

Activated Carbon - 2,000 lb unit x 6/yr x \$2.5/lb =	\$30,000
Total Cost per Year =	\$30,000

Total Operation Costs = \$1,008,471 Per Year

Per Month



Plumsted Township MUA
Operational Cost Estimate

8/15/14

Oxi-ditch Wastewater Treatment Facility (600,000 GPD)

Generator Fuel

1 hr/wk exercise x 52 wks x 7 gal/hr x \$4/gal. =	\$1,456
Full Load - 24 hrs/yr x 15 gal/hr x \$4/gal. =	\$1,440
Total Cost per Year =	\$2,896

Operator Costs

30 hrs/week x 52 weeks/yr x \$80/hr =	\$124,800
Total Cost per Year =	\$124,800

Laboratory Costs

Monthly influent & effluent samples to outside lab. =	\$1,900
Monthly influent & effluent samples - onsite testing =	\$750
Annual sludge testing =	\$800
Annual effluent volatile organics & heavy metals =	\$1,000
Total Cost per Year =	\$4,450

Chemical Costs

Alum for phosphorus removal - 350 lbs/day x 365 days x \$0.3/lb =	\$38,325
Acid (metals removal)	\$4,000
Base (metals removal)	\$4,000
Neutralizer (metals removal)	\$5,000
Alkalinity adjustment - \$85/day x 365 days =	\$31,025
Total Cost per Year =	\$82,350

Sludge Removal & Disposal

(4% solids) 6300 gal/day x 365 days/yr x \$0.2/gal =	\$459,900
Total Cost per Year =	\$459,900

Electrical Costs

Oxidation Ditch System	\$82,000
WWTP (blowers, etc.)	224,000
Pumping Stations	48,000

Effluent Disk Replacement Cost	24,000
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Metals Sludge Disposal

6000 GPD x 365 x \$0.33/gal	722,700
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Odor Control

Activated Carbon - 2,000 lb unit x 8/yr x \$2.5/lb =	\$40,000
Total Cost per Year =	\$40,000

Total Operation Costs = \$1,815,096 Per Year

Per Month



8-15-14

**Plumsted Township MUA
Construction Cost Summary for Phase 1 & 2
Oxidation Ditch Wastewater Treatment Systems**

	OVIVO O2 Ditch 300,000 GPD	OVIVO O2 Ditch 600,000 GPD
Building	\$235,000	\$235,000
Concrete Bldg. Floor & foundation	\$40,000	\$40,000
Influent Coarse Screen (Hydrodyne)	\$115,000	\$145,000
Grit Removal (Pista Grit)	\$45,000	\$55,000
Fine screen	\$40,000	\$75,000
Electrical & Genset	\$450,000	\$450,000
Interconnecting Pipe & Pipe Insulation	\$145,000	\$205,000
Blowers (Pista Grit, Sludge Tank, re-air)	\$55,000	\$85,000
Primary Clarifiers (chains, flights, weirs)	\$125,000	\$240,000
Ovivo Oxidation Ditch & equipment	\$1,400,000	\$2,700,000
Secondary Clarifiers (chains, flights, weirs)	\$125,000	\$240,000
P removal Clarifier (mixer, weirs)	\$95,000	\$180,000
Metals removal Unit (pH, mixers, weirs)	\$85,000	\$160,000
Disk Filter (Kruger) & equipment	\$650,000	\$1,200,000
UV disinfection	\$50,000	\$90,000
Re-aeration tank (coarse bubble diffusion)	\$45,000	\$80,000
Construction Installation	\$1,000,000	\$1,600,000
25% contingency	\$1,175,000	\$1,945,000
	<u>\$5,875,000</u>	<u>\$9,725,000</u>

All include chemical feed systems for phosphorus/metals removal



Plumsted Township MUA
Operational Cost Estimate

8/18/14

Bardenpho Wastewater Treatment Facility (300,000 GPD)

Generator Fuel

1 hr/wk exercise x 52 wks x 8 gal/hr x \$4/gal. =	\$1,664
Full Load - 24 hrs/yr x 17 gal/hr x \$4/gal. =	\$1,632
Total Cost per Year =	\$3,296

Operator Costs

25 hrs/week x 52 weeks/yr x \$80/hr =	\$104,000
Total Cost per Year =	\$104,000

Laboratory Costs

Monthly influent & effluent samples to outside lab. =	\$1,900
Monthly influent & effluent samples - onsite testing =	\$750
Annual sludge testing =	\$800
Annual effluent volatile organics & heavy metals =	\$1,000
Total Cost per Year =	\$4,450

Chemical Costs

Alum for phosphorus removal - 100 lbs/day x 365 days x \$0.3/lb =	\$10,950
Acid (metals removal)	\$2,000
Base (metals removal)	\$2,000
Neutralizer (metals removal)	\$2,500
Alkalinity adjustment - \$45/day x 365 days =	\$16,425
Total Cost per Year =	\$33,875

Sludge Removal & Disposal

(4% solids) 3150 gal/day x 365 days/yr x \$0.2/gal =	\$229,950
Total Cost per Year =	\$229,950

Electrical Costs

Bardenpho System	\$41,000
WWTP (blowers, etc.)	180,000
Pumping Stations	38,000

Effluent Disk Replacement Cost	12,000
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Metals Sludge Disposal

3000 GPD x 365 x \$0.33/gal	361,350
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Odor Control

Activated Carbon - 2,000 lb unit x 6/yr x \$2.5/lb =	\$30,000
Total Cost per Year =	\$30,000

Total Operation Costs = \$1,037,921 Per Year

Per Month



Plumsted Township MUA
Operational Cost Estimate

8/18/14

Bardenpho Wastewater Treatment Facility (600,000 GPD)

Generator Fuel

1 hr/wk exercise x 52 wks x 8 gal/hr x \$4/gal. =	\$1,664
Full Load - 24 hrs/yr x 17 gal/hr x \$4/gal. =	\$1,632
Total Cost per Year =	\$3,296

Operator Costs

30 hrs/week x 52 weeks/yr x \$80/hr =	\$124,800
Total Cost per Year =	\$124,800

Laboratory Costs

Monthly influent & effluent samples to outside lab. =	\$1,900
Monthly influent & effluent samples - onsite testing =	\$750
Annual sludge testing =	\$800
Annual effluent volatile organics & heavy metals =	\$1,000
Total Cost per Year =	\$4,450

Chemical Costs

Alum for phosphorus removal - 200 lbs/day x 365 days x \$0.3/lb =	\$21,900
Acid (metals removal)	\$4,000
Base (metals removal)	\$4,000
Neutralizer (metals removal)	\$5,000
Alkalinity adjustment - \$85/day x 365 days =	\$31,025
Total Cost per Year =	\$65,925

Sludge Removal & Disposal

(4% solids) 6300 gal/day x 365 days/yr x \$0.2/gal =	\$459,900
Total Cost per Year =	\$459,900

Electrical Costs

Bardenpho System	\$82,000
WWTP (blowers, etc.)	360,000
Pumping Stations	58,000

Effluent Disk Replacement Cost	24,000
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Metals Sludge Disposal

6000 GPD x 365 x \$0.33/gal	722,700
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Odor Control

Activated Carbon - 2,000 lb unit x 8/yr x \$2.5/lb =	\$40,000
Total Cost per Year =	\$40,000

Total Operation Costs = \$1,945,071 Per Year

Per Month



8-18-14

**Plumsted Township MUA
Construction Cost Summary for Phase 1 & 2
Modified Bardenpho Wastewater Treatment Systems**

	Bardenpho Modified 300,000 GPD	Bardenpho Modified 600,000 GPD
Building	\$305,000	\$305,000
Concrete Bldg. Floor & foundation	\$60,000	\$60,000
Influent Coarse Screen (Hydrodyne)	\$115,000	\$145,000
Grit Removal (Pista Grit)	\$45,000	\$55,000
Fine screen	\$40,000	\$75,000
Electrical & Genset	\$500,000	\$500,000
Interconnecting Pipe & Pipe Insulation	\$205,000	\$265,000
Blowers(Aera, Grit, Sludge Tank,2 re-air)	\$100,000	\$150,000
Primary Clarifiers (chains,flights,weirs)	\$125,000	\$240,000
Bardenpho Process & equipment	\$1,600,000	\$2,600,000
Secondary Clarifiers (chains,flights,weirs)	\$125,000	\$240,000
No separate P removal tank	\$0	\$0
Metals removal Unit (pH,mixers,weirs)	\$85,000	\$160,000
Disk Filter (Kruger) & equipment	\$650,000	\$1,200,000
UV disinfection	\$50,000	\$90,000
Re-aeration tank (coarse bubble diffusion)	\$45,000	\$80,000
Construction Installation	\$900,000	\$1,450,000
25% contingency	\$1,237,500	\$1,903,750
	\$6,187,500	\$9,518,750

All include chemical feed systems for phosphorus/metals removal