

**Picnic Point WWTF  
Business Case Evaluation  
Alternatives Analysis Net Present Value Template**

*Name of Agency:*

Picnic Point WWTF
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*Name of Project/Problem:*

Aeration and Membrane Blower Selection Analysis
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*Names of Alternatives:*

Alternative 1	<b>PD Blowers</b> (3 @ Phase 1 & 4 @ Phase 2)	<i>Without PUD Incentive</i>
Alternative 2	<b>Neuros Blowers</b> (4 @ Phase 1 & 5 @ Phase 2)	<i>Without PUD Incentive</i>
Alternative 3	<b>PD Blowers</b> (3 @ Phase 1 & 4 @ Phase 2)	<i>Without PUD Incentive</i>
Alternative 4	<b>Neuros Blowers</b> (4 @ Phase 1 & 5 @ Phase 2)	<i>With PUD Incentive @ 2009</i>

*Year of analysis:*

2009
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*Escalation rate:*

4%
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*Discount rate:*

7%
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**Picnic Point WWTF  
Aeration and Membrane Blower Selection Analysis  
Life Cycle Alternative Cost Analysis  
Summary of Alternatives**

Alternative	Name	Capital Cost (thousands)	20-yr NPV (thousands)
1	PD Blowers (3 @ Phase 1 & 4 @ Phase 2) <i>Without PUD Incentive</i>	\$679	\$4,077
2	Neuros Blowers (4 @ Phase 1 & 5 @ Phase 2) <i>Without PUD Incentive</i>	\$1,169	\$3,897
3	PD Blowers (3 @ Phase 1 & 4 @ Phase 2) <i>Without PUD Incentive</i>	\$679	\$4,077
4	Neuros Blowers (4 @ Phase 1 & 5 @ Phase 2) <i>With PUD Incentive @ 2009</i>	\$1,109	\$3,841

*Note: Cost evaluation is based on Phase 1 and Phase 2 Equipment Costs  
Future 4th PD blower and 5th Neuros blower capital costs are adjusted to present worth. These will  
be installed in the future as noted under criteria and based on airflow requirements*

**Savings Using Turbo Blower**

**\$179,358** Without PUD Incentive  
**\$235,565** Using PUD Incentive @ 2009

**PD Blower and Neuros Blower Cost Summary Basis**

Phase 2 Blower Purchase Year	
Aeration System	2022
Membrane System	2014
Current Year of Purchase	2009
Inflation rate (f)	4%
Interest rate (i)	5%
Years of project implementation (n)	

Economic Analysis:  
 Present worth (PW) formula <sup>(2)</sup>:  
 (2)  $P_0$  is the present value of the project's capital cost

$$PW = \frac{P_0 (1+f)^n}{(1+i)^n}$$

**CAPITAL COST**

**Aeration System**

Parameter	PD Blower	Parameter	Neuros Blower
Number of Blowers	3	Number of Blowers	4
Service Life	15	Service Life	15
HP each motor	125	HP each motor	75
Blower Cost	\$ 59,532	Blower Cost	\$ 107,638
VFD Cost <sup>1</sup>	\$ 25,000	VFD Cost	\$ -
<b>Phase 2 Present Worth</b>		<b>Phase 2 Present Worth</b>	
4th Blower Addition 2022	\$ 74,644	5th Blower Addition 2022	\$ 95,047
<b>PD Blower Cost Estimate</b>	<b>\$ 328,240</b>	<b>Neuros Blower Cost Estimate</b>	<b>\$ 525,599</b>

1. VFD Cost information from MS Mean Cost Data 2006

2. All blower configurations include 1 standby

PUD Incentive \$ 20,034 2009

**Membrane System**

Parameter	PD Blower	Parameter	Neuros Blower
Number of Blowers	3	Number of Blowers	4
Service Life	15	Service Life	15
HP each motor	200	HP each motor	100
Cost/scfm			
Blower Cost	\$ 63,843	Blower Cost	\$ 129,847
VFD Cost <sup>1</sup>	\$ 25,000	VFD Cost	\$ -
<b>Phase 2 Present Worth</b>		<b>Phase 2 Present Worth</b>	
4th Blower Addition 2014	\$ 84,692	4th Blower Addition 2014	\$ 123,780
<b>PD Blower Cost Estimate</b>	<b>\$ 351,221</b>	<b>Neuros Blower Cost Estimate</b>	<b>\$ 643,168</b>

1. VFD Cost information from MS Mean Cost Data 2006

2. All blower configurations include 1 standby

PUD Incentive \$ 39,462 2009

<b>Total PD Blower Costs</b>	<b>\$ 679,461</b>	<b>Total Neuros Blower Cost</b>	<b>\$ 1,168,767</b>
		<i>Total PUD Incentive 2009</i>	<i>\$ 59,496 2009</i>

Aeration and Membrane System	PD Blower		Neuros Blower
2028 Energy Cost	\$ 327,982	2028 Energy Cost	\$ 263,071
		2028 Energy Saved , Kw-Hr	954,573

**AERATION Blower BHP Calculations**

**References:** EPA Fine Pore Design Manual (pg 139)

**Calculations** BHP= (4.28 \*10^-4\*Aeration Flow \* Inlet temp/Combined blower and motor efficiency) [(Blower discharge Pressure/Field atm Pressure)^0.283 -1]

**Assumptions:** Since BHP at Design point for PD Blowers was provided, the calculations assumed motor/blower efficiency to calculate turndown and power consumptions  
 Neuros turndown was calculated from the Performance Characteristics Provided by the manufacturer.  
 PD blower turndown information provided by Aerzen Rep. Max turndown provided at 13 psi is 750 scfm  
 Inlet Air Temp 20 Celsius

**PD Blower**

Max Airflow 1600 scfm  
 Design Point 1400 scfm  
 Min Airflow 750 scfm  
 Motor HP 125 HP  
 Design point Efficiency **56%**

**Addition of Future  
4th PD**

Year	Parameter		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
	Aeration Flow	scfm	470	519.12	565.79	612.46	659.12	705.79	752.46	799.12	845.79	892.46	939.12	985.79	1032.46	1079.12	1125.79	1172.46	1219.12	1265.79	1312.46	1403.33
	Number of Aeration Tanks online		2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Total Airflow Required		940	1038.25	1131.58	1224.91	1318.25	2117.37	2257.37	2397.37	2537.37	2677.37	2817.37	2957.37	3097.37	3237.37	3377.37	3517.37	3657.37	3797.37	3937.37	4210.00
	Number of Blowers in Operation		1	1	1	1	1	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3
	Airflow per blower		940.00	1038.25	1131.58	1224.91	1318.25	1058.68	1128.68	1198.68	1268.68	1338.68	1408.68	1478.68	1548.68	1079.12	1125.79	1172.46	1219.12	1265.79	1312.46	1403.33
	Electric power rate																					
	Year 2006	0.068																				
	Aeration Blowers																					
	Blower Efficiency	%	56%	56%	56%	56%	56%	57%	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%
	Blower discharge pressure	psi	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00
	<b>Blower base BHP - TOTAL</b>	<b>HP</b>	<b>74.7</b>	<b>82.5</b>	<b>89.9</b>	<b>97.3</b>	<b>104.7</b>	<b>83.4</b>	<b>89.7</b>	<b>94.9</b>	<b>100.6</b>	<b>106.2</b>	<b>111.7</b>	<b>117.5</b>	<b>122.6</b>	<b>85.5</b>	<b>89.1</b>	<b>92.8</b>	<b>96.5</b>	<b>101.5</b>	<b>104.3</b>	<b>111.1</b>
	Total for Blowers in Operation	HP	74.7	82.5	89.9	97.3	104.7	166.8	179.4	189.8	201.3	212.3	223.4	235.0	245.3	256.4	267.4	278.4	289.4	304.5	312.9	333.4
	Blower power consumption	Kw-hr/yr	488,164	539,185	587,655	636,126	684,467	1,089,868	1,172,304	1,240,579	1,315,366	1,387,681	1,459,970	1,535,831	1,602,812	1,675,258	1,747,378	1,819,470	1,891,535	1,989,829	2,044,768	2,178,571
	Base blower power cost	\$/yr	\$ 33,195	\$ 36,665	\$ 39,961	\$ 43,257	\$ 46,544	\$ 74,111	\$ 79,717	\$ 84,359	\$ 89,445	\$ 94,362	\$ 99,278	\$ 104,436	\$ 108,991	\$ 113,918	\$ 118,822	\$ 123,724	\$ 128,624	\$ 135,308	\$ 139,044	\$ 148,143

**Neuros Blower**

**NX-75** Max Airflow 1200 scfm  
 Design Point 1050 scfm  
 Min Airflow 620 scfm  
 Motor HP 75 HP  
 Design point Efficiency **70%**

**Addition of Future  
5th Neuros**

Year	Parameter		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
	Aeration Flow per tank	scfm	470.00	519.12	568.25	617.37	666.49	715.61	764.74	813.86	862.98	912.11	961.23	1010.35	1059.47	1108.60	1157.72	1206.84	1255.96	1305.09	1312.46	1403.33
	Number of Aeration Tanks online		2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Total Airflow Required		940.00	1038.25	1136.49	1234.74	1332.98	2146.84	2294.21	2441.58	2588.95	2736.32	2883.68	3031.05	3178.42	3325.79	3473.16	3620.53	3767.89	3915.26	3937.37	4210.00
	Number of Blowers in Operation		1	1	1	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4	4
	Airflow per blower		940.00	1038.25	1136.49	617.37	666.49	1073.42	1147.11	813.86	862.98	912.11	961.23	1010.35	1059.47	831.45	868.29	905.13	941.97	978.82	984.34	1052.50
	Electric power rate																					
	Year 2006	0.068																				
	Aeration Blowers																					
	Blower Efficiency		70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%
	Blower discharge pressure	psi	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00
	<b>Blower base BHP - TOTAL</b>	<b>BHP</b>	<b>56.3</b>	<b>62.1</b>	<b>68.0</b>	<b>37.0</b>	<b>39.9</b>	<b>64.3</b>	<b>68.7</b>	<b>48.7</b>	<b>51.7</b>	<b>54.6</b>	<b>57.5</b>	<b>60.5</b>	<b>63.4</b>	<b>49.8</b>	<b>52.0</b>	<b>54.2</b>	<b>56.4</b>	<b>58.6</b>	<b>58.9</b>	<b>63.0</b>
	Total for blowers in Operation	BHP	56.3	62.1	68.0	73.9	79.8	128.5	137.3	146.1	155.0	163.8	172.6	181.4	190.3	199.1	207.9	216.7	225.5	234.4	235.7	252.0
	Blower power consumption	Kw-hr/yr	367,696	406,127	444,557	482,987	521,418	839,772	897,418	955,063	1,012,709	1,070,354	1,128,000	1,185,645	1,243,291	1,300,937	1,358,582	1,416,228	1,473,873	1,531,519	1,540,166	1,646,810
	Base blower power cost	\$/yr	\$ 25,003	\$ 27,617	\$ 30,230	\$ 32,843	\$ 35,456	\$ 57,105	\$ 61,024	\$ 64,944	\$ 68,864	\$ 72,784	\$ 76,704	\$ 80,624	\$ 84,544	\$ 88,464	\$ 92,384	\$ 96,303	\$ 100,223	\$ 104,143	\$ 104,731	\$ 111,983

Assumption Blower Inlet Temp 68 F  
 Proposed PUD Incentive 0.14 \$/kw-hr  
**Energy Savings Using Neuros**  
 2011 2028  
 143,098 531,761 kw-hr/yr  
**\$ 20,034** \$

**Membrane Blower BHP Calculations**

Design Condition 1400 scfm @ 8 psi

**Assumptions**

**PD Blower** Max Airflow 3045 scfm  
 Design Point 2800 scfm  
 Min Airflow 600 scfm  
 Motor HP 200 HP

4th PD

13.2

Year	Parameter		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
	Plant Flow	MGD	3.3	3.51	3.73	3.96	4.18	4.41	4.63	4.86	5.08	5.31	5.53	5.76	5.98	6	6	6	6	6	6	6
	Aeration Flow	scfm	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
	Number of tanks in operation		4	4	4	4	4	5	5	5	5	6	6	6	6	6	6	6	6	6	6	6
	Total Airflow		5600	5600	5600	5600	5600	7000	7000	7000	7000	8400	8400	8400	8400	8400	8400	8400	8400	8400	8400	8400
	Number of Blowers in Operation		2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Airflow per Blower		2800	2800	2800	2800	2800	2333	2333	2333	2333	2800	2800	2800	2800	2800	2800	2800	2800	2800	2800	2800
	Electric power rate																					
	Year 2006	0.068																				
	MBR Blowers																					
	<b>Blower base BHP - TOTAL</b>	<b>BHP</b>	<b>134.9</b>	134.9	134.9	134.9	134.9	113.8	113.8	113.8	113.8	134.9	134.9	134.9	134.9	134.9	134.9	134.9	134.9	134.9	134.9	<b>134.9</b>
	Total for Blowers in Operation	BHP	269.8	269.8	269.8	269.8	269.8	341.4	341.4	341.4	341.4	404.7	404.7	404.7	404.7	404.7	404.7	404.7	404.7	404.7	404.7	404.7
	Blower power consumption	Kw-hr/yr	1,763,132	1,763,132	1,763,132	1,763,132	1,763,132	2,231,035	2,231,035	2,231,035	2,231,035	2,644,698	2,644,698	2,644,698	2,644,698	2,644,698	2,644,698	2,644,698	2,644,698	2,644,698	2,644,698	2,644,698
	Base blower power cost	\$/yr	\$ 119,893	\$ 119,893	\$ 119,893	\$ 119,893	\$ 119,893	\$ 151,710	\$ 151,710	\$ 151,710	\$ 151,710	\$ 179,839	\$ 179,839	\$ 179,839	\$ 179,839	\$ 179,839	\$ 179,839	\$ 179,839	\$ 179,839	\$ 179,839	\$ 179,839	\$ 179,839

**Neuros Blower** Max Airflow 2333 scfm  
 Design Point 2100 scfm  
 Min Airflow 1000 scfm  
 Motor HP 100 HP

5th Neuros

Year	Parameter		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
	Plant Flow MGD	MGD	3.3	3.51	3.73	3.96	4.18	4.41	4.63	4.86	5.08	5.31	5.53	5.76	5.98	6	6	6	6	6	6	6
	Aeration Flow	scfm	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
	Number of tanks in operation		4	4	4	4	4	5	5	5	5	6	6	6	6	6	6	6	6	6	6	6
	Total Airflow		5600	5600	5600	5600	5600	7000	7000	7000	7000	8400	8400	8400	8400	8400	8400	8400	8400	8400	8400	8400
	Number of Blowers in Operation		3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Airflow per blower		1867	1867	1867	1867	1867	1750	1750	1750	1750	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
	Electric power rate																					
	Year 2006	0.068																				
	Aeration Blowers																					
	<b>Blower base BHP - TOTAL</b>	<b>BHP</b>	<b>75.6</b>	75.6	75.6	75.6	75.6	70.8	70.8	70.8	70.8	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	<b>85.0</b>
	Total for blowers in Operation	BHP	226.7	226.7	226.7	226.7	226.7	283.3	283.3	283.3	283.3	340.0	340.0	340.0	340.0	340.0	340.0	340.0	340.0	340.0	340.0	340.0
	Blower power consumption	Kw-hr/yr	1,481,258	1,481,258	1,481,258	1,481,258	1,481,258	1,851,572	1,851,572	1,851,572	1,851,572	2,221,886	2,221,886	2,221,886	2,221,886	2,221,886	2,221,886	2,221,886	2,221,886	2,221,886	2,221,886	2,221,886
	Base blower power cost	\$/yr	\$ 100,726	\$ 100,726	\$ 100,726	\$ 100,726	\$ 100,726	\$ 125,907	\$ 125,907	\$ 125,907	\$ 125,907	\$ 151,088	\$ 151,088	\$ 151,088	\$ 151,088	\$ 151,088	\$ 151,088	\$ 151,088	\$ 151,088	\$ 151,088	\$ 151,088	\$ 151,088

Assumption Blower Inlet Temp 68 F  
 Proposed PUD Incentive 0.14 \$/kw-hr

**Energy Savings Using Neuros**

2011	2028	
281,875	422,812	kw-hr/yr
<b>\$ 39,462</b>		

From Summary Sheet:  
 Year of analysis: 2007  
 Escalation rate: 4%  
 Discount rate: 7%

Risk adjustments (+/- percent):  
 Capital cost:   
 Benefits:   
 Annual/R&R costs:

Picnic Point WWTF  
 Aeration and Membrane Blower Selection Analysis  
 Life Cycle Alternative Cost Analysis (\$000s)  
 PD Blowers (3 @ Phase 1 & 4 @ Phase 2)  
 Without PUD Incentive

	Year																													
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
<b>Expressed in 2007 dollars, unescalated</b>																														
Capital Outlays			679																											
Benefits:																														
Rebate																														
Benefit 2																														
Benefit 3																														
Total benefits																														
Annual Running Costs:																														
M&O																														
Power (Aeration)				33	37	40	43	47	74	80	84	89	94	99	104	109	114	119	124	129	135	139	148							
Power (Membrane)				120	120	120	120	120	152	152	152	152	180	180	180	180	180	180	180	180	180	180	180							
Compliance monitoring																														
Unexpected events																														
Other																														
Other																														
Other																														
Total running costs				153	157	160	163	166	226	231	236	241	274	279	284	289	294	299	304	308	315	319	328							
R&R Costs:																														
Replace Diffusers																														
Replace Blowers																														
Other																														
Other																														
Other																														
Total refurbishments																														
Net Cost			679	153	157	160	163	166	226	231	236	241	274	279	284	289	294	299	304	308	315	319	328							

Expressed in escalated dollars with sensitivity adjustments																														
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Capital Outlays			735																											
Benefits:																														
Rebate																														
Benefit 2																														
Benefit 3																														
Total benefits																														
Annual Running Costs:																														
M&O																														
Power (Aeration)				37	43	49	55	61	101	113	125	138	151	165	181	196	213	231	251	271	296	317	351							
Power (Membrane)				135	140	146	152	158	208	216	225	234	288	299	311	324	337	350	364	379	394	410	426							
Compliance monitoring																														
Unexpected events																														
Other																														
Other																														
Other																														
Total running costs				172	183	194	206	219	309	329	349	371	439	465	492	520	550	582	615	650	691	727	777							
R&R Costs:																														
Replace Diffusers																														
Replace Blowers																														
Other																														
Other																														
Other																														
Total refurbishments																														
Net escalated cost			735	172	183	194	206	219	309	329	349	371	439	465	492	520	550	582	615	650	691	727	777							

Life cycle cost analysis																														
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
PVs in 2007			642	141	140	139	138	136	180	179	178	176	195	193	191	189	186	184	182	180	178	175	175							
NPV as of 2007			4,077																											

From Summary Sheet:  
 Year of analysis 2007  
 Escalation rate 4%  
 Discount rate 7%

Risk adjustments (+/- percent):  
 Capital cost  
 Benefits  
 Annual/R&R costs

Picnic Point WWTF  
 Aeration and Membrane Blower Selection Analysis  
 Life Cycle Alternative Cost Analysis (\$000s)  
 Neuros Blowers (4 @ Phase 1 & 5 @ Phase 2)  
 Without PUD Incentive

	Year																													
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
<b>Expressed in 2007 dollars, unescalated</b>																														
Capital Outlays			1,169																											
Benefits:																														
Benefit 1																														
Benefit 2																														
Benefit 3																														
Total benefits																														
Annual Running Costs:																														
M&O																														
Power (Aeration)				25	28	30	33	35	57	61	65	69	73	77	81	85	88	92	96	100	104	105	112							
Power (Membrane)				101	101	101	101	101	126	126	126	126	151	151	151	151	151	151	151	151	151	151	151							
Compliance monitoring																														
Unexpected events																														
Other																														
Other																														
Total running costs				126	128	131	134	136	183	187	191	195	224	228	232	236	240	243	247	251	255	256	263							
R&R Costs:																														
Replace Diffusers																														
Replace Blowers																														
Other																														
Other																														
Other																														
Total refurbishments																														
Net Cost			1,169	126	128	131	134	136	183	187	191	195	224	228	232	236	240	243	247	251	255	256	263							

	Year																													
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
<b>Expressed in escalated dollars with sensitivity adjustments</b>																														
Capital Outlays			1,264																											
Benefits:																														
Benefit 1																														
Benefit 2																														
Benefit 3																														
Total benefits																														
Annual Running Costs:																														
M&O																														
Power (Aeration)				28	32	37	42	47	78	87	96	106	117	128	140	152	166	180	195	211	228	239	265							
Power (Membrane)				113	118	123	127	133	172	179	186	194	242	252	262	272	283	294	306	318	331	344	358							
Compliance monitoring																														
Unexpected events																														
Other																														
Other																														
Other																														
Total running costs				141	150	159	169	179	250	266	283	300	358	379	401	424	449	474	501	529	559	583	623							
R&R Costs:																														
Replace Diffusers																														
Replace Blowers																														
Other																														
Other																														
Other																														
Total refurbishments																														
Net escalated cost			1,264	141	150	159	169	179	250	266	283	300	358	379	401	424	449	474	501	529	559	583	623							

Life cycle cost analysis	
PVs in 2007	1,104
NPV as of 2007	3,897

From Summary Sheet:  
 Year of analysis: 2007  
 Escalation rate: 4%  
 Discount rate: 7%

Risk adjustments (+/- percent):  
 Capital cost:   
 Benefits:   
 Annual/R&R costs:

**Picnic Point WWTF  
 Aeration and Membrane Blower Selection Analysis  
 Life Cycle Alternative Cost Analysis (\$000s)  
 Neuros Blowers (4 @ Phase 1 & 5 @ Phase 2)  
 With PUD Incentive @ 2009**

	Year																													
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
<b>Expressed in 2007 dollars, unescalated</b>																														
Capital Outlays			1,109																											
Benefits:																														
Benefit 1																														
Benefit 2																														
Benefit 3																														
Total benefits																														
Annual Running Costs:																														
M&O																														
Power (Aeration)				25	28	30	33	35	57	61	65	69	73	77	81	85	88	92	96	100	104	105	112							
Power (Membrane)				101	101	101	101	101	126	126	126	126	151	151	151	151	151	151	151	151	151	151	151							
Compliance monitoring																														
Unexpected events																														
Other																														
Other																														
Total running costs				126	128	131	134	136	183	187	191	195	224	228	232	236	240	243	247	251	255	256	263							
R&R Costs:																														
Other																														
Other																														
Other																														
Other																														
Total refurbishments																														
Net Cost			1,109	126	128	131	134	136	183	187	191	195	224	228	232	236	240	243	247	251	255	256	263							

<b>Expressed in escalated dollars with sensitivity adjustments</b>																														
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Capital Outlays			1,200																											
Benefits:																														
Benefit 1																														
Benefit 2																														
Benefit 3																														
Total benefits																														
Annual Running Costs:																														
M&O																														
Power (Aeration)				28	32	37	42	47	78	87	96	106	117	128	140	152	166	180	195	211	228	239	265							
Power (Membrane)				113	118	123	127	133	172	179	186	194	242	252	262	272	283	294	306	318	331	344	358							
Compliance monitoring																														
Unexpected events																														
Other																														
Other																														
Total running costs				141	150	159	169	179	250	266	283	300	358	379	401	424	449	474	501	529	559	583	623							
R&R Costs:																														
Other																														
Other																														
Other																														
Other																														
Total refurbishments																														
Net escalated cost			1,200	141	150	159	169	179	250	266	283	300	358	379	401	424	449	474	501	529	559	583	623							

<b>Life cycle cost analysis</b>																														
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
PVs in 2007			1,048	115	115	114	113	112	146	145	144	142	159	157	156	154	152	150	148	146	145	141	141							
<b>NPV as of 2007</b>			<b>3,841</b>																											