May 4, 2011

BOARD ACTION/DISCUSSION ITEMS
MAY 2011 – JULY 2011

PRIORITY*	PROJECT/ISSUE	TYPE OF ACTION	TIMING**
	AS NEEDED		
H	Update on wastewater treatment capacity evaluation/steering committee	Status Report	As needed
H	Acquisition/Growth Strategy Activities	Status Report/ Discussion/Approval	As needed
H	Boston Beer Agreement Renewal	Status Report	May (W)
	WITHIN 45 DAYS		
H	LCA/COA Interconnection, Phase 2 *Project Authorization Construction, Contract Awards*	Approval	May (B)
H	Western Weisenberg WTP *Project Authorization Construction, Contract Awards*	Approval	May (B)
	WITHIN 75 DAYS		
H	Jordan Creek Wastewater System- *LCA/Wal-Mart cost sharing Agreement*	Approval	June (B)or July(W)
H	Meter Replacement Program, Phase 2 *Project Authorization Construction, Contract Awards*	Approval	June (W/B)
M	Energy Study of LCA WWTPs	Status Report	June (W/B)
M	WW Capital Recovery Fees	Approval	June (B)

Upcoming Meeting Dates:

05/23	May Board Meeting
06/13	June Workshop Meeting

*** H – High**
M – Medium
L – Low

**** (W) – Workshop**
(B) – Board
(W/B) - Either

LEHIGH COUNTY AUTHORITY

WORKSHOP AGENDA

Monday, May 9, 2011 – 12:00 PM

INITIAL ITEMS *(Collectively 5 Minutes)*

1. ***Identify items for May Board Meeting***

- *Review Board Discussion items, May 2010 –July 2011*

ACTION/DISCUSSION ITEMS

1. **Boston Beer Company Agreement** *(Discussion)*

Boston Beer has been operating under the Diageo agreement dated September 1, 2005, since they went on line in 2007. As per the agreement, Boston Beer requested an extension of the term of the agreement for a renewal period of five years commencing on May 15, 2011. LCA and Boston Beer have been negotiating the agreement since July of 2010 and anticipate a final understanding in the near future. An amendment to the existing Diageo agreement will be drafted and presented to the Board for review and approval once it is finalized. At this time, a summary of the terms negotiated will be presented to the Board. Following a discussion with Boston Beer later this week, we may provide the proposed changes to the Agreement prior to the meeting.

2. **Financial Statements** *(Acceptance)*

The 2010 Audited Financial Statements will be sent under separate cover prior to the Workshop meeting.

3. **Long-term Wastewater Capacity Presentation** *(Discussion)*

An update on the LCA Wastewater Capacity Program will be presented to the Board for discussion ***(tan)***. The presentation will include the wastewater capacity timeline, current status, changes having an impact on the original cost estimates, current capital costs and the next steps. Malcolm Pirnie will primarily focus on the updated cost estimates of the options, including the cost estimate prepared and updated by the City of Allentown Engineer.

INFORMATION ITEMS

1. ***Education and Training***

Linda Eberhardt, Michelle Danberry	GFOA-PA – State College, PA	5/2-4; $1320
Emily Gerber	PA GIS Conference – Harrisburg, PA	5/24-26; $400

OTHER ITEMS

None.

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

Technical Memorandum

Date: May 2, 2011

To: Pat Mandes (LCA)

Copy: Aurel Arndt (LCA)

From: Craig Murray (Malcolm Pirnie)

Re: Wastewater Capacity Program

Updated Cost Summary for Wastewater Capacity Alternatives

For the past several years LCA has been investigating alternatives for obtaining additional wastewater capacity allocation to meet the long-term growth anticipated within the Lehigh Valley. Since the most recent version of the Wastewater Capacity Work Plan (WCWP) was issued in May 2010, there has been additional dialog relative to the alternatives available and what they would cost. Most notably, the City of Allentown has identified a revised preferred alternative for the Remain Pretreatment Alternative. To allow for a new comparison of alternatives, LCA and the City of Allentown were each tasked with developing updated and more comprehensive capital cost estimates.

In December 2010, LCA and the City of Allentown received updated cost estimates from their engineering consultants Malcolm Pirnie and Omni Environmental, respectively. On March 1, 2011 the parties met to review the new information and exchange comments. In parallel with this effort, LCA retained Castle Valley Consultants to evaluate natural treatment alternatives (NTA), including subsurface discharge of treated effluent. This memorandum serves to summarize the current status of these efforts, including updated capital costs for all four alternatives being considered.

Malcolm Pirnie has updated the costs for the various LCA direct discharge alternatives that were evaluated as part of the Wastewater Capacity Program. The revised costs for LCA are presented in the table on the following page. It should be noted that various elements of the cost table were prepared by others. The following is a summary of those costs that were not prepared by Malcolm Pirnie:

- Land Application Pump Station and Forcemain Costs – prepared by Castle Valley Consultants
- Land Application System Costs – prepared by Castle Valley Consultants
- KIWWTP Wet Weather Upgrades (Reduce Discharges from Outfall 003) – prepared by Camp, Dresser & McKee (CDM)
- KIWWTP Compliance Upgrades (Additional Primary Digester) – prepared by Omni Environmental
- KIWWTP 44 mgd Expansion Upgrades – prepared by Omni Environmental

KIWWTP Alternative Cost Summary

Cost Item	Remain Pre-treatment Facility w/ All Flow to Allentown	Upgrade WTP and Direct Discharge via Land Application	Upgrade WTP and Direct Discharge to Jordan Creek	Upgrade WTP and Direct Discharge to Lehigh River
LCA Costs				
WTP Treatment Upgrades	$11.2 MM	$34.5 MM	$34.6 MM	$34.5 MM
WTP Effluent Pump Station & Force Main	-	$4.5 MM	$19.9 MM	$56.2 MM
WTP Land Application System (1)	-	$27.4 MM	-	-
KIWWTP Wet Weather Upgrades(2)	$4.1 MM	$3.3 MM	$3.3 MM	$3.3 MM
KIWWTP Compliance Upgrades(3)	$1.8 MM	$1.5 MM	$1.5 MM	$1.5 MM
KIWWTP 44 mgd Expansion Upgrades(4)	$32.6 MM	-	-	-
Additional LCA Conveyance Costs(5)	$6.4 MM	-	-	-
Additional Allentown Conveyance Costs(6)	$6.4 MM	-	-	-
Estimated LCA Total Costs	**$62.5 MM**	**$71.2 MM**	**$59.3 MM**	**$95.5 MM**
Non-LCA Costs				
KIWWTP Wet Weather Upgrades(7)	$7.9 MM	$8.7 MM	$8.7 MM	$8.7 MM
KIWWTP Compliance Upgrades(8)	$3.6 MM	$3.9 MM	$3.9 MM	$3.9 MM
Estimated Allentown Total Costs	**$11.5 MM**	**$12.6 MM**	**$12.6 MM**	**$12.6 MM**
Total Costs				
Estimated Total Costs	**$74.0 MM**	**$83.8 MM**	**$71.9 MM**	**$108.1 MM**

(1) Estimate does not include cost to purchase land for disposal. It is anticipated this land will be leased.
(2) Includes LCA's portion of the Outfall 003 work. LCA's portion is prorated based on flow.
(3) Includes LCA's portion of the additional Primary Digester. LCA's portion is prorated based on flow.
(4) Assumes LCA's cost is 100% of the cost for the KIWWTP expansion from 40 mgd to 44 mgd.
(5) Includes the cost for upgrades to LCA's conveyance system to convey an additional 4 mgd.
(6) Includes the cost for upgrades to Allentown's conveyance system to convey an additional 4 mgd. Assumes LCA's cost is 100% of the cost additional conveyance costs within Allentown's system.
(7) Includes the remainder of the total cost for the Outfall 003 work. LCA's portion is prorated based on flow.
(8) Includes the remainder of the total cost for the additional Primary Digester.

The costs in the preceding table supersede the direct discharge costs presented in the first three rows of Table 5-1 of the WCWP as well as the costs presented in the December 3, 2010 Cost Update Technical Memorandum.

An updated summary of the factors which had a significant impact on costs are as follows:

1. The Delaware River Basin Commission (DRBC) completed modeling runs for each of the proposed alternatives and summarized them in a memorandum. The modeling runs and results were subsequently revised again. To varying degrees, the revised information and interpretation by DRBC impacted the level of treatment required for all alternatives.
2. Updated projections for influent loads (namely reduction in BOD while maintaining similar nutrient concentrations) had a significant effect on the biological treatment requirements. The previous assumption that the available N and P in the influent would be consumed during treatment is no longer valid, resulting in the need for additional nitrogen treatment capacity. A nitrifying moving bed bioreactor (MBBR) followed by denitrification filters were assumed for the purposes of updating the cost estimates.
3. Additional costs for a building for the MBBR system were added to the estimates.
4. Based on the updated influent loads, the assumed treatment trains for the Lehigh River and Jordan Creek alternatives are now essentially the same. The only difference is the need for dechlorination for the Jordan Creek alternative.
5. Nitrogen removal and storage facilities were added to the Land Application system requirements. With nitrogen removal included, the treatment train for the land application system is the same as the one for discharge to the Lehigh River.
6. Pipeline costs were updated to align with a $14/inch-diameter/lf. This increased unit price allocated additional funds for the numerous stream, highway and railroad crossing that will likely be required.
7. Costs for easements were added to all alternatives. An easement cost of $10/lf for a 20 foot wide easement was used based on work relative to the recent LCA-Allentown water system interconnection project.
8. Costs for conveying the additional 4mgd to the KIWWTP were included for the "remain pretreatment alternative". Separate costs were presented for the LCA and Allentown systems. The required pipe replacement within the LCA system was determined using hydraulic modeling. The required pipe replacement within the Allentown system was estimated to be equal to that within LCA.

Important considerations related to this estimate include:

- Costs for any form of flow reallocation among signatories, or even the ability to perform reallocation, were not considered in this estimate.
- Costs presented are in 2011 dollars.

- No detailed piping routing study has been performed to establish the actual length of pipe that will be needed or the number of potential stream, highway or railroad crossings required.
- Based on the existing plant design, pile foundations are not included. If piles are required for all water containing structures, the additional cost for the three LCA discharge options would be approximately $1.6MM.
- No modifications or upgrades to the Park Pump Station are included in these estimates.
- A more accurate estimate of conveyance costs for the Allentown system is required. The preferred way to achieve this would be to use a dynamic model; however, the City will likely not have a calibrated model for many months.
- Ultimately, the required conveyance piping changes to meet future average flow requirements needs to be compared to the required changes to convey wet weather flows in order to determine how the two may be related.

Based on our review of these updated costs we believe that the Remain Pretreatment alternative (all flow to KIWWTP) and the LCA Discharge to Jordan Creek alternative both remain viable. The Lehigh River and Land Application alternatives do not appear to be cost effective based on the current estimated capital cost and the anticipated present worth values.

The recommended next steps are as follows:

- Complete the present worth analysis for the Remain Pretreatment and Jordan Creek alternatives
- Work with Allentown to confirm the methodology for determining and evaluating the conveyance costs
- Initiate the Act 537 planning process to finalize the evaluations and select the preferred alternative. LCA's Act 537 planning work must be coordinated with the parallel Act 537 planning being completed by the City of Allentown

Appendices:

A. Data Sheets for LCA Direct Discharge Alternatives
B. Updated breakdown of probable construction costs.

Lehigh County Authority
Updated Cost Summary for Wastewater Capacity Alternatives

APPENDIX A
DATA SHEETS FOR LCA DIRECT DISCHARGE ALTERNATIVES

May 2011

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

LCA WTP UPGRADE AND DISCHARGE VIA LAND APPLICATION

I. Unit Process Descriptions:
   a. EQ Tanks (2 MG High Strength and 0.5 MG Hauled Waste)
   b. Grease EQ (convert abandoned DAFT units)
   c. Primary Settling Tank
   d. Chemical Phosphorus Removal System (to achieve DRBC Limits)
   e. Thickening (Gravity Belt Thickener)
   f. MBBR with building
   g. Secondary Settling Tank
   h. Denitrification filters (includes carbon storage and feed facility)
   i. Disinfection
   j. Effluent pump station
   k. Forcemain
   l. Storage lagoon

II. Assumptions:
   a. Assumes subsurface, year-round discharge of effluent
   b. Does not include purchase of land for subsurface discharge. It is assumed that the land would be leased. Price for land for storage is included.
   c. System includes a lagoon for 30 days storage.
   d. Uncertainty on future influent nutrient loads drives need to provide complete nitrification and partial denitrification capacity.
   e. Average design flow through MBBR is 4 MGD. Peak daily flow is 7 MGD.
   f. Average design flow through denitrification filter is 2 MGD (i.e. side stream treatment of 50% of the flow)
   g. Subsequent MBBR treatment is needed only for nitrification of the flow (sized for complete nitrification of average flow), not for significant BOD removal (which is achieved by upstream HPO/settling process)
   h. Nitrifying MBBR is assumed to have negligible solids production, commensurate with its function as a nitrifying reactor. Therefore, it is assumed that there is no net solids contribution to flow from MBBR
   i. The solids load to denite filter (downstream of the MBBR) is assumed to be equivalent to settled flow from HPO system, which is acceptable filter influent quality
   j. Chemical phosphorus removal system assumes an influent phosphorus concentration of 8 mg/L. Assumed chemical is alum.
   k. MBBR sized to achieve complete nitrification (< 1 mg NH3-N/L) for a design influent of 20 mg TKN/L
   l. Denitrification filters sized to achieve complete denitrification (< 1 mg NO2/NO3-N/L) on a design influent of 20 mg NH3-N/L
   m. At average flow (4 MGD), BNR system sized to meet an effluent limit of 10 mg TN/L (pending refractory nitrogen fraction)
   n. Additional polishing filters are not needed because updated treatment projections include denitrification filters (change from previous estimates)
   o. No dechlorination required

LCA WTP UPGRADE AND DISCHARGE TO JORDAN CREEK

I. Unit Process Descriptions:
   a. EQ Tanks (2 MG High Strength and 0.5 MG Hauled Waste)
   b. Grease EQ (convert abandoned DAFT units)
   c. Primary Settling Tank
   d. Chemical Phosphorus Removal System (to achieve DRBC Limits)
   e. Thickening (Gravity Belt Thickener)
   f. MBBR with building
   g. Secondary Settling Tank
   h. Denitrification filters (includes carbon storage and feed facility)
   i. Disinfection
   j. Dechlorination
   k. Effluent pump station
   l. Forcemain

II. Assumptions:
   a. Uncertainty on future influent nutrient loads drives need to provide complete nitrification and partial denitrification capacity.
   b. Average design flow through MBBR is 4 MGD. Peak daily flow is 7 MGD.
   c. Average design flow through denitrification filter is 2 MGD (i.e. side stream treatment of 50% of the flow)
   d. Subsequent MBBR treatment is needed only for nitrification of the flow (sized for complete nitrification of average flow), not for significant BOD removal (which is achieved by upstream HPO/settling process)
   e. Nitrifying MBBR is assumed to have negligible solids production, commensurate with its function as a nitrifying reactor. Therefore, it is assumed that there is no net solids contribution to flow from MBBR
   f. The solids load to denite filter (downstream of the MBBR) is assumed to be equivalent to settled flow from HPO system, which is acceptable filter influent quality
   g. Chemical phosphorus removal system assumes an influent phosphorus concentration of 8 mg/L. Assumed chemical is alum.
   h. MBBR sized to achieve complete nitrification (< 1 mg NH3-N/L) for a design influent of 20 mg TKN/L
   i. Denitrification filters sized to achieve complete denitrification (< 1 mg NO2/NO3-N/L) on a design influent of 20 mg NH3-N/L
   j. At average flow (4 MGD), BNR system sized to meet an effluent limit of 10 mg TN/L (pending refractory nitrogen fraction)
   k. Additional polishing filters are not needed because updated treatment projections include denitrification filters (change from previous estimates)

LCA WTP UPGRADE AND DISCHARGE TO THE LEHIGH RIVER

I. Unit Process Descriptions:
   a. EQ Tanks (2 MG High Strength and 0.5 MG Hauled Waste)
   b. Grease EQ (convert abandoned DAFT units)
   c. Primary Settling Tank
   d. Chemical Phosphorus Removal System (to achieve DRBC Limits)
   e. Thickening (Gravity Belt Thickener)
   f. MBBR with building
   g. Secondary Settling Tank
   h. Denitrification filters (includes carbon storage and feed facility)
   i. Disinfection
   j. Effluent pump station
   k. Forcemain

II. Assumptions:
   a. Uncertainty on future influent nutrient loads drives need to provide complete nitrification and partial denitrification capacity.
   b. Average design flow through MBBR is 4 MGD. Peak daily flow is 7 MGD.
   c. Average design flow through denitrification filter is 2 MGD (i.e. side stream treatment of 50% of the flow)
   d. Subsequent MBBR treatment is needed only for nitrification of the flow (sized for complete nitrification of average flow), not for significant BOD removal (which is achieved by upstream HPO/settling process)
   e. Nitrifying MBBR is assumed to have negligible solids production, commensurate with its function as a nitrifying reactor. Therefore, it is assumed that there is no net solids contribution to flow from MBBR
   f. The solids load to denite filter (downstream of the MBBR) is assumed to be equivalent to settled flow from HPO system, which is acceptable filter influent quality
   g. Chemical phosphorus removal system assumes an influent phosphorus concentration of 8 mg/L. Assumed chemical is alum.
   h. MBBR sized to achieve complete nitrification (< 1 mg NH3-N/L) for a design influent of 20 mg TKN/L
   i. Denitrification filters sized to achieve complete denitrification (< 1 mg NO2/NO3-N/L) on a design influent of 20 mg NH3-N/L
   j. At average flow (4 MGD), BNR system sized to meet an effluent limit of 10 mg TN/L (pending refractory nitrogen fraction)
   k. Additional polishing filters are not needed because updated treatment projections include denitrification filters (change from previous estimates)
   l. No dechlorination required

Lehigh County Authority
Updated Cost Summary for Wastewater Capacity Alternatives

APPENDIX B
UPDATED BREAKDOWN OF PROBABLE CONSTRUCTION COSTS

May 2011

MALCOLM PIRNIE | ARCADIS
The Water Division of ARCADIS

LCA WTP Upgrades: Updated Cost Estimate
Option: Remain Pre-treatment Facility w/ All Flow to Allentown
Updated: 5/2/11

System	Quantity	Unit	Unit Cost	Installation	Item Cost	Comments
WTP Upgrades						
New Primary Settling Tanks						
Excavation/Backfill	2,100	CY	$25		$52,500	Based on 0.16 MG primary settling tank
Sheeting	4,800	SF	$20		$96,000	
Concrete	450	CY	$700		$315,000	Based on 0.16 MG primary settling tank
Equipment						
Collection Equipment	1	LS	$160,930	$40,233	$201,163	Based on equipment quote + 25% installation
Weirs	150	LF	$64	$16	$12,000	Based on quote + 25% installation
Primary Sludge Pumps (Progressing Cavity)	1	LS	$13,963	$3,491	$17,453	Based on equipment quote + 25% installation
Primary Scum Pumps (Progressing Cavity)	1	LS	$10,723	$2,681	$13,404	Based on equipment quote + 25% installation
EQ/Storage Tanks						
2 MG High Strength Storage Tank	2,000,000	Gal	$1.00		$2,000,000	Based on recent FEB project (3MG) & recent Crom quote (1MG)
0.5 MG Hauled Waste EQ Tank	500,000	Gal	$1.40		$700,000	Based on concrete, excavation, and equipment costs
Convert DAFTs for Grease EQ Tank	1	LS	$200,000		$200,000	
Gravity Belt Filter						
New Gravity Belt Filter	1	LS	$180,000	$45,000	$225,000	Based on equipment quote + 25% installation
SUBTOTAL MAIN ESTIMATE (SME)					**$3,830,000**	Sum of main estimate
PERCENTAGE ITEMS						
Civil/Site work	10%	%			$383,000	10% of SME
Piping	20%	%			$766,000	20% of SME
Electrical	20%	%			$766,000	20% of SME
I&C	10%	%			$383,000	10% of SME
SUBTOTAL DIRECT COSTS (SDC)					**$6,130,000**	Sum of SME + percentage items
INDIRECT COSTS						
General Conditions	7%	%			$429,100	7% of SDC
Overhead and Profit	15%	%			$919,500	15% of SDC
Contingency	30%	%			$1,839,000	30% of SDC
TOTAL CONSTRUCTION COSTS (TCC)					**$9,318,000**	SDC + Indirect Costs
Engineering, Legal & Admin	20%	%			$1,863,600	20% of TCC
TOTAL BUDGETARY CAPITAL COST					**$11,182,000**	TCC + Engineering, Legal & Admin

LCA WTP Upgrades: Updated Cost Estimate
Option: Upgrade WTP and Direct Discharge to Jordan Creek
Updated: 5/2/11

System	Quantity	Unit	Unit Cost	Installation	Item Cost	Comments
EFFLUENT PUMP STATION						
Concrete	100	CY	$700		$70,000	
Misc Metals	1	LS	$10,000		$10,000	
Building	300	SF	$500		$150,000	
Low Flow Submersible Pumps w/ VFDs & accessories	2	EA	$30,000	$7,500	$75,000	
Wet Weather Submersible Pumps w/VFDs & accessories	3	EA	$135,000	$33,750	$506,250	
Duplex Sump System	1	EA	$12,000	$3,000	$15,000	
24" dia. Gate Valves	3	EA	$24,000	$6,000	$90,000	
SUBTOTAL MAIN ESTIMATE (SME)					**$920,000**	Sum of main estimate
PERCENTAGE ITEMS						
Civil/Site work	10%	%			$92,000	10% of SME
Piping	20%	%			$184,000	20% of SME
Electrical	20%	%			$184,000	20% of SME
I&C	10%	%			$92,000	10% of SME
SUBTOTAL DIRECT COSTS (SDC)					**$1,470,000**	Sum of SME + percentage items
INDIRECT COSTS						
General Conditions	7%	%			$102,900	7% of SDC
Overhead and Profit	15%	%			$220,500	15% of SDC
Contingency	30%	%			$441,000	30% of SDC
TOTAL CONSTRUCTION COSTS (TCC)					**$2,234,000**	SDC + Indirect Costs
Engineering, Legal & Admin	20%	%			$446,800	20% of TCC
TOTAL PUMP STATION CAPITAL COST					**$2,681,000**	TCC + Engineering, Legal & Admin

FORCEMAIN						
Forcemain (24")	27,400	LF	$336		$9,206,400	$14/inch-dia/lf
Easements for pipelines	27,400	LF	$8.5		$232,900	Based on Allentown Interconnection. Reduced for no GC and O&P.
SUBTOTAL EASEMENTS/LAND COSTS					**$9,440,000**	
INDIRECT COSTS						
General Conditions	7%	%			$660,800	7% of SDC
Overhead and Profit	15%	%			$1,416,000	15% of SDC
Contingency	30%	%			$2,832,000	30% of SDC
TOTAL CONSTRUCTION COSTS (TCC)					**$14,350,000**	
Engineering, Legal & Admin	20%	%			$2,870,000	20% of TCC
TOTAL FORCEMAIN					**$17,220,000**	TCC + Engineering, Legal & Admin

TOTAL BUDGETARY CAPITAL COST					**$19,901,000**	

LCA WTP Upgrades: Updated Cost Estimate
Option: Upgrade WTP and Direct Discharge to Jordan Creek
Updated: 5/2/11

System	Quantity	Unit	Unit Cost		Item Cost	Comments
WTP Upgrades						
New Primary Settling Tanks						
Excavation/Backfill	2,100	CY	$25		$52,500	Based on 0.16 MG primary settling tank
Sheeting	4,800	SF	$20		$96,000	
Concrete	450	CY	$700		$315,000	Based on 0.16 MG primary settling tank
Equipment						
Collection Equipment	1	LS	$160,930	$40,233	$201,163	Based on equipment quote + 25% installation
Weirs	150	LF	$64	$16	$12,000	Based on quote + 25% installation
Primary Sludge Pumps (Progressing Cavity)	1	LS	$13,963	$3,491	$17,453	Based on equipment quote + 25% installation
Primary Scum Pumps (Progressing Cavity)	1	LS	$10,723	$2,681	$13,404	Based on equipment quote + 25% installation
New Secondary Settling Tanks						
Excavation/Backfill	8,500	CY	$25		$212,500	Based on 100ft diam. 14ft SWD secondary settling tank
Sheeting	11,000	SF	$20		$220,000	
Concrete	1,000	CY	$700		$700,000	Based on 100ft diam. 14ft SWD secondary settling tank
Equipment						
Collection Equipment	1	LS	$328,510	$82,128	$410,638	Based on equipment quote + 25% installation
Weirs	320	LF	$64	$16	$25,600	Based on quote + 25% installation
RAS Pumps (Centrifugal)	1	LS	$21,670	$5,417	$27,087	Based on equipment quote and VFD + 25% installation
WAS Pumps (Progressing Cavity)	1	LS	$39,877	$9,969	$49,846	Based on equipment quote and VFD + 25% installation
Basin Drain Pump (Centrifugal)	1	LS	$10,612	$2,653	$13,264	Based on equipment quote + 25% installation
MBBR						
MBBR System (4 MGD)	1	LS	$1,790,000	$447,500	$2,237,500	Based on equipment quote of similar system + 25% installation
Excavation/Backfill	3,700	CY	$25		$92,500	Based on total of 0.4 MG MBBR tank
Sheeting	5,600	SF	$20		$112,000	
MBBR Concrete Tanks	450	CY	$700		$315,000	Based on vendor input for volume of similar system
MBBR Concrete Tank Accessories	1	LS	$50,000		$50,000	
Blowers	3	EA	$75,000	$18,750	$281,250	Based on equipment quote + 25% installation
Denite Filters (2 MGD)						
Filter Media, Equipment, & Carbon Feed System	1	LS	$710,000	$177,500	$887,500	Based on equipment quote of similar system + 25% installation
Excavation/Backfill	1,500	CY	$25		$37,500	Based on volume of filter boxes (14,000 ft3)
Sheeting	2,000	SF	$20		$40,000	
Filter Concrete	280	CY	$700		$196,000	Based on vendor input for volume of similar system
Building for Carbon Feed, Blowers, Pumps, etc.	2,000	SF	$250		$500,000	
Chemical Phosphorus Removal System						
Chemical Storage and Feed Building	500	SF	$250		$125,000	Includes chemical containment
Chemical Storage and Feed Equipment	1	LS	$40,000	$10,000	$50,000	Based on 30,000 gallon tank, 2 feed pumps + 25% installation
EQ/Storage Tanks						
2 MG High Strength Storage Tank	2,000,000	Gal	$1.00		$2,000,000	Based on recent FEB project (3MG) & recent Crom quote (1MG)
0.5 MG Hauled Waste EQ Tank	500,000	Gal	$1.40		$700,000	Based on concrete, excavation, and equipment costs
Convert DAFTs for Grease EQ Tank	1	LS	$200,000		$200,000	
Gravity Belt Filter						
New Gravity Belt Filter	1	LS	$180,000	$45,000	$225,000	Based on equipment quote + 25% installation
Splitter Box						
Excavation/Backfill	450	CY	$25		$11,250	Based on 20'x15'x10'd splitter box
Sheeting	2,650	SF	$20		$53,000	
Concrete	80	CY	$700		$56,000	Based on 20'x15'x10'd splitter box
Equipment						
Automatically Controlled Sluice Gates	3	EA	$134,040	$33,510	$502,650	Based on equipment quote + 25% installation

LCA WTP Upgrades: Updated Cost Estimate
Option: Upgrade WTP and Direct Discharge to Jordan Creek
Updated: 5/2/11

System	Quantity	Unit	Unit Cost		Item Cost	Comments
Disinfection (CCT)						
Excavation/Backfill	1,400	CY	$25		$35,000	Based on 41'x41'x10'swd contact basin baffles (3 passes)
Sheeting	5,000	SF	$20		$100,000	
Concrete	260	CY	$700		$182,000	Based on 41'x41'x10'swd contact basin baffles (3 passes)
Chemical Storage and Feed Building	1,500	SF	$250		$375,000	Based on 1500 SF building to house tanks, pumps, skids
Equipment						
Automatically Controlled Sluice Gates	2	EA	$15,960	$3,990	$39,900	Based on equipment quote + 25% installation
Chemical Feed Equipment and Piping	1	LS	$30,000	$10,000	$40,000	Includes chem feed skids, tanks, pipe fittings and appurtenances
Dechlorination						
Dechlorination System	1	LS	$37,500	$12,500	$50,000	Based on equipment for similar system;No building,No Contact Basin
SUBTOTAL MAIN ESTIMATE (SME)					**$11,860,000**	Sum of main estimate
PERCENTAGE ITEMS						
Civil/Site work	10%	%			$1,186,000	10% of SME
Piping	20%	%			$2,372,000	20% of SME
Electrical	20%	%			$2,372,000	20% of SME
I&C	10%	%			$1,186,000	10% of SME
SUBTOTAL DIRECT COSTS (SDC)					**$18,980,000**	Sum of SME + percentage items
INDIRECT COSTS						
General Conditions	7%	%			$1,328,600	7% of SDC
Overhead and Profit	15%	%			$2,847,000	15% of SDC
Contingency	30%	%			$5,694,000	30% of SDC
TOTAL CONSTRUCTION COSTS (TCC)					**$28,850,000**	SDC + Indirect Costs
Engineering, Legal & Admin	20%	%			$5,770,000	20% of TCC
TOTAL BUDGETARY CAPITAL COST					**$34,620,000**	TCC + Engineering, Legal & Admin

LCA WTP Upgrades: Updated Cost Estimate
Option: Upgrade WTP and Direct Discharge to Lehigh River
Updated: 5/2/11

System	Quantity	Unit	Unit Cost	Installation	Item Cost	Comments
EFFLUENT PUMP STATION						
Concrete	100	CY	$700		$70,000	
Misc Metals	1	LS	$10,000		$10,000	
Building	300	SF	$500		$150,000	
Low Flow Submersible Pumps w/ VFDs & accessories	2	EA	$30,000	$7,500	$75,000	
Wet Weather Submersible Pumps w/VFDs & accessories	3	EA	$135,000	$33,750	$506,250	
Duplex Sump System	1	EA	$12,000	$3,000	$15,000	
24" dia. Gate Valves	3	EA	$24,000	$6,000	$90,000	
SUBTOTAL MAIN ESTIMATE (SME)					**$920,000**	Sum of main estimate
PERCENTAGE ITEMS						
Civil/Site work	10%	%			$92,000	10% of SME
Piping	20%	%			$184,000	20% of SME
Electrical	20%	%			$184,000	20% of SME
I&C	10%	%			$92,000	10% of SME
SUBTOTAL DIRECT COSTS (SDC)					**$1,470,000**	Sum of SME + percentage items
INDIRECT COSTS						
General Conditions	7%	%			$102,900	7% of SDC
Overhead and Profit	15%	%			$220,500	15% of SDC
Contingency	30%	%			$441,000	30% of SDC
TOTAL CONSTRUCTION COSTS (TCC)					**$2,234,000**	SDC + Indirect Costs
Engineering, Legal & Admin	20%	%			$446,800	20% of TCC
TOTAL PUMP STATION CAPITAL COST					**$2,681,000**	TCC + Engineering, Legal & Admin

FORCEMAIN						
Forcemain (30")	68,500	LF	$420		$28,770,000	$14/inch-dia/lf
Easements for pipelines	68,500	LF	$8.5		$582,250	Based on Allentown Interconnection. Reduced for no GC and O&P.
SUBTOTAL EASEMENTS/LAND COSTS					**$29,350,000**	
INDIRECT COSTS						
General Conditions	7%	%			$2,054,500	7% of SDC
Overhead and Profit	15%	%			$4,402,500	15% of SDC
Contingency	30%	%			$8,805,000	30% of SDC
TOTAL CONSTRUCTION COSTS (TCC)					**$44,610,000**	
Engineering, Legal & Admin	20%	%			$8,922,000	20% of TCC
TOTAL FORCEMAIN					**$53,532,000**	TCC + Engineering, Legal & Admin

TOTAL BUDGETARY CAPITAL COST					**$56,213,000**	

LCA WTP Upgrades: Updated Cost Estimate
Option: Upgrade WTP and Direct Discharge to Lehigh River
Updated: 5/2/11

System	Quantity	Unit	Unit Cost	Installation	Item Cost	Comments
WTP Upgrades						
New Primary Settling Tanks						
Excavation/Backfill	2,100	CY	$25		$52,500	Based on 0.16 MG primary settling tank
Sheeting	4,800	SF	$20		$96,000	
Concrete	450	CY	$700		$315,000	Based on 0.16 MG primary settling tank
Equipment						
Collection Equipment	1	LS	$160,930	$40,233	$201,163	Based on equipment quote + 25% installation
Weirs	150	LF	$64	$16	$12,000	Based on quote + 25% installation
Primary Sludge Pumps (Progressing Cavity)	1	LS	$13,963	$3,491	$17,453	Based on equipment quote + 25% installation
Primary Scum Pumps (Progressing Cavity)	1	LS	$10,723	$2,681	$13,404	Based on equipment quote + 25% installation
New Secondary Settling Tanks						
Excavation/Backfill	8,500	CY	$25		$212,500	Based on 100ft diam. 14ft SWD secondary settling tank
Sheeting	11,000	SF	$20		$220,000	
Concrete	1,000	CY	$700		$700,000	Based on 100ft diam. 14ft SWD secondary settling tank
Equipment						
Collection Equipment	1	LS	$328,510	$82,128	$410,638	Based on equipment quote + 25% installation
Weirs	320	LF	$64	$16	$25,600	Based on quote + 25% installation
RAS Pumps (Centrifugal)	1	LS	$21,670	$5,417	$27,087	Based on equipment quote and VFD + 25% installation
WAS Pumps (Progressing Cavity)	1	LS	$39,877	$9,969	$49,846	Based on equipment quote and VFD + 25% installation
Basin Drain Pump (Centrifugal)	1	LS	$10,612	$2,653	$13,264	Based on equipment quote + 25% installation
MBBR						
MBBR System (4 MGD)	1	LS	$1,790,000	$447,500	$2,237,500	Based on equipment quote of similar system + 25% installation
Excavation/Backfill	3,700	CY	$25		$92,500	Based on total of 0.4 MG MBBR tank
Sheeting	5,600	SF	$20		$112,000	
MBBR Concrete Tanks	450	CY	$700		$315,000	Based on vendor input for volume of similar system
MBBR Concrete Tank Accessories	1	LS	$50,000		$50,000	
Equipment						
Blowers	3	EA	$75,000	$18,750	$281,250	Based on equipment quote + 25% installation
Denite Filters (2 MGD)						
Filter Media, Equipment, & Carbon Feed System	1	LS	$710,000	$177,500	$887,500	Based on equipment quote of similar system + 25% installation
Excavation/Backfill	1,500	CY	$25		$37,500	Based on volume of filter boxes (14,000 ft3)
Sheeting	2,000	SF	$20		$40,000	
Filter Concrete	280	CY	$700		$196,000	Based on vendor input for volume of similar system
Building for Carbon Feed, Blowers, Pumps, etc.	2,000	SF	$250		$500,000	
Chemical Phosphorus Removal System						
Chemical Storage and Feed Building	500	SF	$250		$125,000	Includes chemical containment
Chemical Storage and Feed Equipment	1	LS	$40,000	$10,000	$50,000	Based on 30,000 gallon tank, 2 feed pumps + 25% installation
EQ/Storage Tanks						
2 MG High Strength Storage Tank	2,000,000	Gal	$1.00		$2,000,000	Based on recent FEB project (3MG) & recent Crom quote (1MG)
0.5 MG Hauled Waste EQ Tank	500,000	Gal	$1.40		$700,000	Based on concrete, excavation, and equipment costs
Convert DAFTs for Grease EQ Tank	1	LS	$200,000		$200,000	
Gravity Belt Filter						
New Gravity Belt Filter	1	LS	$180,000	$45,000	$225,000	Based on equipment quote + 25% installation
Splitter Box						
Excavation/Backfill	450	CY	$25		$11,250	Based on 20'x15'x10'd splitter box
Sheeting	2,650	SF	$20		$53,000	

LCA WTP Upgrades: Updated Cost Estimate
Option: Upgrade WTP and Direct Discharge to Lehigh River
Updated: 5/2/11

System	Quantity	Unit	Unit Cost	Installation	Item Cost	Comments
Concrete	80	CY	$700		$56,000	Based on 20'x15'x10'd splitter box
Equipment						
Automatically Controlled Sluice Gates	3	EA	$134,040	$33,510	$502,650	Based on equipment quote + 25% installation
Disinfection (CCT)						
Excavation/Backfill	1,400	CY	$25		$35,000	Based on 41'x41'x10'swd contact basin baffles (3 passes)
Sheeting	5,000	SF	$20		$100,000	
Concrete	260	CY	$700		$182,000	Based on 41'x41'x10'swd contact basin baffles (3 passes)
Chemical Storage and Feed Building	1,500	SF	$250		$375,000	Based on 1500 SF building to house tanks, pumps, skids
Equipment						
Automatically Controlled Sluice Gates	2	EA	$15,960	$3,990	$39,900	Based on equipment quote + 25% installation
Chemical Feed Equipment and Piping	1	LS	$40,000		$40,000	Includes chem feed skids, tanks, pipe fittings and appurtenances
SUBTOTAL MAIN ESTIMATE (SME)					**$11,810,000**	Sum of main estimate
PERCENTAGE ITEMS						
Civil/Site work	10%	%			$1,181,000	10% of SME
Piping	20%	%			$2,362,000	20% of SME
Electrical	20%	%			$2,362,000	20% of SME
I&C	10%	%			$1,181,000	10% of SME
SUBTOTAL DIRECT COSTS (SDC)					**$18,900,000**	Sum of SME + percentage items
INDIRECT COSTS						
General Conditions	7%	%			$1,323,000	7% of SDC
Overhead and Profit	15%	%			$2,835,000	15% of SDC
Contingency	30%	%			$5,670,000	30% of SDC
TOTAL CONSTRUCTION COSTS (TCC)					**$28,728,000**	SDC + Indirect Costs
Engineering, Legal & Admin	20%	%			$5,745,600	20% of TCC
TOTAL BUDGETARY CAPITAL COST					**$34,474,000**	TCC + Engineering, Legal & Admin

LCA DWF Analysis

10.7 MGD Option

Pipe Size	Length (ft.)	Unit Price	Cost
12"	1,500	$ 125.00	$ 187,500.00
15"	450	$ 145.00	$ 65,250.00
30"	4,032	$ 260.00	$ 1,048,320.00
36"	12,985	$ 310.00	$ 4,025,350.00
	18,967		**$ 5,326,420.00**

14.7 MGD Option

Pipe Size	Length (ft.)		
12"	1,500	$ 125.00	$ 187,500.00
18"	450	$ 165.00	$ 74,250.00
21"	7,467	$ 195.00	$ 1,456,065.00
24"	1,497	$ 220.00	$ 329,340.00
30"	5,616	$ 260.00	$ 1,460,160.00
36"	39	$ 310.00	$ 12,090.00
42"	14,530	$ 365.00	$ 5,303,450.00
	31,099		**$ 8,822,855.00**

Cost assumptions:

1. Pipes are PVC
2. 12' deep
3. Not in pavement installation
4. Direct remove and replace using the same trench

LCA WTP Upgrades: Updated Cost Estimate
Option: Additional Conveyance Costs
Updated: 2/24/11

System	Quantity	Unit	Unit Cost	Item Cost
ADDITIONAL CONVEYANCE COSTS				
Sewer Piping to KIWWTP				
Sewer Replacement	1	LS	$3,496,435	$3,496,435
SUBTOTAL DIRECT COSTS (SDC)				**$3,500,000**
		0		
INDIRECT COSTS				
General Conditions	7%	%		$245,000
Overhead and Profit	15%	%		$525,000
Contingency	30%	%		$1,050,000
TOTAL CONSTRUCTION COSTS (TCC)				**$5,320,000**
Engineering, Legal & Admin	20%	%		$1,064,000
TOTAL BUDGETARY CAPITAL COST (Year 2010)				**$6,400,000**