LEHIGH COUNTY AUTHORITY

December 7, 2011

BOARD MEETING AGENDA

1. Call to Order
2. Review of Agenda
   - *Public Participation Sign-In Request*
3. Executive Sessions
4. Approval of Minutes
   - *October 24, 2011 Regular Meeting Minutes*
   - *November 14, 2011 Workshop Meeting Minutes*
5. Public Comments
6. Action / Discussion Items

FINANCE AND ADMINISTRATION

- *Preliminary 2012 Budget (Approval)*

WATER

- *Arcadia West Pumping Station Modifications (Approval)*

WASTEWATER

- *Park Pump Station Improvements – Comminutor Replacement (Approval)*
- *Wastewater Treatment Capacity Option Life Cycle Costs*

7. System Operations Overview
8. Staff Comments
9. Solicitor's Comments
10. Other Comments
11. Adjournment

JANUARY MEETINGS

Workshop Meeting – January 9 – 1:30 p.m.
Board Meeting – January 23 – 12:00 p.m.

PUBLIC PARTICIPATION POLICY

In accordance with Authority policy, members of the public shall record their name, address, and discussion item on the sign-in sheet at the start of each meeting; this information shall also be stated when addressing the meeting. Members of the public will be allowed 5 minutes to make comments/ask questions regarding non-agenda items, but time may be extended at the discretion of the Chair; comments/questions regarding agenda items may be addressed after the presentation of the agenda item. Members of the public may not request that specific items or language be included in the meeting minutes.

REGULAR MEETING MINUTES
October 24, 2011

The Regular Meeting of the Lehigh County Authority was called to order at 12:17 p.m. on Monday, October 24, 2011, Chairman Asa Hughes presiding. Other Members present at the commencement of the meeting were: Thomas Muller, Richard Bohner, Brian Nagle, Emrich Stellar, Scott Bieber, and Norma Cusick. Authority Staff present were: Aurel Arndt, Bradford Landon, Pat Mandes, Frank Leist, Douglas Young, Joseph McMahon, Liesel Adam, and Cristin Keppel.

Member of the public, Jeanine Bauer was also in attendance.

REVIEW OF AGENDA

Mr. Arndt noted that Item 1 regarding the Personnel Study Consultant Selection will be discussed at the November Workshop because a recommendation cannot be made at this time. He also stated there were 2 additional information items that will be discussed following the regular agenda items.

EXECUTIVE SESSION

Mr. Arndt stated there would be no executive sessions.

APPROVAL OF MINUTES

September 19, 2011 Regular Meeting Minutes

On a motion by Mr. Bohner, seconded by Mr. Muller, the Board unanimously approved the minutes of the September 19, 2011 Regular Meeting, as amended (7-0).

PUBLIC COMMENTS

None.

ACTION AND DISCUSSION ITEMS

2012-21 Capital Plan (Plan) (Approval)

Mr. Arndt stated that no additional changes have been made to the Plan since the initial presentation at the September meeting. He also noted that Lehigh Valley Planning Commission and Lehigh County commissioners have reviewed and commented on the Plan; therefore, approval of the Plan is now requested.

On a motion by Mr. Bohner, seconded by Mr. Nagle, the Board unanimously approved a Budget Amendment for Actuarial Services in the amount of $4,150 (5-0).

2012 Budget Assumptions

Mr. Young addressed the budget assumptions via the attached listing including in the Board Agenda. He highlighted that a more conservative budget is being drafted because growth has flattened in the Authority service area since 2008. Extensive discussion followed as Mr. Young addressed various questions of all Board members to clarify the reasoning behind the assumptions. He noted that Staff members are currently working on the preliminary budget.

Oakland Park Main Replacement

Mr. Bohner asked for clarification regarding Water Information item #2.

Mr. Leist explained that in accordance with changes in regulations that became effective in 2011, any project that disturbs more than 0.96 acres during construction is required to obtain a NPDES permit. The section of water main along Highland Court in the Clearview Manor development being added to

the project is not contiguous to Oakland Park and therefore less than 0.96 acres, so it will not need to be included in any NPDES permit submittals.

Boston Beer Company Agreement *(Approval)*

Ms. Mandes referred to the attached presentation regarding the final *Amendment No. 1 to Wastewater Capacity and Treatment Agreement* with Boston Beer Company for the Samuel Adams brewery. This agreement is an amendment to the Diageo Agreement, which Boston Beer Company assumed when they purchased the property from Diageo. The amendment provides a new method for generating Boston Beer's annual rates. The annual rate will be adjusted to cover the LCA Pretreatment Plant expenses during the year plus 8% coverage including a Working Capital Reserve as calculated by a model. Ms. Mandes provided financial details via the presentation. Discussion followed.

On a motion from Mr. Stellar, seconded by Mr. Muller, the Board unanimously approved the Boston Beer Company amendment and authorized the General Manager to sign all documents necessary to execute the agreement (7-0).

2012 Western Lehigh Interceptor (WLI) User Fee Report

Ms. Mandes explained that this is the annual report that explains the derivation of the various billing rates that are charged to the users of the Western Lehigh Interceptor, Little Lehigh Relief Interceptor Phase 1, and Little Lehigh Relief Interceptor Phase 2. She stated that charges to an average residential user will increase by 0.9%. This is primarily due to costs associated with the I&I Program, including the SCARP and hydraulic modeling. Ms. Mandes noted that $150,000 of reserves have been included in the rates to offset future increased debt service costs. She noted that these rates were distributed to the Signatories for review and approval of the rates will be sought in conjunction with the 2012 Budget in December.

LCA WTP Truck Waste Receiving Station & Digester Mixer Replacement *(Approval)*

Mr. Leist explained that the Authority retained CET Engineering, Inc. to undertake a WTP Energy Audit/Bioenergy Recovery Evaluation Study ("Study"), and a presentation of the findings was made at the August Board meeting. Phase 2 of the study looked at energy efficiency / conservation & biogas production. He noted that the recommendations called for construction of a Truck Waste Receiving Station to allow the introduction of high strength liquid waste directly into the digesters which will increase biogas production by an estimated 114 cfm (cubic foot per minute) and reduce the amount of high purity oxygen utilized in treating such waste resulting in an estimated annual electrical power savings of about $150,000. Mr. Leist also stated that the recommendations called for replacing the current inefficient mixing systems in the two primary digesters which will increase biogas production by an estimated 31cfm, reduce the amount of solids, thereby resulting in an estimated annual land application disposal cost savings of about $65,900, and provide estimated annual electric power savings of about $10,400. Mr. Leist also noted that given the estimated operational savings from this project, the relatively short payback period for the required investment and the impact on additional biogas production that is necessary for the future CHP project, he recommended moving forward as soon as possible and hiring CET to perform the related engineering services.

Ms. Mandes noted that the digester mixers at the WTP needed to be replaced regardless of this project; however, now there is added benefit to doing so in conjunction with the Energy Efficiency upgrades.

On a motion from Scott Bieber, seconded by Norma Cusick, the Board unanimously approved a Capital Project Authorization in the amount of $215,000 which included Professional Services Authorization for CET Engineering in the amount of, $137,000 Inc. (7-0).

Signatory I & I Investigation and Remediation – 2011-2012 Program Management *(Approval)*

Ms. Mandes explained that a Professional Services Authorization and Capital Project Amendment are needed for Malcolm Pirnie for Program Management work related to the I & I SCARP Program. She noted there was extra work needed in 2011 for an additional DEP memorandum related to the SCARP. She explained this authorization is a combination of those additional funds for 2011 and for continued services in 2012.

On a motion from Mr. Bieber, seconded by Mr. Nagle, the Board unanimously approved the Capital Project Authorization Amendment and Professional Services Authorization for Malcolm Pirnie, Inc. in the amount of $50,000; added to the prior authorizations ($2,883,031), updating the total project to $2,933,031 (7-0).

Park Pump Station Upgrades *(Approval)*

Mr. Leist explained that Capital Works staff has solicited five engineering firms to design, permit and bid two portions of the upgrades necessary at the Park Pump Station; four proposals were received. He noted that the existing hydraulic activated comminutor is to be replaced with a new, electric comminutor.

On a motion from Mr. Muller, seconded by Mr. Bohner, the Board unanimously approved the Capital Project Authorization in the amount of $10,100, which included a Professional Services Authorization for RETTEW Associates in the amount of $5,084, for the Park Pump Station Comminutor replacement (7-0).

Mr. Leist continued by explaining that the previous underground 8,000 gallon fuel storage tank will be replaced with an above-ground unit and screening wall. Mr. Leist noted that although Barry Isett and Associates was not the lowest bidder, their familiarity with the Authority and their extensive contacts with the City of Allentown will be beneficial for project completion. Some discussion followed.

On a motion from Mr. Muller, seconded by Mr. Bohner, the Board approved the Professional Services authorization in the amount of $13,428 for Barry Isett and Associates for the Park Pump Station Fuel Tank Replacement (5-2). Messrs. Nagle and Hughes expressed concern about using Barry Isett because they were the second lowest proposal.

On a motion from Mr. Bohner, seconded by Mr. Muller, the Board unanimously approved the Capital Project Authorization for the Park Pump Station Fuel Tank Replacement project in the amount of $26,500 (7-0).

Western Lehigh Interceptor (WLI) Physical Condition Assessment *(Approval)*

Ms. Mandes requested approval for a physical condition assessment of the Swabia Creek (Alburtis/Macungie) branch of the WLI from manhole LCA-90 to LCA-182. The assessment will include CCTV inspection, report of the findings, recommended follow-up actions and a meeting to review the findings. She stated that the Physical Condition Assessment Program began in 2004; and to date, approximately 58,000 linear feet of the WLI has been completed and additional sections of the WLI will be completed in the future. Ms. Mandes stated that it is important for the Authority to inspect the WLI sewers as part of the I&I SCARP program in order to make any corrections that may be causing extraneous flows into the system. She also added that the use of the Authority TV Truck and availability of Operations technicians are being evaluated to determine if the CCTV work can be done in house rather than paying an outside source.

On a motion from Mr. Bohner, seconded by Ms. Cusick, the Board unanimously approved the Professional Services Authorization for Malcolm Pirnie, Inc. not to exceed $85,000 for the WLI Physical Condition Assessment (7-0).

SYSTEM OPERATIONS OVERVIEW

No comments.

STAFF COMMENTS

Debt Refinancing

Mr. Arndt notified Board members that the Authority is currently evaluating the refinancing of $2.3 million worth of existing PENNVEST funding and looking to finance up to $2.6 million of new money for Capital Projects. He stated that bids will be taken on November 10, 2011.

November Meeting Changes

With bids coming in on November 10th, Mr. Arndt asked if the November Workshop meeting could be moved to November 14th instead of November 7th; he also then requested the move of the Regular Meeting to November 30th.

This was acceptable to all Board members.

Mr. Arndt stated a public notice would be issued regarding the changes.

SOLICITOR'S COMMENTS

None.

OTHER COMMENTS

Northern Lehigh Wastewater System

Mr. Beiber asked for clarification on Wastewater information item 5, regarding Wal-Mart and KidsPeace.

Mr. Arndt explained that Wal-Mart's timeline has changed and they would like the Authority to assume responsibility for the design, permitting and construction of the wastewater facilities because the Authority is under different requirements and guidelines for these processes; which it is anticipated will proceed more expeditiously. He noted the staff believes that the cost to the Authority will remain roughly the same as the agreement is negotiated. Mr. Arndt then explained the changed circumstances in the original KidsPeace agreement are because KidsPeace sold land to Lehigh Carbon Community College that had originally been proposed as a housing development, and the timeline for construction has changed. He noted that the execution of purchase and major agreement terms are not anticipated to change substantially.

EXECUTIVE SESSION

There were no executive sessions.

ADJOURNMENT

There being no further business, the Chairman adjourned the meeting at 2:43 p.m.

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Richard H. Bohner
Secretary

WORKSHOP MEETING MINUTES
November 14, 2011

The Workshop Meeting of the Lehigh County Authority was called to order at 12:23 p.m., on Monday, November 14, 2011, Chairman Asa Hughes presiding. Other Members present at the commencement of the meeting were: Thomas Muller, Brian Nagle, Emrich Stellar, Norma Cusick, and Richard Bohner. Authority Staff present were: Aurel Arndt, Doug Young, Bradford Landon, Frank Leist, Patricia Mandes, Liesel Adam, Joseph McMahon, and Cristin Garger.

Also in attendance were Michael Gaul from King, Spry, Herman, Freund & Faul LLC; Christopher Gibbons from Concord Public Financial Advisors, Inc. (Concord); and Gary Birks from Senator Pat Browne's office.

Agenda Review

Mr. Arndt stated there were four additional items for discussion following the regular agenda, one of which will be discussed in Executive Session.

Water/Wastewater Financing *(Approval)*

Mr. Arndt referred to the attached presentation regarding refinancing of some of the existing PennVEST loans and obtaining new funds for the Vera Cruz Sewer Project. He explained that the Authority worked with Concord and took bids for three separate loans from banks, rather than a traditional bond issue because the lower issuance costs and low interest rates are more favorable at the current time. Mr. Arndt explained that the loans are separated because the collateral backing the respective loans are from different Authority revenue streams and systems. He also stated that the final amounts of the loans are suspected to be lower than the requested amounts. Mr. Arndt noted that Pennsylvania Infrastructure Investment Authority (PennVEST) approval is needed before the Authority can officially refinance exisiting loans from them; however, that process has already started and approvals are expected shortly; also both PennVEST and PennWorks need to approve allowing the new debt to have a priority or parity lien on the respective Authority revenues.

Mr. Gibbons distributed the bank loan bid report for all three loans and explained that the Authority's AA bond rating made for a favorable reception of proposals, stating that the Authority had many more bids than usual. He referred to the presentation, explaining the bids received for refinancing an outstandinding water loan and refinancing/new funding via the Sewer A Bonds and Sewer B Bonds.

Atty. Gaul stated that Resolutions 11-2011-1, 2, and 3 are in line with other Authority and industry financing resolutions and do not allow for major changes to occur without Board approval. Extensive discussion followed.

On a motion from Mr. Stellar, seconded by Mr. Bohner, the Board unanimously approved Resolutions 11-2011-1, 11-2011-2, and 11-2011-3, authorizing the award and issuance of the recommended loans and authorizing the appropriate officers and staff to execute the necessary documents affiliated with each loan (6-0).

Personnel Study *(Approval)*

Mr. Young stated the Authority received three proposals for the Personnel Study and referred to the previously distributed memorandum for details regarding each firm's submission. He explained that although Pinnacle Consulting has a lower cost proposal, the Authority recommends contracting with Fox Lawson based on their greater experience, significant salary database, positive references, and

ability to respond to all items under the scope of work. Mr. Young recommended selecting the $28,500 option in their proposal which eliminates a salary survey but builds the classification plan from using their database resource and other surveys such as AWWA, and adjusting that data to our region.

Mr. Nagle asked how current does Fox Lawson keep their database of salary surveys.

Mr. Young stated that it is updated on a yearly basis.

Ms. Cusick inquired about the last time the survey was done and if other local entities are involved.

Mr. Young explained that the last study was performed in 2006 and usually recurs every five years. He noted that other municipalities, counties, authorities, and some private engineering firms are called for information as well. Mr. Young stated the study results will be presented in March 2012 to guide salary and benefit changes that would normally take effect in April.

On a motion from Mr. Muller, seconded by Ms. Cusick, the Board unanimously approved contracting with Fox Lawson and Associates for the Authority's Personnel Study in the amount of $28,500 and authorizing the appropriate staff members to execute and attest on necessary documents (6-0).

Third Quarter Unaudited Financial Statements (Statements) *(Acceptance)*

Mr. Young distributed updated copies of the Statements, noting there was a significant error regarding depreciation. He noted that water revenues are still relatively flat because of the significant reduction in Capital Recovery Fees due to lack of growth because of the economy. Mr. Young also stated the wastewater amounts are estimated because the Authority has still not been billed for the services provided by the City of Allentown Wastewater Treatment Plant. Some discussion followed.

On a motion from Ms. Cusick, seconded by Mr. Stellar, the Board unanimously accepted the 2011 Third Quarter Unaudited Financial Statements (6-0).

Operations Update – Response to October 29, 2011 Inclement Weather

Mr. McMahon stated that one foreman was called in during the snowstorm both Saturday and Sunday. He noted that the Authority Operations Center lost power until late Monday afternoon; therefore, restoring power in portions of the Operations Center, such as the Computer Room, took priority in order to maintain communication with all systems. Mr. McMahon also noted that some smaller systems lost power temporarily as well and proper notifications were issued by Customer Care; most of the larger systems have generators at their respective well stations. He added that research is being done on obtaining a generator large enough to power the entire Operations Center.

Madison Park System

Ms. Adam explained that the Authority acquired the Madison Park system in Lynn Township in 2010. She noted that this system did not have meters; therefore, bills were estimated from previous usage until meter installation. Ms. Adam stated that meters have now been installed and the data shows that customers were overcharged slightly and the Authority will be issuing refunds to about 50 customers totaling ~$1,900. The Authority will not be going back and charging additional fees to customers who used more water than that for which they were billed.

Strategic Planning

Mr. Arndt referred to a previously distributed memorandum regarding the Authority Strategic Plan update. He noted the last update occurred in 2007, and he has been gathering comments and ideas from employees and management staff for the past few months regarding possible changes. Mr. Arndt explained that feedback from the Authority Board is an integral part of the update and any ideas/issues stemming from the current Plan are greatly appreciated. Extensive discussion followed.

Executive Session

The Chairman called for an Executive Session at 2:28 p.m. to discuss personnel.

The session ended at 3:12 p.m.

There being no further business, the Chairman adjourned the meeting at 3:13 p.m.

Richard H. Bohner
Secretary

FINANCE & ADMINISTRATION

ACTION ITEMS

1. ***2012 Budget*** *(Approval)*

   The 2012 Preliminary Budget is included for review and approval. A presentation will be made at the meeting to review the major components of the Budget.

DISCUSSION ITEMS

1. ***None.***

INFORMATION ITEMS

1. ***Recently Purchased Investments – Certificates of Deposit (CDs)***

Fund	Bank	Location	Gross Amount	Date of Purchase	Date Due	Net Rate %
WW Capac	PSDLAF Collatoralized CD		660,000.00	10/27/11	1/24/12	0.210
Cons Wtr (2)	Doral Bank	San Juan, Pr	245,000.00	11/3/11	5/3/13	0.700
Cons Wtr (2)	Medallion Bank	Salt lake City, UT	245,000.00	11/3/11	5/3/13	0.750
Cons Wtr (2)	The Bank of Holland	Holland, Mi	99,000.00	11/9/11	2/11/13	0.350
WW Capac	The Bank of Northern Michigan	Petosky, Mi	240,000.00	11/16/11	2/11/13	0.350
Cons LL2 (314)	Sterling Savings Bank	Spokane, Wa	95,000.00	11/16/11	11/16/12	0.300
WW Capac	Barclays Bank	Wilmington, De	240,000.00	11/23/11	5/23/13	0.550
Cons Wtr (2)	Sallie Mae Bank	Murray, Ut	198,000.00	11/23/11	11/23/12	0.450
WW Capac	BMW Bank	Salt Lake City, Ut	99,000.00	11/30/11	5/30/13	0.800

Fund Descriptions for Investments:

WW Capac	Wastewater Capacity
Cons Wtr (2)	Consolidated Water 2
Cons LL2	Consolidated Little Lehigh Relief Interceptor 2

2. ***2012 Workshop and Board Meeting Schedule***

   The tentative 2012 Board meeting schedule is attached for review ***(pink)***.

3. ***Information Technology Master Plan (ITMP)***

   The ITMP is its final stages as our consultant EMA has completed an assessment of LCA's current IT status, developed a list of high level needs and developed a draft prioritized projects list to address those needs.

4. ***SCADA Upgrade***

   The SCADA Communications Study completion is expected before the end of the year. This project's objective is to evaluate the overall communication of the heart of LCA's operations - the SCADA (Supervisory Control and Data Acquisition) and Telog Systems and determine an effective future plan to update and upgrade the systems as necessary to increase effective observation and control of our varied water and wastewater systems. Controls systems with automation are tools to keeps labors costs under control while increasing operational efficiency and reducing operational risks. This study will evaluate and determine our path to meeting the following FCC rule: "On January 1, 2013, all public safety and business industrial land mobile radio systems operating in the 150-512 MHz radio bands must cease operating using 25 kHz efficiency technology, and begin operating using at least 12.5 kHz efficiency technology."

WATER

ACTION ITEMS

1. ***Arcadia West Pumping Station Modifications***

Eight firms submitted proposals on October 18 for design, permitting and construction-related engineering services for improvements to the pumping station. We have evaluated the proposals and intend to recommend T&M Associates to perform these services pending a satisfactory reference check. A Capital Project Authorization and Professional Services Authorization is included for approval ***(yellow)***. A project kickoff meeting will be scheduled following Board approval. *The attachments referred to in the Professional Services Authorization are available upon request for your review.*

DISCUSSION ITEMS

1. ***None.***

INFORMATION ITEMS

1. ***Interconnection with Allentown***

Phase 2 - Connection to City Transmission System at 26th and Chew Streets – Livengood is working in the Lehigh County park west of Cedar Crest Boulevard. He is planning to complete the bored crossings under Rt. 309 and Cedar Crest Boulevard by the end of the year. When those areas are completed, he will remobilize to the eastern end of the project, make the connection to the City water system, and begin working west. Work in Chew Street and Ott Street near Muhlenberg College will occur during the college's Christmas break.

A second pipelaying crew will likely begin work in West Walnut Street (South Whitehall Township) in early 2012.

The contractor has been very responsive to notices from the Lehigh County Conservation District regarding non-compliance with the approved E&S Plan in the Cedar Creek Parkway West. Soil had been disturbed outside the NPDES permit limits; this was caused by the extremely wet conditions since early September. E&S controls have been re-established, and we have submitted an application to modify the NPDES permit boundary.

Although the City of Allentown has not yet signed easement agreements, we are working with the City Public Works staff to occupy the easement areas, since they have been approved by the City Solicitor's office.

2. ***Water Main Replacement Project 2011 – Oakland Park (UMT)***

Due to changes in the NPDES permit requirements effective as of 2011, this project will require that we complete an E&S plan for review by the Lehigh County Conservation District. Since a NPDES permit is required we anticipate a spring 2012 start date.

We are adding to the project a section of water main along Highland Court in the Clearview Manor development in LMT. This 845' section has experienced 3 main breaks in the last year and a half. Prices for survey work have been solicited and survey work for this area is expected to begin in September. As this area is not contiguous with the rest of the project, it will not need to be included in any NPDES permit submittals.

3. ***Water Main Relocation Project – Slatedale***

Our water facilities on West Grant Street were successfully relocated in June. Work on Main Street has been scheduled for 2012. Our exposure, by PennDOT Agreement, is about $25,000.

4. ***Water Meter Replacement Project***

Phase 2 - TSE, Inc. has replaced 1,618 out of 3,300 aging meters, radio-read units and backflow preventers through November 22. Customer complaints have dropped since our meeting with TSE to discuss scheduling. TSE has also been doing a better job with data submission, but QC lists must be addressed. A response was made on November 18 to TSE's attorney regarding a fair price for ball valve installations and a return visit charge, and in classifying installations when an existing backflow preventer is present. Substantial completion is scheduled for April 20, 2012.

5. ***Developments***

Water system construction is occurring at the following developments:

Trexler Fields, Phases 2/3/7, 38 residential lot, UMT
Trexlertown Shopping Center, 1 commercial lot, LMT/UMT (The improvements will serve a Giant Food Store.)
Valley West Estates, Phases 4, 5 & 6, 46 residential lots (sfd), UMT *(There has not been any construction activity at this development in over a year.)*

Water system plans are being reviewed for the following developments:

Above & Beyond (personal care facility), 2 commercial lots, UMT
Diocesan Pastoral Center, 2 commercial lots, 3 additional lots, & residual lot for existing cemetery, LMT
Hamilton Crossings, 3 commercial lots, LMT
Hickory Park Estates, 3 residential lots (sfd), UMT
Hillview Farms, 31 residential lots (sfd), LMT/SWT
Indian Creek Industrial Park, 6 commercial lots, UMilT, water and sewer
Lehigh Hills, 247 residential lots (sfa/sfd), UMT
Morgan Hills, 40 residential lots (sfd), Water & Sewer, WeisT
North Whitehall Commercial Center (Walmart), 5 commercial lots, NWT, water and sewer
Rabenold Farms, 205 residential lots (sfd), (Portion south of I-78), UMT
Rabenold Farms II, 288 apartment units and clubhouse, (Portion north of I-78), UMT
Red Maple Acres Expansion, 29 units, LMT
Shepherd's Corner, 1 commercial lot, LMT
Spring Creek Properties Subdivision 1, 14 commercial and industrial lots, LMT
Trexler Business Center, Lot 1, 1 commercial building, LMT
Trexler Senior Living Center, 2 commercial lots, LMT *(In bankruptcy)*
Weilers Road Twins, 82 residential lots (sfa), UMT
West Hills Business Center, 8 industrial lots, WeisT
Woodmere Estates, 60 residential units (sfd), UMT

WASTEWATER

ACTION ITEMS

1. ***Park Pump Station Improvements – Comminutor Replacement***

   Bid advertisement for the procurement of the comminutor was listed on October 30, 2011. Proposals are anticipated on November 14, with Board action to award the contracts expected at the November 30 meeting. Action will also amend the project authorization and professional services contract to authorize construction phase services for shop drawing approvals ***(purple)***.

DISCUSSION ITEMS

1. ***Wastewater Treatment Capacity Option Life Cycle Costs***

   The final life cycle costs for the four wastewater capacity options will be presented to the Board. The costs were calculated by the respective consultants for LCA and the City. The cost memos were reviewed, discussed at a meeting held with the City and their Engineer and subsequently revised. The Options Analysis will also be presented to the Board for review ***(green)***. The Steering Committee and the WLI Advisory Committee provided feed-back for the various non-monetary factors.

INFORMATION ITEMS

Vera Cruz Area Sewer Project

Work continues, with directional boring activity nearly completed in Main Road East. The official "Notice to Connect" for Milestone #1 Area went out October 27. Final paving in completed portions of the project area, is anticipated for spring of 2012. Substantial Completion and Final Completion are presently January 29, 2012 and March 29, 2012, respectively.

2. ***Infiltration and Inflow (I&I) Program Update***

   Malcolm Pirnie has provided a draft report on the SSES Activities Data Analysis which shows the catchments for CCTV work and dye testing. After review, the LCA Signatories will be notified of the work required. The Optimization Study results are expected soon.

3. ***Wastewater Treatment Capacity***

   A steering Committee meeting was held on October 14th for the purpose of educating the committee on the Infiltration and Inflow issues within the City and LCA systems. A presentation was given on the LCA SCARP program.

   The final Steering Committee meeting was held on October 28th. The final high level capital and life cycle costs for each of the four options were presented. The group provided input on the non-monetary issues related to the four Capacity Options.

   Members from the LCA staff visited DEP on October 31st to discuss our intentions for the 537 Planning Study process. LCA plans on approaching the City to see if they would like to work together on completing the 537 plan. An RFP will be issued in the near future for the Planning efforts either as a combined effort or on our own.

   Talks with Coplay-Whitehall Sewer Authority and Salisbury Townships may result in the sale and/or lease of allocation. An offer was presented to Salisbury for consideration.

4. *Arcadia West Wastewater Treatment Plant Upgrade*

Bids were received on March 17 for the General Construction, Electrical Construction and Mechanical and Plumbing Construction contracts. After many discussions with PaDEP and PennVEST staff on the acceptability of the "or equal" provisions of the bid documents continue, we cannot change their interpretation that we would lose the PennVEST loan offer if we awarded the contracts based on those bids. A schedule will be developed after a meeting with PaDEP in early December.

5. *Northern Lehigh Wastewater System*

The project is proceeding in a number of areas:

Wastewater Treatment Plant (on a 5 acre tract at Kids Peace)

1. A Special Exception must be granted by the Zoning Hearing Board for the proposed property use. The hearing before the Zoning Hearing Board began on May 18, was continued on June 22, July 7 and September 13 but was not completed. The hearing will resume on December 1, 2011.

The total cost of the WTP including soft costs and Kids-Peace acquisition costs is estimated at $4.69 million.

Offsite Conveyance Facilities (OSCF)

1. Wal-Mart's has stopped design of the necessary conveyance facilities, which includes gravity sewers, a pump station and force main to deliver the wastewater from their proposed development and other future wastewater customers to the wastewater treatment facilities until a cost sharing agreement is reached with LCA. Wal-Mart has proposed that LCA assume the responsibility of designing, permitting and constructing the OSCF, which is a change from the previous plan where Wal-Mart had the responsibility. A cost-sharing agreement is still being negotiated with Wal-Mart.

   The construction cost of the conveyance facilities is estimated at $1.354 million.

2. An amendment to the agreement with KidsPeace is being negotiated to reflect the changed circumstances since the original agreement was signed in 2006. A recent meeting has indicated that KidsPeace is unwilling to entertain any changes to the original agreement that would decrease compensation or increase ongoing costs.

6. *Park Pump Station Improvements*

Comminutor Replacement –A kick off meeting was held on October 31, to review schedules and actions necessary to complete both the procurement and construction phases of this project. The project is currently on schedule.

Fuel Tank Replacement – A kick off meeting was held on October 28, 2011 to review schedules and actions to complete this project in accordance to the authorized schedule.

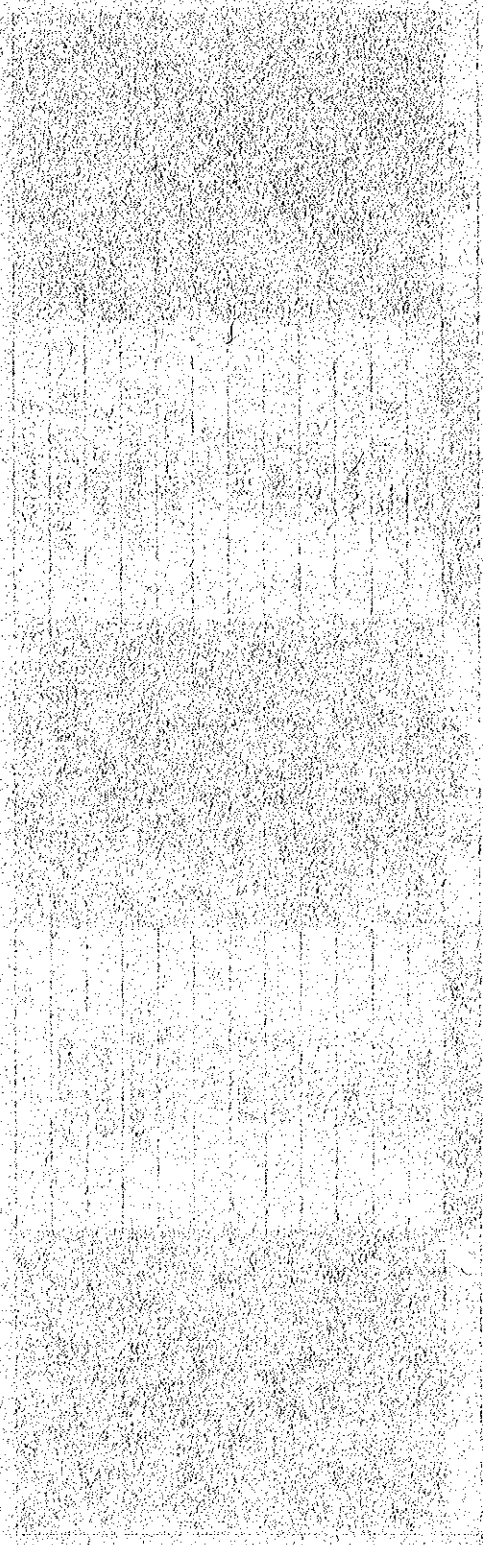
6. *LCA WTP- Truck Waste Receiving Station & Digester Mixer Replacement*

The project is underway; a design review meeting is scheduled for December 9, 2011. The current schedule anticipates completion of the aforementioned improvements in the last quarter of 2012.

December 1, 2011

2012 SCHEDULE (Tentative)

Month	Staff	Workshop Deadline	Workshop	Board Meeting	Board
January	[redacted]	January 3	[redacted]	January 16	[redacted]
February	[redacted]	February 6	[redacted]	February 20	[redacted]
March	[redacted]	March 5	[redacted]	March 19	[redacted]
April	[redacted]	April 2	[redacted]	April 16	[redacted]
May	[redacted]	April 30	[redacted]	May 14	[redacted]
June	[redacted]	May 28	[redacted]	June 11	[redacted]
July	[redacted]	July 2	[redacted]	July 16	[redacted]
August	[redacted]	August 6	[redacted]	August 20	[redacted]
September	[redacted]	September 3	[redacted]	September 17	[redacted]
October	[redacted]	October 1	[redacted]	October 15	[redacted]
November	[redacted]	November 5	[redacted]	November 19	[redacted]
December	[redacted]		[redacted]	December 3	[redacted]



MEMORANDUM

Date: November 29, 2011

To: Authority Board
From: Edward Hoyle, Frank Leist
Subject: Arcadia West Pumping Station Modifications & Community Water System Permitting Project
Design Phase - Capital Project and Professional Services Authorizations

MOTIONS / APPROVALS REQUESTED:

No.	Item	Amount
1	Capital Project Authorization - Design Phase	$139,440
2	Professional Services Authorization - T&M Associates (1)	$72,940

(1) Included in the Capital Project Authorization.

PROJECT OVERVIEW: The project includes re-piping the Arcadia West Pumping Station in Weisenberg Township, Lehigh County, installing larger distribution pumps with variable frequency drives (VFD), an emergency power generator, metering, SCADA control, corrosion control, a redundant fire pump, minor building expansion (if required), paving, and a pump in well PW-1. Any electrical deficiencies and code violations are to be addressed by the design. The station is to maintain service during construction.

Department of Environmental Protection (DEP) standards will be used to determine whether the size of the existing water storage tank has adequate capacity for future fire flows and domestic demands. The storage tank, if of adequate size, and the well supply lines will be inspected for deterioration to determine if they must be rehabilitated or replaced. A public water supply permit application will be made to permit the system as a Community Water System. Additional testing to permit PW-1 and the system as a Community Water System may be required. Only source sampling for PW-1 is included in the current authorization. DEP has indicated in phone conversations that SWIP testing will not be required, and existing wellhead protection zones are grandfathered. We do not anticipate that the township will require land development plans if a minor building expansion is required or for proposed paving. We will negotiate a fee with the design firm should land development plans become necessary. We will also seek to mitigate the impact of Act 167 requirements (if applicable) for storm water infiltration in the design.

The proposed improvements will provide increased reliability of fire protection, service to proposed developments, increased pumping efficiency, increased security, full SCADA control and will address corrosion in the station caused by well water having a low pH.

The system is currently classified as a non-transient, non-community public water supply and has been assigned a Pennsylvania Water Supply Identification number (PWSID) of 3391001. LCA currently operates the system under a Brief Description Form (BDF), which limits the number of residential connections to 15 and/or population served to 25. There are two active wells (PW-2 @ 95 GPM and PW-3 @ 89 GPM) near I-78 that supply the system. A third well (PW-1 @ 17

GPM)) is a relatively low producing well that the previous owners did not put into the system and is held in reserve. Raw water is conveyed through a 6" line approximately 1,400' long to a 250,000 gallon above-ground bolted steel storage tank. Water is chlorinated before it enters the tank. The pump station provides both domestic and fire protection to the system through 8" and 12" ductile iron pipe. The domestic pumps have emergency power backup. A diesel engine runs the fire pump. Pressures in the system range between 150 and 170 PSI.

LCA entered into a Water Service Agreement with Weisenberg Township on January 13, 2003. This service area will be used as the basis of design for future improvements. This service area differs from that described in the BDF and Delaware River Basin Commission (DRBC) docket, which limit the service area to the Arcadia West Industrial Park. This discrepancy will be addressed during the permitting process.

Lehigh County Authority (LCA) intends to retain the services of an engineering consulting firm to provide design, permitting, bidding and construction related engineering services for the Arcadia West Pumping Station Modifications Project. Authorization for construction phase services is not requested at this time. The following table summarizes the professional services to be performed:

Professional Services
1. Evaluate service area.
2. Evaluate existing tank capacity and physical condition.
3. Investigate condition of raw water pipeline.
4. Design pump station improvements.
5. Perform permitting services (DEP, DRBC, Weisenberg Township).
6. Perform bidding services.
7. Perform construction engineering services. (Not included in the Design Phase authorization.)

Additional design phase authorization will be needed from the Board for a separately bid SCADA contract to design, furnish and implement a SCADA system that will control and monitor station operation, including an upgrade of hardware and software components at the LCA central office, and for security features added by LCA's security consultant, Monks Security Systems (Monks). We believe that the consulting firm authorized by this current authorization must advance the design sufficient for the SCADA contractor and Monks to submit proposals for their work.

A Capital Project Authorization (CPA) Amendment for the Construction phase of the project will be presented to the Board at a later date, which will include the general and electrical construction contracts, as well as for construction engineering services, staff costs, and a construction manager. We will know at that time if rehabilitation or replacement of the existing storage tank and/or well supply lines, or if any code violation fixes must be included in the construction contracts.

CONSULTANT SELECTION PROCESS: A highly detailed Request for Proposals was developed and sent out to fifteen engineering consulting firms. The nine firms listed in Table 1 responded to the invitation and attended an open house at the station where their questions were answered.

Table 1
Firms Attending Station Open House
ARRO Consulting, Inc.
Barry Isett & Associates, Inc.
Buchart Horn, Inc.
Carroll Engineering Corporation
Cowan Associates, Inc.
Gannett Fleming, Inc.
Keystone Consulting Engineers, Inc.
Rettew, Inc.
T&M Associates

Eight firms attending the open house submitted proposals. A cost and man-hour summary of these proposals is shown in Table 2.

Table 2 (1)	
Firms Submitting a Proposal	
Firm	**Cost**
T&M Associates (Recommended)	**$95,890**
Carroll Engineering Corporation	$101,700
ARRO Consulting, Inc.	$105,935
Barry Isett & Associates, Inc.	$116,249
Buchart Horn, Inc.	$119,949
Cowan Associates, Inc.	$129,300
Rettew, Inc.	$147,399
Gannett Fleming, Inc.	$299,175

(1) Includes select construction engineering services. The firm's construction engineering services are not included in this authorization, but will be included in the CPA Amendment for the construction phase.

Based upon our review of all aspects of both the Technical and Cost Proposals submitted by the eight firms, we recommend award of the design, permitting and bidding phase services of the project to T&M Associates. Their proposal is on scope and represents what we believe is the best overall value for the Authority.

T&M Associates would perform the services outlined in LCA's Request for Proposals and open-house Response to Questions under the terms of a Professional Services Authorization. Further clarification of the scope of work is contained in their letter dated November 11, 2011, and in their November 28, 2011 acceptance of several scope clarification statements prepared after an in-depth telephone conversation with the principal-in-charge of the project.

T&M ASSOCIATES COMPANY INFORMATION & REFERENCE CHECK: T&M Associates was founded over 40 years ago and provides engineering, planning and environmental consulting services for private, local and government authorities and agencies for transportation, environmental, real estate development, solid waste, public works and renewable energy projects. The firm is headquartered in Middletown, New Jersey with local offices throughout New Jersey and in Pennsylvania, including one in Bethlehem. Their experience includes the development of

plans and specifications for water supply and distribution systems, sewage collection systems, pumping stations, treatment plants, system upgrades and infrastructure replacement. Their team of nearly 300 professionals, holding more than 100 professional licenses, includes civil, traffic, transportation, site, structural, electrical and environmental engineers; professional planners; landscape architects; environmental scientists; land surveyors; construction inspectors and other technical and support personnel.

Several firms were contacted to check T&M Associates' references for booster pump station upgrades. The firms reported that T&M Associates had the skills and manpower necessary to perform the work, was responsive to their needs, and met their expectations. We are waiting for a response from some references, and intend to follow-up with these following the Board mailing.

PROJECT SCHEDULE: T&M Associates has estimated that the project would take approximately 13 continuous months to complete. Additional time built into the schedule will allow for the PennVEST funding cycle. A project kick-off meeting will be scheduled upon Board authorization of the project.

CAPITAL PROJECT AUTHORIZATION

PROJECT NO.: W-11-3 **BUDGET FUND:** Water\Capital\AW\

PROJECT TITLE: **Arcadia West Pumping Station Modifications & Community Water System Permitting Project**

PROJECT TYPE:

- ☒ Construction
- ☐ Engineering Study
- ☐ Equipment Purchase
- ☐ Amendment

THIS AUTHORIZATION: **$139,440**

DESCRIPTION AND BENEFITS:

The project includes re-piping the station, installing larger distribution pumps with variable frequency drives (VFD), emergency generator, metering, SCADA control, PH adjustment system, a redundant fire pump and a third well (pump only) to meet future needs. The adequacy of the size of the water storage tank will be evaluated, and the storage tank and well supply lines will be inspected to determine if they must be rehabilitated or replaced. In addition, a public water supply permit application will be made to permit the system as a Community Water System. Currently, the system is operated under a Brief Description Form which limits the number of residential connections and/or population served. The pump station was designed to serve only the Arcadia West Industrial Park.

The proposed improvements will provide increased reliability of fire protection, service to proposed developments, increased pumping efficiency, increased security, SCADA control, and control of corrosion in the station caused by well water having a low pH.

Please reference the cover Memo for additional information.

Authorization Status:

REQUESTED THIS AUTHORIZATION	
Design Phase (1)	
Staff	$45,000
Engineering Consultant	$72,940
Miscellaneous	$8,500
Contingencies	$13,000
Total This Authorization	**$139,440**

Future Authorization (2)	
Construction Phase/SCADA	$539,560

Total Estimated Project	$679,000

(1) If deemed necessary, does not include SWIP testing, enlargement of wellhead protection zones, land development plans or complex Act 167 mitigation efforts.

(2) If deemed necessary, does not include rehabilitation or replacement of the existing storage tank or well supply line, major building expansion or major code violation fixes.

REVIEW AND APPROVALS:

Project Manager	Date	General Manager	Date
Capital Works Manager	Date	Chairman	Date

Lehigh County Authority 1053 Spruce Street * P.O. Box 3348 * Allentown, PA 18106-0348
(610)398-2503 * FAX (610)398-8413

PROFESSIONAL SERVICES AUTHORIZATION

(To be signed by Professional and returned to the Authority)

Professional: T&M Associates
Eleven Tindall Road
Middletown, NJ 07748-2792

Date: November 30, 2011
Requested By: Edward Hoyle, Jr.
Approvals
Department Head: _____
General Manager: _____

Description of Services *(Work Scope, Steps, Check Points, etc.):*

Provide design phase services for the "Arcadia West Pumping Station Modifications & Community Water System Permitting Project" in Weisenberg Township, Lehigh County, PA, as identified in the attached Technical and Cost Proposals submitted by T&M Associates on October 18, 2011, which are based upon the attached Request for Proposals for Engineering Services issued by the Authority on September 14, 2011 and open-house Response to Questions issued by the Authority on September 30, 2011. Further clarification of the scope of work is contained in the attached T&M Associates' letter dated November 11, 2011, and in their November 28, 2011 acceptance of several scope clarification statements prepared after an in-depth telephone conversation with the principal-in-charge of the project. T&M Associates' Standard Terms and Conditions for Professional Services, as revised per comments by the Authority, is also attached. T&M Associates shall not proceed with the construction phase of the project until authorized to do so by the Lehigh County Authority Board of Directors.

Cost Estimate *(not to be exceeded without further authorization):*

The estimated cost to perform the design phase services is summarized in T&M Associates' Cost Proposal revised November 10, 2011 to reflect the clarifications in their scope of work. Services will be paid for based on the Schedule of Hourly Billing Rates in their Cost Proposal. These services and related expenses, such as subcontractors, authorized travel, reproduction charges, supplies and deliverables, shall be provided for a total not-to-exceed fee of $72,940.00. T&M Associates' Cost Proposal included an additional $22,950.00 for construction phase services, which will be included when we seek Board authorization for the construction phase.

Timetable and Completion Deadline *(either party may terminate upon thirty days written notice):*

In its Technical Proposal, T&M Associates' schedule estimated that the project would take approximately 13 continuous months to complete through the construction phase. Additional time is built into their schedule to allow for the PennVEST funding cycle, if financial assistance will be sought. This schedule meets the Authority's requirement to complete the project by August 1, 2013. A project kick-off meeting will be scheduled upon Board authorization of the project.

I am or represent the Professional indicated above, and as such I am authorized to:

- Accept the terms of the professional authorization set forth above; and
- Agree to indemnify, hold harmless and defend the Authority, its employees, agents, officials, successors and assigns (hereinafter all jointly referred to as "Authority"), from any and all loss and liability for claims, demands, suits or causes of action at law or in equity for damages and injuries (including death of every kind and nature) to persons (including employees of the Professional) and property arising out of error, omission or negligent act of Professional, or any person under contract to it, in rendering professional services under this authorization. The indemnification shall include, but not be limited to, payment of reasonable attorney fees and reasonable incidental litigation expenses of the Authority. Professional shall not, however, be liable for any portion of a judgment nor associated litigation expenses, including attorney's fees, ultimately determined to be the result of the negligence of the Authority.

_____ Name (Signature)

_____ Name (printed):

Title:_____

(For Authority Use Only)

Authorization Completion:

Approval:_____ **Actual Cost:** _____ **Date:**_____

Lehigh County Authority 1053 Spruce Street * P.O. Box 3348 * Allentown, PA 18106-0348
(610) 398-2503 * FAX (610) 398-8413 * Email: service@lehighcountyauthority.org

MEMORANDUM

Date: November 29, 2011

To: Board of Directors & Management Staff
From: Lance M. Babbitt
Re: Park Pump Station – Comminutor Replacement
Amendment #1

Motions/Approvals Requested

No.	Motion/Approval Items	Bid/Description	Amount
1	Capital Project Authorization Amendment #1 Procurement Proposal	Design, Bidding Phase	$75,990.00
3	Procurement Approval (**)	Franklin Miller, Inc.	$65,890.00

(**) Included in the Capital Project Authorization

Background

This is the first amendment to the Capital Project Authorization, to allow for the procurement of the comminutor equipment that will be installed. There is a long lead time (12-14 weeks) from shop drawing approval, so the equipment is being procured to be available in time to beat the spring thaws and rain.

The Procurement Proposal was advertized on October 30, 2011. One proposal was received upon bid opening November 14. Franklin Miller, Inc. is the manufacturer of the equipment we currently have installed at the station. They bid directly with us on the procurement. Their proposal total was $65,890.00.

The project is currently on schedule and should be completed by late March, 2012.

RETTEW

We answer to you.

941 Marcon Blvd Ste 601, Allentown, PA 18109 ○ Phone: (610) 866-8330
Email: rettew@rettew.com ○ Website: rettew.com

Engineers
Planners
Surveyors
Landscape Architects
Environmental Consultants

November 29, 2011

Mr. Lance Babbitt
Lehigh County Authority
1053 Spruce Street
P. O. Box 3348
Allentown, PA 18106-0348

Re: Park Pump Station
Comminutor Procurement Project
RETTEW Project 057932001

Dear Mr. Babbitt:

We have reviewed the single bid received for the above referenced project. The bid was submitted by Franklin Miller, Inc. and is in the amount of $65,890.00. Bid security in the form of a cashier's check in the amount of $6,589 was provided. Based on the information provided with the bid, it is our opinion that the bidder meets the requirements of the bidding documents and we recommend award of the project to Franklin Miller, Inc.

Although only a single bid was received, we are satisfied that the cost submitted is a fair price. Our review included a comparison with the quote received in August 2010 for the installation of an identical unit. Due to the requirement that the new comminutor match the comminutor installed last year at the Park Pump Station, we did not expect to receive any bids other than the bid received from the manufacturer of the recently installed comminutor.

Should you have any questions, please contact our office.

Sincerely,

Carl F. Dicker, Jr., PE
Project Manager

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CAPITAL PROJECT AUTHORIZATION

PROJECT NO.: BUDGET FUND: WASTEWATER CAPITAL - 111

PROJECT TITLE: Park Pump Station - Comminutor Replacement

PROJECT TYPE:

	Construction
	Engineering Study
	Equipment Purchase
X	Amendment #1

THIS APPROVAL	$	65,890
Total Approval	$	76,990

DESCRIPTION AND BENEFITS

This project will replace the aging hydraulic operated comminutor at the Park Pump Station. This Amendment is for Procuring the comminutor.

Previously Approved Total	$ 10,100

This Approval	
Procurement Phase	
Comminutor Award	$ 65,890
Total This Approval	$ 65,890

FUTURE APPROVAL

CONSTRUCTION PHASE COSTS: $33,110 (ESt)

TOTAL PROJECT COST: $109,100

REVIEW AND APPROVALS

Project Manager	Date	General Manager	Date
Capital Works Manager	Date	Chairman	Date

MALCOLM PIRNIE | ARCADIS

The Water Division of ARCADIS

Technical Memorandum

Date: November 28, 2011 (revised)

To: Pat Mandes (LCA)

Copy: Aurel Arndt (LCA)

From: Craig Murray (Malcolm Pirnie)

Re: Wastewater Capacity Program

Present Value Analysis for the 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. As described in more detail in previous memoranda, the following alternatives are being considered:

1. Keep the existing LCA treatment plant (LCA WTP) as a pretreatment plant only and upgrade the City of Allentown Kline's Island Wastewater Treatment Plant (KIWWTP) to receive and treat the additional flows
2. Upgrade the LCA WTP and provide additional treatment and conveyance facilities to discharge a portion of the flow via land application
3. Upgrade the LCA WTP and provide additional treatment and conveyance facilities to discharge a portion of the flow to the Jordon Creek
4. Upgrade the LCA WTP and provide additional treatment and conveyance facilities to discharge a portion of the flow to the Lehigh River

Updated capital cost estimates were prepared for each alternative and these are summarized in the attached memorandum dated May 2, 2011 (Appendix A). Subsequent to the development of capital costs, LCA and the City of Allentown, along with their consultants (Malcolm Pirnie and Castle Valley Associates for LCA and Omni Environmental for the City of Allentown), have developed annual operation and maintenance (O&M) costs and compiled present value costs for their respective alternatives. The annual O&M and present value analysis is presented in this memorandum. The memo supersedes the original memo dated August 22, 2011.

The purpose of the present value analysis is to more fully understand the true cost of each alternative over time in order to make a fully informed decision on the preferred alternative for additional LCA capacity.

Assumptions

Table 1 summarizes the operations and maintenance cost assumptions used in the present value analysis for the wastewater capacity alternatives. General assumptions on the preparation of the estimates are provided following the table.

Table 1: O&M Cost Category Assumptions

O&M Cost Category	Unit	Unit Cost
Annual Equipment Maintenance	%	1% of installed equipment cost
Estimated O&M Labor	FTE	$70,000 per year (burdened)
Electricity	kWh	$0.082/kWh
Carbon Source	Gal/day	$1.50/gal
Alum	Gal/day	$1.06/gal
Polymer	Lbs/day	$1.70/lb
Sodium Hypochlorite	Gal/day	$1.50/gal
Sulfur Dioxide	Lbs/day	$0.27/lb

Additional assumptions include the following:

- The present value analysis was calculated using a 5% discount rate for a 20 year life cycle (P/A = 12.46).
- Annual equipment maintenance costs were calculated based on 1% of the installed equipment costs including general conditions, contractor overhead and profit, and contingency (indirect costs) as well as engineering and legal/administration costs.
- O&M labor requirements were estimated based on the complexity of the additional unit processes and an estimate of required labor for operating and maintaining the new unit processes. The new unit processes required at the LCA WTP for the direct discharge alternatives were assumed to require one additional full time operator (1 FTE).
- No additional labor was assumed for the upgrades to the existing LCA WTP unit processes.
- Annual O&M for the LCA conveyance facilities was calculated based on historical O&M costs (2008-2010) for the Little Lehigh Relief Interceptor and Park Pumping Station.
- As was done with the capital costs, the additional annual O&M for the Allentown conveyance system was assumed based on the calculated value for LCA. However, since the Allentown system will not have a pump station the O&M costs attributed to the Park Pump Station were subtracted prior to calculating the O&M cost for the Allentown conveyance system. This would need to be confirmed once more information is available on the necessary upgrades to the Allentown collection system.
- Costs assume a total additional flow from the LCA system of 4.0 MGD. Of that 4.0 MGD it is assumed that 2.2 MGD would come from the WTP and the remaining 1.8 MGD would come from other areas of the system. The amount of flow from the pretreatment plant impacts various O&M costs at the KIWWTP for the remain pretreatment alternative (costs to be calculated by Omni Environmental).

- Effluent pumping costs were based on two 50 HP pumps operating for the land application and Jordan Creek alternatives. Two 100 HP pumps operating were utilized for the Lehigh River alternative.
- As part of its regular payments to the City, LCA currently pays a flow-based contribution of the overhead for the General Fund. In 2010 this rate was $0.144/1,000 gallons. For an average daily flow of 4.0 MGD this equates to an annual fee of $210,000.
- Chemical usage rates for polymer and alum are based on an additional flow rate of 2.2 MGD through the pretreatment plant and assume the following:
  - Polymer: Calculations assume 1.2 dry tons of sludge/MGD based on historical information and a dosage of 15 lbs/DT.
  - Alum: based on 5 mg/L influent total phosphorus concentration and an effluent total phosphorus concentration of 0.8 mg/L.
- Chemical usage rates for carbon, chlorination and dechlorination are based on an additional flow rate of 4.0 MGD through the additional unit processes required for direct discharge and assume the following:
  - Carbon: As previously discussed in the capital cost memo, only half of the flow (2.0 MGD) will go through the denite filters. Assuming 20 mg/l NO3 and a 5:1 COD:NO3 ratio, 168 GPD of methanol would be required.
  - Chlorination and Dechlorination: Either chlorination or chlorination/dechlorination is required on the full 4.0 MGD flow. The dose for sodium hypochlorite and sulfur dioxide were estimated to be 5 mg/L.

This memorandum provides the details for the O&M cost estimates prepared by Malcolm Pirnie. O&M estimates prepared by others are included in the cost summary table that follows the cost breakdowns for each alternative.

O&M Cost Breakdown - Remain Pretreatment Facility with All Flow to KIWWTP

The remain pretreatment option cost includes O&M costs associated with the following work at the LCA WTP:

- A new primary settling tank and equipment
- A new secondary settling tank and equipment
- Additional storage tanks (EQ and high strength wastes)
- A new gravity belt thickener

This option does not require any additional O&M labor. Additionally, a carbon source, alum, sodium hypochlorite, or sulfur dioxide are not required.

Table 2: O&M Cost Summary for Remain Pretreatment Option

O&M Cost Category	Total per Year Cost	Comments
WTP Treatment Upgrades		
Annual Equipment Maintenance	$7,000	1% of installed equipment cost
Estimated O&M Labor	N/A	No additional labor required
Electricity	$11,000	Pumps, collection equipment, and GBT
Carbon Source	N/A	Carbon not required
Alum	N/A	Alum not required
Polymer	$25,000	Additional polymer required for additional solids on GBT
Sodium Hypochlorite	N/A	Disinfection not required
Sulfur Dioxide	N/A	Dechlorination not required
TOTAL O&M COST:	$43,000	

O&M Cost Breakdown - Upgrade WTP and Direct Discharge via Land Application

The land application options cost includes O&M costs associated with WTP treatment upgrades (assumed to be identical to the upgrades for direct discharge to Lehigh River option) as well as land application storage and distribution system which includes:

- A new primary settling tank and equipment
- A new secondary settling tank and equipment
- Additional storage tanks (EQ and high strength wastes)
- A new gravity belt thickener
- An MBBR system and equipment for 4 MGD flow
- A denitrification filter system for 2 MGD of flow
- Carbon storage and feed system
- Chemical phosphorus removal storage and feed system
- A new splitter box
- Chlorination tankage, storage and feed systems
- Additional effluent pumping equipment
- Lagoon/Storage system
- Drip irrigation system
- Additional effluent pumping equipment
- Land lease costs for the drip irrigation system

Table 3: O&M Cost Summary for Land Application Option

O&M Cost Category	Total per Year Cost	Comments
WTP Treatment Upgrades		
Annual Equipment Maintenance	$68,000	1% of installed equipment cost
Estimated O&M Labor	$70,000	1 additional FTE assumed required to operate MBBR and denite filters
Electricity	$232,000	Pumps, blowers (MBBR), and denite filter operation
Carbon Source	$92,000	Carbon required for denite filters
Alum	$150,000	Alum required for phosphorus removal
Polymer	$25,000	Additional polymer required for additional solids on GBT
Sodium Hypochlorite	$91,000	Disinfection required
Sulfur Dioxide	N/A	Dechlorination not required
SUBTOTAL O&M COST:	**$728,000**	
WTP Effluent Pump Station & Force Main		
Annual Equipment Maintenance	$10,000	1% of installed equipment cost
Estimated O&M Labor	N/A	No additional labor required
Electricity	$54,000	Pumps
SUBTOTAL O&M COST:	**$64,000**	
TOTAL O&M COST:	**$792,000**	

O&M Cost Breakdown - Upgrade WTP and Direct Discharge to Jordan Creek

The direct discharge to Jordan Creek option cost includes O&M costs associated with WTP treatment upgrades which includes:

- A new primary settling tank and equipment
- A new secondary settling tank and equipment
- Additional storage tanks (EQ and high strength wastes)
- A new gravity belt thickener
- An MBBR system and equipment for 4 MGD flow
- A denitrification filter system for 2 MGD of flow
- Carbon storage and feed system
- Chemical phosphorus removal storage and feed system
- A new splitter box
- Chlorination and dechlorination tankage, storage and feed systems
- Additional effluent pumping equipment

Table 4: O&M Cost Summary for Direct Discharge to Jordan Creek Option

O&M Cost Category	Total per Year Cost	Comments
WTP Treatment Upgrades		
Annual Equipment Maintenance	$69,000	1% of installed equipment cost
Estimated O&M Labor	$70,000	1 additional FTE assumed required to operate MBBR and denite filters
Electricity	$232,000	Pumps, blowers (MBBR), and denite filter operation
Carbon Source	$92,000	Carbon required for denite filters
Alum	$150,000	Alum required for phosphorus removal
Polymer	$25,000	Additional polymer required for additional solids on GBT
Sodium Hypochlorite	$91,000	Disinfection required
Sulfur Dioxide	$16,000	Dechlorination required
SUBTOTAL O&M COST:	**$745,000**	
WTP Effluent Pump Station & Force Main		
Annual Equipment Maintenance	$10,000	1% of installed equipment cost
Estimated O&M Labor	N/A	No additional labor required
Electricity	$54,000	Pumps
SUBTOTAL O&M COST:	**$64,000**	
TOTAL O&M COST:	**$809,000**	

O&M Cost Breakdown - Upgrade WTP and Direct Discharge to the Lehigh River

The direct discharge to Lehigh River option costs includes O&M costs associated with WTP treatment upgrades which includes:

- A new primary settling tank and equipment
- A new secondary settling tank and equipment
- Additional storage tanks (EQ and high strength wastes)
- A new gravity belt thickener
- An MBBR system and equipment for 4 MGD flow
- A denitrification filter system for 2 MGD of flow
- Carbon storage and feed system
- Chemical phosphorus removal storage and feed system
- A new splitter box
- Chlorination tankage, storage and feed systems (dechlorination is not required in this option)
- Additional effluent pumping equipment

Table 5: O&M Cost Summary for Direct Discharge to Lehigh River Option

O&M Cost Category	Total per Year Cost	Comments
WTP Treatment Upgrades		
Annual Equipment Maintenance	$68,000	1% of installed equipment cost
Estimated O&M Labor	$70,000	1 additional FTE assumed required to operate MBBR and denite filters
Electricity	$232,000	Pumps, blowers (MBBR), and denite filter operation
Carbon Source	$92,000	Carbon required for denite filters
Alum	$150,000	Alum required for phosphorus removal
Polymer	$25,000	Additional polymer required for additional solids on GBT
Sodium Hypochlorite	$91,000	Disinfection required
Sulfur Dioxide	N/A	Dechlorination not required
SUBTOTAL O&M COST:	**$728,000**	
WTP Effluent Pump Station & Force Main		
Annual Equipment Maintenance	$14,000	1% of installed equipment cost
Estimated O&M Labor	N/A	No additional labor required
Electricity	$107,000	Pumps
SUBTOTAL O&M COST:	**$121,000**	
TOTAL O&M COST	**$849,000**	

O&M Cost Breakdown - Conveyance Costs

From 2008 to 2010, the average annual O&M cost for the Little Lehigh Relief Interceptor (LLRI) and Park Pumping Station was $274,000. Operation of this facility on a year to year basis is highly variable. However, as flows in the system increase it is a good assumption that the use of the LLRI will also increase. For this analysis it is assumed that the increase in the LLRI operation will be proportional to the overall increase in the total system flow. The current average daily flow for LCA is approximately 7.4 MGD. Therefore, an additional 2.2 MGD equates to an increase of 30% or $82,000 per year.

Of the $274,000 approximately $200,000 is attributed to the Park Pumping Station. Therefore the Allentown cost is assumed to be 30% of the remaining $74,000 or $22,000 per year.

Annual O&M Cost Summary

The following table summarizes the annual O&M costs for all alternatives. Individual line items are provided for each major work area. This table mimics the capital cost summary provided in the May 2, 2011 cost memorandum.

Table 6: Annual O&M 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
WTP Treatment Upgrades	$43,000	$728,000	$745,000	$728,000
WTP Effluent Pump Station & Force Main	-	$64,000	$64,000	$121,000
WTP Land Application System	-	$337,000 (1)	-	-
KIWWTP Wet Weather Upgrades	Same for all	Same for all	Same for all	Same for all
KIWWTP Compliance Upgrades	Same for all	Same for all	Same for all	Same for all
KIWWTP 44 mgd Expansion Upgrades	$696,000 (2)	-	-	-
Additional LCA Conveyance Costs	$82,000	-	-	-
Additional Allentown Conveyance Costs	$22,000	-	-	-
Estimated LCA Annual Costs	**$843,000**	**$1,129,000**	**$809,000**	**$849,000**

(1) Estimate prepared by Castle Valley Consultants
(2) Includes $210,000 annual general fund contribution and $486,000 annual O&M estimate prepared by Omni Environmental

Present Value Cost Summary

Table 7 summarizes the capital costs (as presented in the May 2, 2011 memo titled *Updated Cost Summary for Wastewater Capacity Alternatives*) and the calculated 20-year present value (PV) previously presented in this memorandum.

Table 7: Present Value 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
Capital Cost Present Value	$62.5 MM	$71.2 MM	$59.3 MM	$96.2 MM
O&M Present Value	$10.5 MM	$14.1 MM	$10.1 MM	$10.6 MM
Total Present Value	**$73.0 MM**	**$85.3 MM**	**$69.4 MM**	**$106.8 MM**

Observations

At this time the contents of this memorandum provide a comprehensive summary of the anticipated project costs for the four alternatives. The costs presented are as close to an "apples to apples" comparison as can be performed at this time based on the level of design that has been prepared by all parties involved. The following is a summary of some additional specific observations on the work completed to date and areas that may benefit from further evaluation:

- At this level of engineering, the costs for the Remain Pretreatment Facility and Jordan Creek alternatives are essentially equal. Additional refinement of the alternatives would be required to be able to further differentiate the costs, as well as confirm the total estimated costs for the Lehigh River and Land Application alternatives. However, as there still may not be a clear lowest cost alternative after this work is completed it is important that non-economic evaluations be performed as well.
- Capital and O&M costs for the LCA and Allentown conveyance systems are based on the results of very high level modeling for the LCA system and many assumptions for both systems. These two line items could have a significant impact on the overall economic evaluation. A common basis for evaluating the impacts to LCA and Allentown's conveyance systems needs to be reached in order to more accurately assess the capital and O&M costs for these two line items. Use of the dynamic collection system model being assembled by the City, in concert with LCA's model, would be the preferred approach but the City's tool may not be available for several months. At this time it would be very beneficial for the City's consultant to be aware of this intended use for the model so that the tool can be developed with this purpose in mind.
- As part of any additional evaluations revised flow estimates should be prepared so that the O&M costs can be confirmed. Where the additional flows are anticipated to enter the LCA system (ie upstream vs downstream of the pretreatment facility) and what level of treatment flows have received by LCA prior to being sent to Allentown is also an important consideration moving forward. Refined flow projections would also assist with developing the required timeline for construction of the new facilities wherever they may be.
- During this evaluation staffing impacts for both LCA and the City should be more thoroughly evaluated. In addition to paid staff for LCA and the City, impacts to contract operations (OMI) and the annual budgets for outside consultants may also warrant consideration.

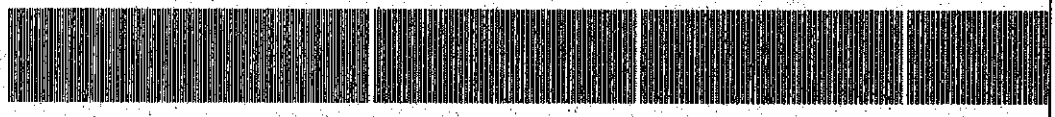
To refine the cost estimates, and ultimately make a decision, additional engineering evaluations are required. The general consensus by the parties involved is that these evaluations should be performed as part of Act 537 plan revisions. Consequently, at this time it is recommended that LCA and the City consult with PADEP to determine the preferred method, content, and signatory responsibilities for completing Act 537 planning.

Appendices:

A. Updated Cost Summary for Wastewater Capacity Alternatives (May 2, 2011 Memorandum)
B. Omni Environmental Annual O&M Cost and Present Value of Recommended Alternative (September 23, 2011 Memorandum)

APPENDIX A

Updated Cost Summary for Wastewater Capacity Alternatives (May 2, 2011 Memorandum)



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.

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

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:

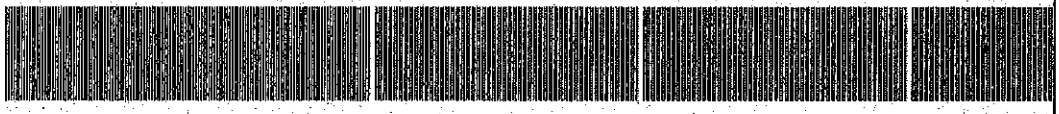
1. Pipes are PVC
2. 12' deep
3. Not in pavement installation
4. Direct remove and replace using the same trench

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**

APPENDIX B

Omni Environmental Annual O&M Cost and Present Value of Recommended Alternative (September 23, 2011 Memorandum)



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Memorandum – Updated Draft

To: Bob Kerchusky and John Parsons

CC: Rich Young

From: Tim Bradley

Date: September 23, 2011

Re: KIWWTP Expansion Alternatives Evaluation
Annual O&M Cost and Present Value of Recommended Alternative

BACKGROUND

The evaluation of alternatives to expand Kline's Island WWTP capacity from 40 mgd to 44 mgd was presented in Omni's draft report dated February 7, 2011. The recommended alternative was the BAF Alternative.

On February 14, 2011, the City of Allentown (COA) received Malcolm Pirnie's Technical Memorandum dated December 3, 2010 presenting updated costs for three alternatives to convert the Lehigh County Authority's (LCA's) Industrial Pretreatment Plant (IPP) to a direct discharge facility.

On March 1, 2011, a COA/LCA meeting was held to discuss LCA's comments on the KIWWTP Expansion Alternatives Evaluation and to discuss COA's/Omni's comments on the updated costs for the three LCA direct discharge alternatives. There were several COA/Omni comments on the updated costs that LCA and Malcolm Pirnie were to address following the meeting. In addition, it was agreed that O&M costs would be developed for the recommended KIWWTP expansion alternative and for LCA's three direct discharge alternatives, using a format to be developed by Malcolm Pirnie and to be used by both LCA and COA for consistency.

On March 30, 2011, Omni received Malcolm Pirnie's Technical Memorandum dated March 25, 2011 responding to COA's/Omni's comments.

On May 27, 2011, Omni received Malcolm Pirnie's format and proposed unit costs for O&M cost development and presentation.

The estimated annual O&M costs for the recommended Kline's Island WWTP expansion alternative were presented in Omni's draft memorandum dated June 17, 2011.

On August 22, 2011, Omni received (1) Malcolm Pirnie's Technical Memorandum dated August 22, 2011 presenting the Present Value Analysis for the Wastewater Capacity Alternatives, and (2) Malcolm Pirnie's Technical Memorandum dated May 2, 2011 presenting the Updated Cost Summary for Wastewater Capacity Alternatives.

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On September 9, 2011, a COA/LCA meeting was held to discuss Omni's estimated annual O&M costs for expansion of the Kline's Island WWTP and Malcolm Pirnie's estimated annual O&M costs for the LCA direct discharge options.

This Memorandum presents the updated annual O&M costs for expansion of the Kline's Island WWTP based on discussion that occurred during the September 9th meeting, considering both the new and existing processes.

ANNUAL O&M COST OF RECOMMENDED NEW FACILITIES

As described in the KIWWTP Expansion Alternatives Evaluation Report, implementation of the recommended alternative will result in intermediate settling tank (IST) effluent average flow in excess of the grandfathered flow of 31 mgd being directed to new biological aerated filters (BAFs) for nitrification and denitrification, with carbon addition required for denitrification and alum addition required for phosphorus removal. The BAFs were sized for 13 mgd based on expansion to 44 mgd under the assumption that unused signatory capacity is not re-allocated.

The estimated annual O&M costs will be based on the additional 4 mgd of non-grandfathered flow that would be directed to the KIWWTP if one of the LCA direct discharge options is not implemented. The O&M cost categories and corresponding unit costs pertinent to estimating annual O&M costs are presented in the following table.

O&M Cost Category	Unit	Unit Cost
Annual Equipment Maintenance	%	1% of installed equipment cost
Estimated O&M Labor	FTE	$69,260 per year (burdened)
Electricity	kWh	$0.082/kWh
Carbon Source	Gal/day	$1.50/gal
Alum	Gal/day	$1.06/gal
Polymer	lbs/day	$1.70/lb

For the present value calculation, a 5% discount rate over 20 years.

Cost development for each O&M cost category is presented below followed by a summary of annual O&M costs and the corresponding present value (PV).

Annual Equipment Maintenance

Based on the cost breakdown presented in Table 11 of the KIWWTP Expansion Alternatives Evaluation report, the total installed equipment cost is $7.45 million plus a combined 22% for general conditions and contractor overhead and profit, bringing the total installed cost to $9.1 million for a system with a capacity of 13 mgd. As previously indicated, the O&M costs are based on 4 mgd of non-grandfathered flow. Therefore, the proportionate capital cost for 4 mgd of flow is 4/13 x $9.1 million or $2.8 million. However, this assumes that the actual future flow will be 44 mgd. A study in 2005 predicted a future year 2025 flow of 37.6 mgd. Assuming that an update of the predicted future flow would be closer to approximately 40 mgd, the proportionate share of capital costs that will be used to estimate annual O&M costs will be increased to 50% of $9.1 million, or $4.55 million.

Based on 1% of the proportionate installed equipment cost of $4.55 million for annual equipment maintenance, the corresponding annual equipment maintenance cost is $45,500 per year.

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Estimated O&M Labor

The COA would not hire additional operations personnel for the new equipment and processes, but rather has indicated that it would likely hire an addition instrumentation technician. Based on the COA's actual pay scale, the fully burdened annual cost of a full time instrumentation technician is approximately $69,200 per year.

Electricity

At the design capacity of 13 mgd, the daily energy consumption is estimated to be 9,674 kWh. Since the energy consumption is proportional to flow, the energy consumption at an average flow of 4 mgd is estimated to be 2,977 kWh/day. Based on a unit cost of $0.082/kWh, the corresponding annual electricity cost is approximately $89,100/year.

Other incidental equipment, such as chemical metering pumps, will consume electricity, but at a very modest rate. To account for these incidental sources, the annual cost will be increased by $2,000 per year, bringing the total annual cost to $91,100.

Carbon Source

As indicated in the KIWWTP Expansion Alternatives Evaluation Report, DRBC has estimated that the non-grandfathered flow (i.e. the flow directed to the new BAFs) will need to achieve an effluent nitrate concentration of 14.4 mg/L, while the grandfathered flow can continue discharging nitrate at its estimated average effluent concentration of approximately 16 mg/L (testing in 2010 resulted in an average effluent nitrate concentration of 15.5 mg/L).

The carbon source dose is based on the following:

1. A non-grandfathered flow of 4 mgd.
2. Nitrification of the ammonia in the 4 mgd flow to 1 mg/L effluent versus the grandfathered 2004 effluent concentration of 2.3 mg/L, resulting in an average nitrate concentration of 16.8 mg/L (based on the 15.5 mg/L 2010 average plus 1.3 mg/L additional nitrate resulting from nitrifying an additional 1.3 mg/L of ammonia).
3. Denitrification to 12 mg/L so as to provide a 20% operating safety factor below the 14.4 mg/L limit.
4. A carbon to nitrate denitrified ratio of 5.0.

The resulting carbon source dose is approximately 96 gal/day. Based on a unit cost of $1.50/day, the corresponding annual cost is estimated to be $52,600/year.

Alum

As indicated in the KIWWTP Expansion Alternatives Report, DRBC has estimated that the non-grandfathered flow will need to achieve an effluent Total Phosphorus concentration of 1.8 mg/L. However, DRBC incorrectly assumed that the grandfathered effluent concentration was 1 mg/L, as subsequent analysis has demonstrated that the KIWWTP's effluent TP concentration averages about 3.2 mg/L, which is typical of plants not designed specifically to remove TP. For this analysis, it is assumed that DRBC will revise the grandfathered TP load based on the KIWWTP's current average effluent TP concentration. In addition, DRBC has indicated that it intends to re-run its No Measurable Change (NMC) analysis based on revised grandfathered TP loads. For purposes of this analysis, it will be

conservatively assumed that the updated NMC will result in a reduction in the non-grandfathered effluent concentration from 1.8 mg/L to 1 mg/L.

The alum dose for phosphorus removal is based on the following:

1. A non-grandfathered flow of 4 mgd.
2. An assumed influent TP concentration of 5 mg/L, which is consistent with the relatively "weak" strength of the KIWWTP's influent, evident by its 2010 average influent BOD concentration of 134 mg/L, average influent ammonia concentration of 18 mg/L and average influent TSS concentration of 148 mg/L.
3. An effluent TP concentration of 1 mg/L

The required alum dose, based on the methodology described in the WEF's 1998 Special Publication *Biological and Chemical Systems for Nutrient Removal,* is 264 gal/day. Based on a unit cost of $1.06/gal, the corresponding estimated annual cost is $102,100/year.

Polymer

The addition of alum for phosphorus removal and carbon for nitrate removal will generate additional sludge. Using the methodology described in WEF's 1998 Special Publication *Biological and Chemical Systems for Nutrient Removal,* the net increase in sludge production resulting from the addition of 264 gal/day of alum is estimated to be 495 pounds/day.

The increase in sludge production resulting from 96 gal/day of supplemental carbon addition was calculated to be 216 pounds/day, based on a sludge yield in the denitrification process of 0.18 pounds VSS per pound COD removed, with pounds COD removed equal to 1.5 times the mass of supplemental carbon applied. The resulting total increase in sludge production from alum and supplemental carbon addition is approximately 710 pounds per day.

Based on COA's 2010 operating data, the COA's polymer dose averages approximately 18 pounds/ton of solids dewatered. There, the addition of 710 pounds per day of sludge will result in 6.4 pounds per day of additional polymer consumption. At a unit cost of $1.70 per pound, the total annual cost is estimated to be $4,000/year.

Annual O&M Cost Summary of New Facilities

The annual O&M costs for the new facilities associated with the recommended KIWWTP Expansion Alternative are summarized in the table below

O&M Cost Category	Unit Cost	Annual O&M Cost
Annual Equipment Maintenance	1% of installed equipment cost	$45,500
Estimated O&M Labor	$69,200 per year (burdened)	$69,200
Electricity	$0.082/kWh	$91,100
Carbon Source	$1.50/gal	$52,600
Alum	$1.06/gal	$102,100
Polymer	$1.70/lb	$4,000
Total		**$364,500**

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ANNUAL O&M COST OF EXISTING FACILITIES

The O&M costs in this category are the electricity, solids handling/disposal and chemical costs associated with pumping, treating and disinfecting 4 mgd of flow through the existing KIWWTP.

Electricity

In 2010 a total of 10,882,800 kWh of electricity was purchased. It is estimated that approximately 60% of this consumption, i.e. 6,529,680 kWh, is related to flow, with the balance to HVAC, lighting and process-related equipment, such as clarifier collector drive, odor control system blowers, girt aeration blowers, etc, the energy consumption of which does not vary in response to changes in flow. Therefore, based on the 2010 average annual flow of 31.64 mgd, the kWh consumed per million gallons of flow treated was 566 kWh/million gallons. The resulting energy consumption associated with a 4 mgd flow is 2,264 kWh/day. Based on a unit cost of $0.082/kWh, the annual electricity cost is estimated to be $67,800/year.

Solids Handlin/Disposal

In 2010 a total of 5,726,482 pounds of dry sludge was produced by treating an average daily flow of 31.64 mgd, requiring an average polymer dose of 18 pounds per ton, resulting in a total polymer consumption of 51,538 pounds. Based on a unit cost of $1.70/pound, the annual polymer cost for processing the sludge generated by treating 4 mgd of flow would be approximately $11,100 per year.

In 2010 a total of 15,474 wet tons of sludge was hauled off-site and disposed, resulting in t total trucking and disposal cost of $268,594. Based on this total cost at a corresponding average daily flow of 31.64 mgd, the estimated trucking and disposal cost for the wet sludge generated by treating 4 mgd of flow would be approximately $34,000 per year.

Therefore, the total sludge handling/disposal cost is estimated to be $45,100/year

Disinfection

In 2010 the total cost for chlorine (ton containers) was $68,952. Based on 2010 average daily flow of 31.64 mgd, the cost per million gallons of flow disinfected is approximately $6/million gallons. The resulting annual chlorine cost to disinfect 4 mgd of flow is approximately $8,800.

Annual O&M Cost Summary

The annual O&M costs for pumping, treating and disinfecting 4 mgd of flow through the existing processes at the KIWWTP are summarized in the table below.

O&M Cost Category	Unit Cost	Annual O&M Cost
Electricity	$0.082/kWh	$67,800
Sludge Handling/Disposal		$45,100
Liquid Chlorine	$6/million gallons	$8,800
Total		**$121,700**