CITY OF WESTLAKE, OHIO

FINAL ENGINEERING ANALYSIS OF WATER SYSTEM STUDIES FOR UTILIZATION OF ALMU AS SECONDARY WATER SOURCE

DENNIS M. CLOUGH, MAYOR

MICHAEL F. KILLEEN, COUNCIL PRESIDENT

COUNCIL

EDWARD G. HACK MICHAEL F. O'DONNELL

JAMES P. CONNOLE KENNETH R. BRADY

DENNIS J. SULLIVAN MARK R. GETSAY

PREPARED BY

CITY OF WESTLAKE DEPARTMENT OF ENGINEERING
27700 HILLIARD BOULEVARD
WESTLAKE, OHIO 44145
(440) 617-4145

DIRECTOR OF ENGINEERING, ROBERT P. KELLY, P.E.

Table of Contents

SECTION 1 EXECUTIVE SUMMARY

1.1 INTRODUCTION

Currently the Cleveland Water Department (CWD) provides the potable water for the entire City of Westlake and also is responsible for the billing and maintenance of the water distribution system. The City of Cleveland Water Department serves five counties in north east Ohio and provides water to about 1.5 million customers.

The City of Westlake is pursuing a secondary source of potable water in addition to that provided by the City of Cleveland Water Department (CWD). Avon Lake Municipal Utilities (ALMU) has been identified as that secondary source. The following factors are the driven force for the City of Westlake to pursue being a bulk water purchaser and having its own water department:

1. Rising water rates from CWD
2. Large financial capital cost for the City of Westlake to replace all water mains over 50 years old.
3. Improved customer service for repairs and billing issues.

The CWD has been very vocal on the possible utilization of ALMU as a secondary water source and has publically made the following comments on why the City of Westlake should not proceed with this:

1. The reliability of supply and delivery are weaker in the proposed Westlake system then in the CWD system.
2. The hydraulic design of the proposed system has flaws
3. The fire flow data for CWD is stronger than the proposed Westlake system.
4. If Westlake leaves CWD will hold Westlake accountable for financial and system impacts on CWD customers including $39 million in "stranded" assets and $17 million to mitigate the cost to cure terminations of water lines around the Westlake border.

1.2 PURPOSE OF REPORT

The purpose of this report is to summarize all the various aspects associated with acquiring a secondary source of potable water and the possible utilization of that source as an alternative to CWD as the primary supplier. The summary of some of the items addressed in this report are as follows:

- The City of Westlake's ownership of the water distribution system
- CWD rational for water rate increases
- CWD new rate schedule
- Recent waterline replacement costs
- Projected replacement cost of the aging water mains
- ALMU infrastructure
- Comparison of ALMU to CWD as a secondary water purveyor in capacity, reliability and quality.
- ALMU history of lower water rates
- ALMU bulk water cost
- Infrastructure required to utilize ALMU as a secondary water purveyor
- Performance of the new water distribution system for pressure and fire flow availability
- Addressed the CWD's comments and concerns about a secondary water purveyor
- The Financial Model generated by the Department of Finance was included within Appendix A

1.3 CITY'S CONSULTANT HNTB

The City of Westlake hired the HNTB Corporation to perform two studies regarding the use of a secondary water purveyor:

- Phase 1 Water Study-dated November 2008
- Phase 2 Water Study-dated March 2012

These water studies concluded that the City of Westlake's water infrastructure with some minor modifications can purchase water from ALMU. Hydraulic modeling was performed and concluded that the water distribution system can meet the current water demands of the City of Westlake and at future build out. These reports will be discussed in more detail later in this report.

SECTION 2 EXISTING CWD SYSTEM

2.1 EXISTING WATER DISTRIBUTION SYSTEM

All water lines 16" in diameter and under within the water distribution network are owned by the City of Westlake based on the water service contract between CWD and the City of Westlake. The remaining water lines 20" in diameter and larger are transmission lines owned by CWD. Currently all water line repairs are CWD responsibility and replacement is the City of Westlake's responsibility. The following table illustrates the total length of water lines grouped by size that are owned by the City of Westlake.

TABLE 2.1 WATER DISTRIBUTION MAINS OWNED BY CITY OF WESTLAKE

WATER MAIN DIAMETER	APPROXIMATE LENGTH	
	FEET	MILES
16"	18,940	3.6
12"	119,850	22.7
10"	1,775	0.3
8"	489,155	92.6
6"	21,370	4.0
<6"	13,020	2.5
TOTAL LENGTH	664,110	125.8

2.2 CWD COST OF SERVICE FOR WATER DISTRICTS

Based on the CWD 2010 metered sales revenue, the City of Westlake is the fourth highest user among all the direct service suburbs with sales at $6,087,236 for 167,351 (MCF) of metered consumption, which is 2.61% of the total CWD consumption.

TABLE 2.2 DIRECT SERVICE SUBURBS[1]

RANK	MUNICIPALITY	METERED SALES REVENUE	PERCENTAGE OF REVENUE	METERED CONSUMPTION (MCF)	PERCENTAGE OF CONSUMPTION
	CLEVELAND	$46,632,467	22.55	2,031,732	32.58
1	PARMA	$11,677,453	5.65	300,933	4.83
2	EUCLID	$6,612,484	3.2	187,408	3.01
3	SOLON	$6,410,475	3.1	141,329	2.27
4	WESTLAKE	$6,087,236	2.94	167,351	2.68
8	NORTH OLMSTED	$4,402,296	2.13	128,636	2.06
17	ROCKY RIVER	$2,968,061	1.44	84,538	1.36
29	BAY VILLAGE	$1,959,067	0.95	59,506	0.95
31	FAIRVIEW PARK	$1,867,471	0.9	56,965	0.91

[1] Cleveland Water Department, "Annual Report 2010", 2010 pg. 22

The water rate schedule for all the direct service suburbs is established from the cost of service for each district. The City of Westlake is in the "Low/1st High" District and from the table below has a cost of service differential of .98 compared to the "Cleveland" district. This essentially means that the total cost (operating, debt, and future capital improvements) to provide water to the City of Westlake is 2% less then to provide water to the residents of Cleveland. However, the water rates for Westlake's district (Low / 1st High) are higher than the residents of Cleveland because additional surcharges are added since CWD is operating outside the corporation limits of the City of Cleveland. The following table illustrates the service rate differentials that are added to each district. For example the "3rd High" district has a rate differential of 1.87 or the water rates are 87% higher than the residents of Cleveland.

TABLE 2.3 DISTRICT'S COST OF SERVICE RATE DIFFERENTIALS[2]

	WATER RATE SCHEDULE DISTRICTS ($1,000'S)			
	CLEVELAND	**LOW/1st HIGH**	**2nd HIGH**	**3rd HIGH**
OPERATING EXPENSES	$38,172	$26,874	$41,292	$30,486
EXISTING DEBT SERVICE	$27,291	$16,891	$25,233	$20,255
FUTURE CAPITAL INVESTMENT	$3,718	$2,243	$3,352	$2,756
TOTAL EXPENSES	$69,181	$46,008	$69,877	$53,497
METERED CONSUMPTION (MCF'S)	1,862,300	1,269,919	1,467,546	920,047
UNIT RATE PER MCF	$0.037	$0.036	$0.048	$0.058
COST OF SERVICE DIFFERENTIAL	**1**	**0.98**	**1.28**	**1.57**
COST OF OWNERSHIP SURCHARGE	**0**	**0.1**	**0.1**	**0.1**
RISK FACTOR	**0**	**0.2**	**0.2**	**0.2**
RATE DISTRICT DIFFERENTIALS	**1**	**1.28**	**1.58**	**1.87**

Essentially, this table illustrates that CWD charges a 30% surcharge to customers outside the City of Cleveland to compensate for ownership surcharge and risk premiums (These values are assumed with no back-up information on the logical approach on how they were derived). It is interesting to note that the actual unit cost of the City of Westlake's water district is about the same as of the City of Cleveland at $37.00/ MCF.

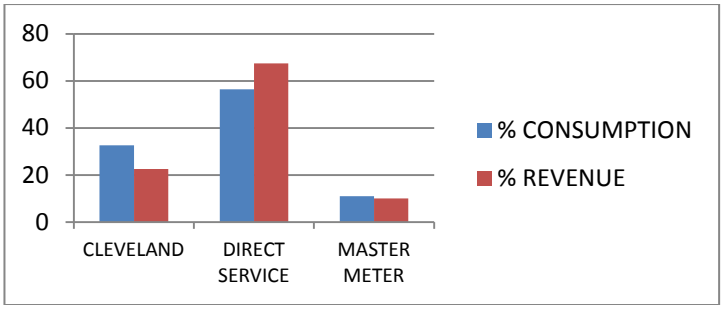
Ownership Surcharge:
This surcharge according to CWD is the value of risks (financial, legal and operational) that it incurs while providing service to customers outside the boundaries of the City of Cleveland. Also this includes a rate of return, which compensates CWD for its use of debt capacity by non-Cleveland citizens, and enables the utility to maintain its credit and acquire new capital.

Risk Premium:
This surcharge according to CWD compensates them for the unquantifiable risks associated with service customers outside of the City of Cleveland limits.

[2] Municipal & Financial Services Group, "City of Cleveland- Division of Water Comprehensive Financial Plan Report", March 2011, Pgs. 8.7-8.8

From the 2010 metered water sales the City of Cleveland's metered water sales revenue was only 22.6% and its consumption was 32.6%. The chart below illustrates how the Direct Service Suburbs have a greater financial burden then the City of Cleveland based on Cost of Service:

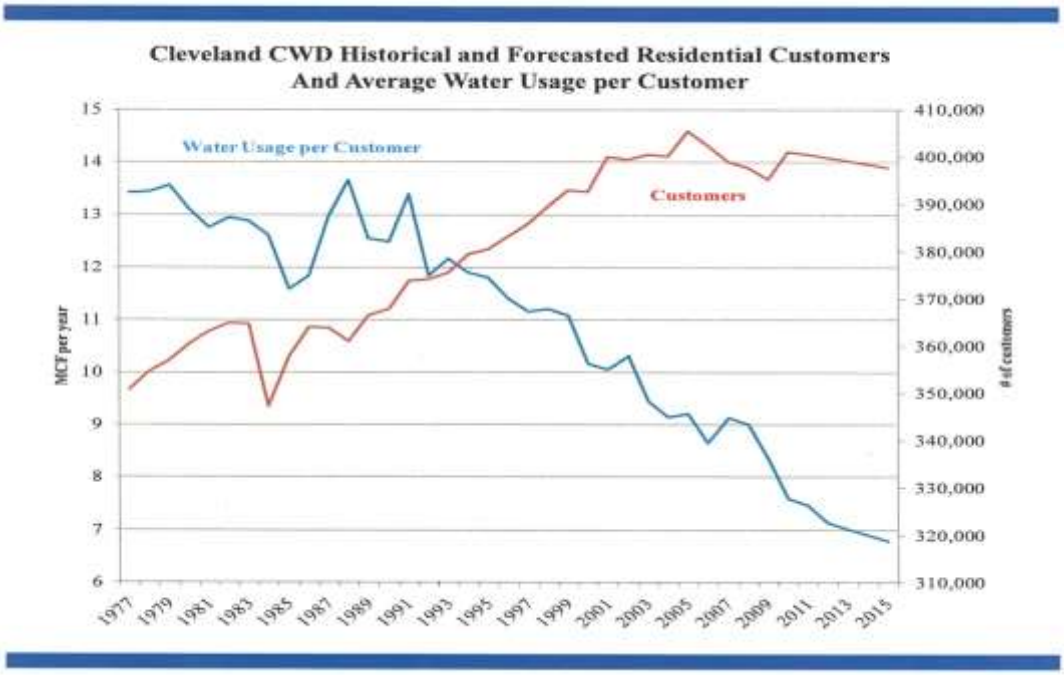
CHART 2.4 COST OF SERVICE COMPARISON



2.3 CWD PROJECTED LOSSES WITH OLD RATE SCHEDULE

This year CWD is implementing a new water rate schedule to account for loss revenue from a decrease in water usage and an increase in expenditures. The chart below illustrates how the consumption per customer has decreased rapidly since the early 1990's.

CHART 2.5[3] HISTORICAL WATER USAGE



[3] Municipal & Financial Services Group, "City of Cleveland- Division of Water Comprehensive Financial Plan" power point presentation, March 28, 2011, Pg. 12

If CWD maintained the previous water rate schedule then the following table illustrates the major revenue shortfall that would occur over the next five years.

TABLE 2.6 CLEVELAND WATER DEPARTMENT BALANCE SHEET WITH PREVIOUS RATE SCHEDULE[4]

(MILLIONS)		2012	2013	2014	2015
TOTAL OPERATING EXPENSES		$148	$151	$155	$158
TOTAL CAPITAL EXPENSES (DEBT SERVICE)		$87	$87	$94	$98
CAPITAL IMPROVEMENT PROJECTS		$27	$26	$19	$23
CAPITAL PROFESSIONAL SERVICES		$2	$2	$2	$2
TOTAL EXPENSES		**$263**	**$266**	**$270**	**$280**
MISC. INCOME		$14	$14	$14	$14
INTEREST INCOME		$4	$3	$2	$0
PRIVATE FIRE SERVICE INCOME		$5	$5	$5	$5
METERED WATER SALES		$203	$198	$194	$189
TOTAL INCOME		**$226**	**$220**	**$214**	**$208**
TOTAL REVENUE		**-$38**	**-$46**	**-$56**	**-$72**

2.4 CWD NEW RATE SCHEDULE

With that alarming trend in the loss of revenue the following water rate schedule was implemented by CWD starting this year:

TABLE 2.7 2012 DIRECT SERVICE RATE SCHEDULE

		2012	RATE DIFFERENTIAL	2013	RATE DIFFERENTIAL	2014	RATE DIFFERENTIAL	2015	RATE DIFFERENTIAL
CLEVELAND									
0-0.6 MCF'S		$13.76		$15.51		$17.34		$19.26	
OVER .6 MCF'S		$27.52		$29.48		$31.22		$32.74	
HOMESTEAD		$6.88		$8.53		$10.41		$12.52	
LOW / 1st HIGH (1.28 RATE DIFF.)									
0-0.6 MCF'S		$20.47	1.49	$22.11	1.43	$23.63	1.36	$25.04	1.30
OVER .6 MCF'S		$41.70	1.52	$42.01	1.43	$42.53	1.36	$42.56	1.30
HOMESTEAD		$10.23	1.49	$12.16	1.43	$14.18	1.36	$16.27	1.30

[4] Municipal & Financial Services Group, "City of Cleveland Comprehensive Financial Plan", power point presentation, March 28, 2011, pg 8

		2012	RATE DIFFERENTIAL	2013	RATE DIFFERENTIAL	2014	RATE DIFFERENTIAL	2015	
2nd HIGH (1.58 RATE DIFF.)									
0-0.6 MCF'S		$24.08	1.75	$26.38	1.70	$28.62	1.65	$30.82	1.60
OVER .6 MCF'S		$48.42	1.76	$50.11	1.70	$51.51	1.65	$52.39	1.60
HOMESTEAD		$12.04	1.75	$14.51	1.70	$17.17	1.65	$20.03	1.60
3rd HIGH (1.87 RATE DIFF.)									
0-0.6 MCF'S		$27.62	2.01	$30.33	1.96	$33.00	1.90	$35.63	1.85
OVER .6 MCF'S		$55.41	2.01	$57.63	1.95	$59.39	1.90	$60.57	1.85
HOMESTEAD		$13.81	2.01	$16.68	1.96	$19.80	1.90	$23.16	1.85
FIXED CHARGE (5/8" -1" METER)		$18.00		$21.00		$24.00		$27.00	

The various districts cost of service rate differentials are not phased in until 2015. So until that time the Direct District Suburbs are paying a higher rate than calculated in Table 2.3. This is an additional rate increase that only the Direct Suburbs are paying.

The following table illustrates a sample water bill based on the CWD water rate schedule with the percentage increase from each year and the percentage increase over the 5 year time frame.

TABLE 2.8 RESIDENTIAL QUARTERLY BILL: BASED ON 2 MCF -5/8" METER

DISTRICT		2010		2011		2012		2013		2014		2015		TOTAL %
CLEVELAND		$46.48	0%	$46.48	39%	$64.78	10%	$71.58	9%	$78.11	8%	$84.39		82%
LOW / 1st HIGH		$68.19	0%	$68.19	30%	$88.65	5%	$93.07	5%	$97.72	4%	$101.61		49%
2nd HIGH		$78.06	0%	$78.06	28%	$100.24	7%	$106.98	6%	$113.28	5%	$118.83		52%
3rd HIGH		$88.33	0%	$88.33	27%	$112.15	7%	$119.88	6%	$126.94	5%	$133.17		51%

2.5 WESTLAKE'S FINANCIAL BURDEN TO THE WATER DISTRIBUTION SYSTEM

Over the past 20 years various water line replacement projects have occurred to maintain a reliable water distribution system for the City of Westlake's residents and businesses at the expense to the City of Westlake. These areas had a higher occurrence of water line breaks than other areas in the City and were financially feasible for replacement as opposed to larger mains on major arterial streets i.e., Center Ridge Road and Detroit Road. The list below shows the amount of water lines replaced and the financial burden the City of Westlake has accrued from these projects without any financial assistance from CWD:

TABLE 2.9 RECENT WATER LINE REPLACEMENT PROJECTS				
PROJECT NAME		**YEAR**		**TOTAL COST**
Canterbury Rd. Waterline (Detroit to Center Ridge)		1995		$700,500
North Glen/Glenmore Waterline		1999		$550,000
Cahoon Rd. Waterline		2001		$457,584
Lincoln Rd. Improvements		2003		$391,384
Hilliard Blvd Ph 1 (Clague to RR Corp. Line)		2003		$398,129
Hilliard Blvd Ph 2 (Clague to Columbia)		2004		$709,130
Sperry 12" Waterline		2004		$372,378
Hilliard Blvd Ph 1		2005		$650,000
Westwood 8" Waterline (Columbia to Center Ridge)		2005		$614,373
Forest Pkwy Estates Waterline		2007		$653,675
Hilliard Blvd Ph 3 (Columbia to Dover Center)		2007		$1,110,355
Columbia Rd. Widening (Hilliard to Center Ridge)		2008		$400,000
Howard Waterline		2008		$120,000
Milmar/Dover Bay Estates Waterline		2008		$669,400
Horseshoe Waterline		2008		$864,030
Canterbury Estates Waterline		2009		$845,716
Hilliard Widening Phase 2 (Bordeaux to Crocker)		2009		$600,000
Clague Road Water Line (Detroit to Hilliard Blvd.)		2010		$1,000,000
Hollywood Water Line		2010		$334,209
Hilliard Blvd. Phase 4(Crocker to West C.L.)		2010		$788,390
Clague and Westwood Waterline		2011		$1,691,319
Clague (Center Ridge to N.O.)				
Westwood (F.P. to Columbia)				
Melrose and Maybelle Drive Waterline		2012		Under Construction
TOTAL COST				**$13,920,573**

2.6 PROJECTED FUTURE WATER MAIN REPLACEMENT COST

The current water distribution system for the City of Westlake has 29 miles of water lines that are over 50 years old, which is about 23% of the total system. It also has 12 miles of water lines that are over 75 years old, which is about 10% of the total system. The estimated replacement cost with minimal restoration (no full width road rehabilitation) for all the water lines over 50 years old is about $45 Million (present value with no inflation). See the following table that lists all the water lines and the estimated replacement with restoration factor included.

TABLE 2.10 ESTIMATED REPLACEMENT COST OF WATER MAINS OLDER THAN 50 YEARS

STREET	LOCATION	SIZE	YEAR BUILT	Length (L.F.)	Unit Cost	Rest. Factor	TOTAL COST
Clague Rd.	600' N. of Detroit Rd. to Detroit Rd.	12"	1926	600	$90	3.5	$189,000
Detroit Rd.	Columbia Rd. to Clague Rd.	12"	1926	5300	$90	3.5	$1,669,500
Detroit Rd.	Clague Rd. to Rocky River Corp. Line	8"	1926	2300	$70	3.5	$563,500
Center Ridge Rd.	Dover Center Rd. to Columbia Road	12"	1927	6000	$90	3.5	$1,890,000
Center Ridge Rd.	Columbia Road to Clague Road	12"	1927	5400	$90	3.5	$1,701,000
Center Ridge Rd.	Clague Road to Rocky River Corp. Line	12"	1927	2350	$90	3.5	$740,250
Detroit Rd.	Canterbury Rd. to Columbia Rd.	12"	1927	2800	$90	3.5	$882,000
Hedgewood Ave.	Clague Rd. to Walter Rd.	8"	1927	2550	$70	3	$535,500
Second St.	All	6"	1927	900	$70	3	$189,000
Smith Ave.	Clague Rd. to Walter	6"	1927	2550	$70	3	$535,500
Vineyard St.	Second St. intersection	6"	1927	175	$70	3	$36,750
Bradley Rd.	Railroad to Detroit Rd.	12"	1927	6100	$90	3.5	$1,921,500
Bradley Rd.	Detroit Road to 1000' S. of Detroit Rd.	12"	1927	1000	$90	3.5	$315,000
Bradley Rd.	1000' S. of Detroit Rd. to Schwartz Rd.	12"	1928	6100	$90	3.5	$1,921,500
Detroit Rd.	Avon Corp. Line to Cahoon Rd.	12"	1928	11200	$90	3	$3,024,000
Detroit Rd.	500' E. of Dellwood Dr. to Dover Center Rd.	12"	1928	1400	$90	3.5	$441,000
Bassett Rd.	Clemens to N. side I-90	12"	1929	650	$90	3.5	$204,750
Bassett Rd.	S. side I-90 to Detroit Rd.	12"	1929	900	$90	3.5	$283,500
Canterbury Rd.	Detroit Road to Hilliard Blvd.	8"	1937	3070	$70	3.5	$752,150
First St. (Dover)	Dover Center Rd. to 900' E. of Dover Cntr.	6"	1941	900	$70	3	$189,000
First St. (Dover)	900' E. of Dover Cntr. to 1080' E. of D.C.R.	6"	1941	180	$70	3	$37,800
West Hedgewood	Columbia Rd. to 600' W. of Columbia Rd.	6"	1945	600	$70	3	$126,000
West Hedgewood	600' W. of Columbia Rd. to 660' S. of C.R.R.	6"	1947	150	$70	5.5	$57,750
Bassett Rd.	Railroad to Clemens Rd.	12"	1951	3000	$90	3.5	$945,000
Detroit Rd.	Cahoon Rd. to 500' E. of Dellwood Dr.	12"	1951	1000	$90	3.5	$315,000
Marshfield Blvd.	All	8"	1951	2600	$70	3	$546,000
Walter Rd.	Maple Ridge Rd. to Hall Rd.	8"	1951	550	$70	3.5	$134,750
Bassett Rd.	1400' W. of Dover Center to Dover Center	12"	1952	1400	$90	3.5	$441,000
Center Ridge Rd.	600' S. North Glen Dr. to Dover Center Rd.	12"	1952	3250	$90	3.5	$1,023,750
Columbia Rd.	Railroad to N. side I-90	12"	1952	1450	$90	3.5	$456,750
First St. (Columbia)	Columbia Rd. to 500' W. of Columbia Rd.	8"	1952	500	$70	3	$105,000
Rose Rd.	All	12"	1952	5300	$90	3.5	$1,669,500
Walter Rd.	Westwood intersection	8"	1952	2700	$70	3.5	$661,500
Walter Rd.	Smith Rd. to Westwood Rd.	8"	1952	650	$70	3.5	$159,250
Walter Rd.	Center Ridge Rd. to Smith Rd.	8"	1952	2350	$70	3.5	$575,750
West Hedgewood	660' S. of Center Ridge to Center Ridge Rd.	6"	1952	675	$70	3	$141,750
Dunford Rd.	Parkwood Drive to Dover Center Rd.	8"	1953	1300	$70	3	$273,000
Hawkins Rd.	Center Ridge to 900' S. of Center Ridge Rd.	8"	1953	900	$70	3	$189,000
Bonny Bank Dr.	Clague Rd. to 600' W. of Clague Rd.	8"	1954	600	$70	3	$126,000
Cornwell Dr.	All	8"	1954	650	$70	3	$136,500
Hall Road	All	8"	1954	2550	$70	3.5	$624,750
Walter Rd.	Westwood Rd. to 1200' S. of Westwood Rd.	8"	1954	1200	$70	3.5	$294,000

STREET	LOCATION	SIZE	YEAR BUILT	Length (L.F.)	Unit Cost	Rest. Factor	TOTAL COST
Bassett Rd.	2100' E. of Hilliard to 2600' E. of Hilliard	12"	1955	500	$90	3.5	$157,500
Clark Parkway	Westwood Rd. to Creekside Dr.	8"	1955	1450	$70	3	$304,500
Walter Rd.	Hall Ln. to North Olmsted Corp. Line	8"	1955	1500	$70	3.5	$367,500
Wonneta Parkway	All	8"	1955	850	$70	3	$178,500
Bassett Rd.	1100' S. of Detroit Rd. to 300' S. of Holden's	12"	1956	2700	$90	3.5	$850,500
Bradley Rd.	Schwartz Rd. to Hilliard Blvd.	12"	1956	1000	$90	3.5	$315,000
Bradley Rd.	Hilliard Blvd. to 1700' S. of Hilliard Blvd.	12"	1956	1700	$90	3.5	$535,500
Brantwood Dr.	North of Westwood Ave	8"	1956	800	$70	3	$168,000
Center Ridge Rd.	North Ridgeville Corp. Line to Bradley Rd.	12"	1956	3200	$90	3.5	$1,008,000
Center Ridge Rd.	Bradley Road to Porter Road	12"	1956	6100	$90	3.5	$1,921,500
Center Ridge Rd.	Porter Rd. to 600' S. of North Glen Dr.	12"	1956	5250	$90	3.5	$1,653,750
Dellwood Dr.	Richmar Dr. to N. side I-90	8"	1956	1300	$70	3	$273,000
Dellwood Dr.	S. side I-90 to Detroit Rd.	8"	1956	200	$70	3	$42,000
Fresno Dr.	All	8"	1956	600	$70	3	$126,000
Jenkins Rd.	200' W. of Lansing to 150' W. of Lansing	8"	1956	50	$70	3	$10,500
Lansing Dr.	Porter Rd. to Jenkins Rd.	8"	1956	1300	$70	3	$273,000
Lansing Dr.	Jenkins Rd. to North Olmsted Corp. Limit	8"	1956	250	$70	3	$52,500
Schwartz Rd.	Bradley Rd. to Center Ridge Rd.	12"	1956	6200	$90	3.5	$1,953,000
Seneca Dr.	All	8"	1956	1300	$70	3	$273,000
Arthur Ave.	All	8"	1957	1200	$70	3	$252,000
Bassett Rd.	Hilliard Blvd. to 2150' W. of Hilliard Blvd.	12"	1957	2150	$90	3.5	$677,250
Bassett Rd.	Hilliard Blvd. to 2100' E. of Hilliard Blvd.	12"	1957	2100	$90	3.5	$661,500
Canterbury Rd.	Railroad to N. side I-90	12"	1957	2300	$90	3.5	$724,500
Parkwood Dr.	200' S. of Hemlock Dr. to Dunford Ave	8"	1957	650	$70	3	$136,500
Rechner Dr.	All	8"	1957	800	$70	3	$168,000
Schwartz Rd.	Lorain County Line to Bradley Rd.	12"	1957	2300	$90	3.5	$724,500
Strawberry Ln.	Canterbury Rd. to culvert (Lilac Ln.)	8"	1957	550	$70	3	$115,500
Strawberry Ln.	culvert (Lilac Ln.) to cul-de-sac	8"	1958	500	$70	3	$105,000
Sunset Dr.	All	8"	1958	1000	$70	3	$210,000
Bradley Rd.	1700' S. of Hilliard Blvd. to Center Ridge Rd.	12"	**1959**	4000	$90	3.5	$1,260,000
Vineyard St.	Second St. to North Corp. Line	8"	1961	250	$70	3	$52,500
Sharon Dr.	All	12"	1962	1200	$90	3	$324,000
Detroit Rd.	Dover Center Rd. to Canterbury Rd.	12"	?	2750	$90	3.5	$866,250
TOTAL COST				153,800			**$43,764,950**

Customer service is a hard issue to quantify in a report. However, the poll within the community suggests that utilizing a secondary water source would be a benefit not a hindrance. Perhaps CWD is too large to properly deal with customer issues on the same level that is expected from Westlake residents. Ideally if a resident has a billing issue it is easier to talk face to face with a person at Westlake City Hall then it is to drive downtown to have the same interaction and deal with multiple individuals prior to receiving a satisfactory answer.

Since the Crown Filtration plant is located within the City of Westlake, repair crews during normal business hours work from that location. However, during off hours a crew needs to be dispatched from

a yard located in Cleveland off of Harvard Road. So that could have some impact on travel time being dispatched to a water main break in Westlake.

A large number of fire hydrants have been offline since they do not operate correctly. These fire hydrants are not repaired in a quick manner and can be seen with garbage bags covering them.

Also it is suggested that mainline valves should be exercised on a routine basis to verify they are in good working order and this has been found not to be the case by CWD. In early stages of the hydraulic modeling of the water distribution system by HNTB various fire hydrant testing was conducted by City of Westlake personal to determine the roughness coefficient (C-value for Hazen William's equation) of the existing water line pipes. About 33 sites were tested during fall of 2010 and the following table illustrates how many problems were encountered with this small sampling of the water distribution system.

TABLE 2.11 CWD MAINTENANCE PROBLEMS DISCOVERED (FALL 2010)

LOCATION	MAINLINE VALVE CLOSED	MAINLINE VALVE NOT FUNCTIONING	FIRE HYDRANT VALVE NOT FUNCTIONING	FIRE HYDRANT NOT FUNCTIONING
FOREST BROOK	1	1		
DOVER CENTER / BERKLEY	1			
DORAL / BRADLEY		1		
BRADLEY / DETROIT	1			
DETROIT WEST OF WALDEN			1	
CENTER RIDGE WEST OF HAWKINS		1		
WINGED FOOT / BEAVER CREEK	1			
RADCLIFF / SALEM				1
MEADOW / WALTER		1		
MENDELSSOHN / SCHUBERT				1
REGENCY / COVENTRY	1			
CENTER RIDGE / WESTTOWN		1		
WESTCHESTER / CAROLINE	1			
EAST BROCKWAY				1
TOTALS	**6**	**5**	**1**	**3**

SECTION 3 AVON LAKE MUNICIPAL UTILITIES

3.1 BACKGROUND

ALMU provides water to about 170,000 people in seven counties, including Cuyahoga County. ALMU water has won "best tasting water" in rural Ohio eight of the last nine years and came in second place at the 2008 National Rural Water Association Conference. Utilizing ALMU as a secondary water source will not be a negative factor for taste and quality and majority of the residents will not even notice a change. The Avon Lake Water Filtration Plant uses two intakes from Lake Erie to provide raw water to the plant. At no time has there been an interruption of raw water entering the plant or water being of poor quality that could not be treated to meet all water quality standards. The filtration plant currently has a capacity of 40 MGD. An expansion is planned to upgrade the filtration plant to 50 MGD and that will be completed by 2013. The expansion is based upon future demand within the existing service areas of ALMU and its bulk customers and the upgrade is not based on the City of Westlake being a customer. This future demand will not be required for some time and the time frame to use ALMU as a secondary water source will not occur until after the plant modifications are completed.

ALMU has two major water transmission lines:

- ETL1-This is along Lear Nagle Road with an average daily flow rate of 3.8 MGD. This is the line that the City of Westlake will connect to.
- ETL2 –Travels south through the western portions of Avon and North Ridgeville en route to Medina County and has average daily flow rate of 6.2 MGD.

3.2 ALMU REDUNDANCY

ALMU has built redundancy into their water transmission and filtration system for reliability and maintenance. The ALMU filtration plant has two separate power feeds. And if both of those power feeds are offline then on site back-up power generation is available to provide more than 100% of electrical demands for the average daily production. Both of the major transmission lines (ETL1 and ETL2) have two interconnects that could allow one of the transmission lines to be shut down for maintenance. Both transmission lines pumping stations have two separate power feeds as well. Also the pumping stations have back-up generation on site that can provide the water flow rate that is required for the system during a typical summer day including the City of Westlake's demand.
The ETL1 and ETL2 pumping stations are operated with variable frequency drives that slowly ramp up and down the flow rate and pressure in the lines to allow the Island Road and Spieth Road storage tanks to fill and draw. There are no known incidents of transient pressure gradients in the system causing breakage of the lines within bulk customer's distribution systems. Bulk customers each maintain their own storage tanks as well.

3.3 WATER QUALITY

When the 2010 published water quality reports of both CWD and ALMU are reviewed they both exceptionally exceed the EPA minimum water quality standards. However, when the two reports are compared to each other, the regulatory contaminant levels of ALMU are lower in most categories. See the following table.

TABLE 3.1 WATER QUALITY STANDARDS

REGULATED	Maximum Contaminant Level	Avon Lake	Cleveland		Lower Regulatory Contaminant
Turbidity (NTU)		0.18	0.2		Avon Lake
Total Organic Carbon (ppm or mg/L)		1	1.01		Avon Lake
Barium (ppm or mg/L)	2	0.026	N/A		
Copper (ppm or mg/L)	1.3	0.05	0.1		Avon Lake
Lead (ppb or µg/L	15	<3.0	4.3		Avon Lake
Fluoride (ppm or mg/L)	4	1.01	1.2		
Nickel (ppm or mg/L)	100	8.8	N/A		
Nitrate (ppm or mg/L)	10	0.62	0.6		Cleveland
Haloacetic Acids (ppb or µg/L)	60	13.8	21.3		Avon Lake
Total Trhalomethanes (ppb or µg/L)	80	30.3	27.5		Cleveland
Chlorine (ppm or mg/L)	4	1.24	1.3		
NON-REGULATED					
Chloroform (ppb or µg/L)	-	12.8	2.1		
Bromoform (ppb or µg/L)	-	0.16	N/A		
Bromodichloromethane (ppb or µg/L)	-	9	2.7		
Dibromochloromethane (ppb or µg/L)	-	4.4	1.6		

3.4 ALMU WATER RATES

The ALMU rate schedule for customers outside the City of Avon Lake is based on the following:

Avon Lake Rate + 10% + MOR (Maintenance and Operating Cost to Provide Water to the Border)

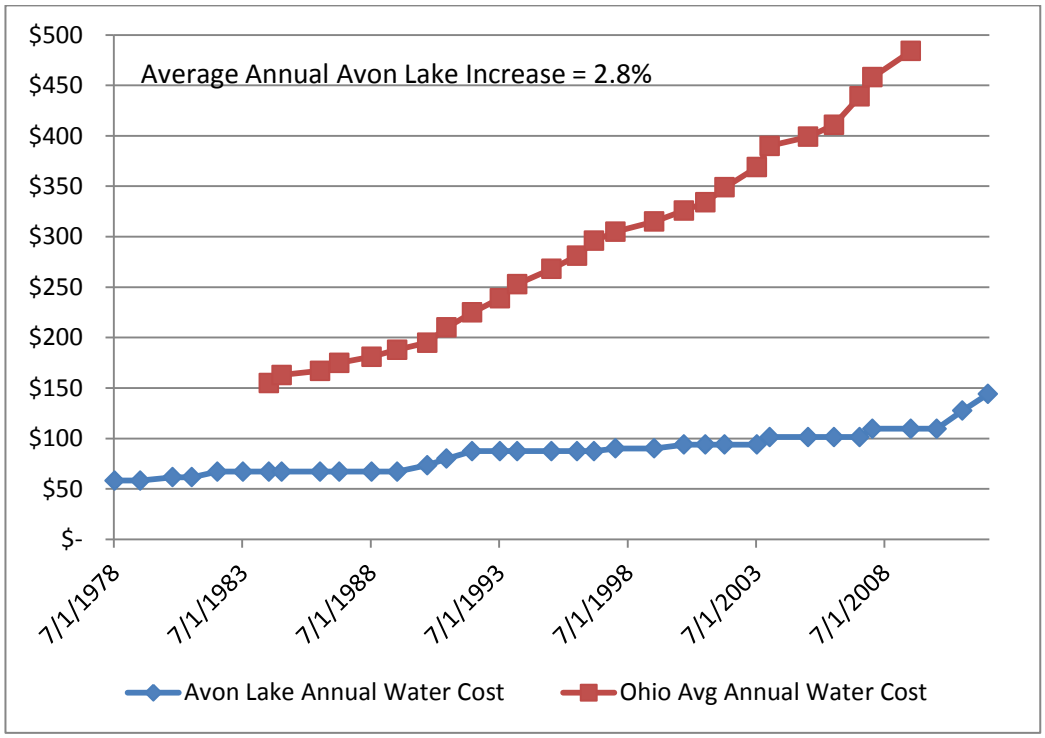
This pricing structure is similar to that of CWD with one major exception, CWD charges customers outside the City of Cleveland a 30% surcharge while ALMU only charges a 10% surcharge. The following table illustrates the potential rates to the City of Westlake as a bulk purchaser from ALMU:

TABLE 3.2 POTENTIAL WATER RATE SCHEDULE FOR WESTLAKE AS BULK WATER PURCHASER

YEAR	AVON LAKE BASE RATE	10% SURCHARGE	M.O.R. RATE	TOTAL UNIT COST		YEAR	AVON LAKE BASE RATE	10% SURCHARGE	M.O.R RATE	TOTAL UNIT COST
2012	$1.06	$0.11	$0.24	$1.41		2012	$7.93	$0.79	$1.80	$10.52
2013	$1.08	$0.11	$0.24	$1.43		2013	$8.08	$0.81	$1.80	$10.69
2014	$1.10	$0.11	$0.24	$1.45		2014	$8.23	$0.82	$1.80	$10.85
2015	$1.12	$0.11	$0.24	$1.47		2015	$8.38	$0.84	$1.80	$11.02
2016	$1.15	$0.12	$0.24	$1.51		2016	$8.60	$0.86	$1.80	$11.26
2017	$1.17	$0.12	$0.24	$1.53		2017	$8.75	$0.88	$1.80	$11.43
	$ / 1,000 GALLONS					$ / MCF				

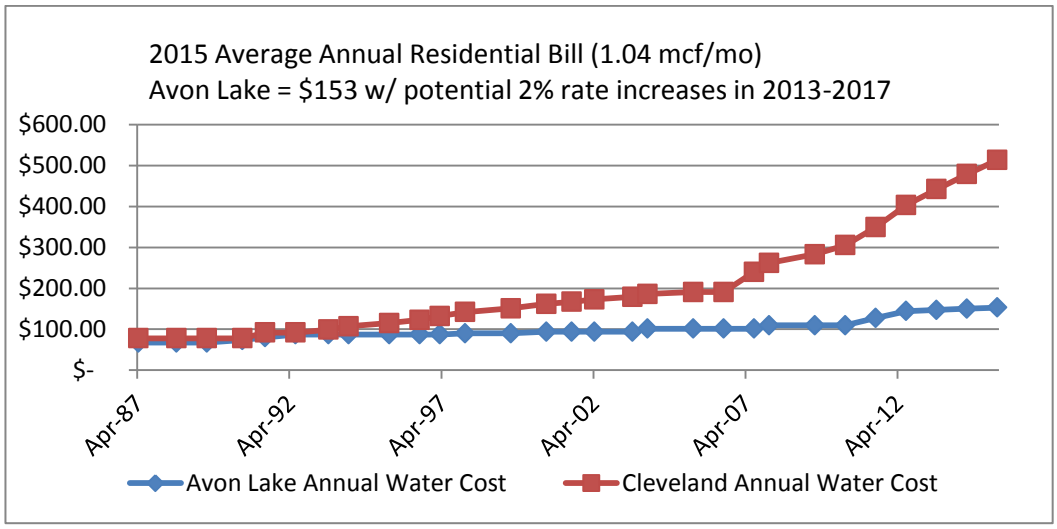
ALMU has been very successful in keeping the water rates low with minimal rate increases. The charts below illustrate this point with a comparison of an average annual water bill of Avon Lake residents compared to that of the State of Ohio average.

CHART 3.3 ANNUAL WATER BILL COMPARISON AVON LAKE v. OHIO AVERAGE[5]



When ALMU (City of Avon Lake residents) rates are compared to that of CWD (City of Cleveland residents) in 2015 a tremendous savings can be seen in the chart below.

CHART 3.4 COMPARISON OF AVON LAKE WATER BILLS V. CITY OF CLEVELAND WATER BILLS[6]



[5] Danielson, Todd, ALMU, email correspondence to Director Kelly, City of Westlake, December 14, 2011
[6] Danielson, Todd, ALMU, email correspondence to Director Kelly, City of Westlake, December 14, 2011

The CWD provides water to various communities that are bulk water purchasers. Those communities established their own water departments for maintenance, repairs, meter reading and billing. The table below compares the potential water rates ALMU will charge to the City of Westlake to the water rates CWD charges to its bulk water purchasers.

TABLE 3.5 CWD MASTER METER WATER RATE SCHEDULES FOR BULK SUPPLIERS[7]

MASTER METER COMMUNITY (MCF)	2012	2013	2014	2015
BEDFORD	$31.54	$31.54	$32.53	$33.35
CHAGRIN FALLS	$35.76	$36.14	$37.51	$38.56
CLEVELAND HEIGHTS	$31.50	$31.50	$32.53	$33.35
LAKEWOOD	$27.10	$27.10	$27.10	$27.10
GEAUGA COUNTY	$38.72	$38.72	$38.72	$38.72
WESTLAKE'S COST FROM ALMU	$10.52	$10.69	$10.85	$11.02

3.5 ALMU REQUIRED CAPITAL IMPROVEMENTS

With the additional water demand of the City of Westlake the ALMU water transmission and filtration system require various capital improvement projects that need to occur now and in the future to maintain proper capacity and redundancy in the system. Some of these capital improvements are the following:

- Connect new City of Westlake 30" transmission line along Schwartz Road to ETL1. This improvement would be required to obtain water from ALMU. The City of Westlake may finance this project so the debt service for this would be added to each of the Westlake customer's bills with the other capital improvement costs. This work is estimated to be about $1.5 Million.
- New transmission line ETL3 to serve City of Westlake and portions of the ALMU service area to the south. This would be installed 5-10 years after the City of Westlake connects to ALMU and the cost would be estimated at $7.5 Million (30" diameter line) to $14 Million (48" diameter line). Since other bulk customers would share this line then the City of Westlake would only be responsible for a portion of the capital expense. The debt service for this project would be added to the bulk water cost to Westlake if ALMU finances the project.
- Additional pumping capacity and new transmission line from the filtration plant to the Moore Road Pumping Station. This improvement is tentatively planned for 15 to 20 years from now. No cost estimate is established yet and the capital improvement cost would be added to the bulk water purchase.

From the supply point of view, utilizing ALMU as a secondary source will have no impact on water quality and dependability. The main difference is that ALMU is more cost competitive then CWD and that savings can be passed on to the residents of Westlake and provide an additional revenue stream for future water replacement projects.

[7] Cleveland Water Department, "Annual Report 2010", 2010 pg. 25

SECTION 4 HNTB REPORTS

4.1 PHASE 1 REPORT

In the Phase 1 Water System Study dated December 2008 the HNTB Corporation recommended that the City of Westlake continue to pursue ALMU as a secondary water source. The following items were addressed and concluded in the Phase 1 Water System Study:

1. Westlake should purchase water wholesale from ALMU and Westlake would maintain all distribution lines with a newly formed water department.
2. The projected Average Day Demand of 5.7 MGD can be supplied by the expanded treatment capacity of 50 MGD from ALMU. The existing ALMU treatment capacity of 40 MGD would be also sufficient to supply water to Westlake.
3. Preliminary Capital Improvement Cost of $33.6 M
    a. One initial transmission line from Westlake to ALMU
    b. One 2 MG storage tank and pump station
    c. Replacement of existing distribution mains in Westlake
    d. Installation of shut-off valves at connections to CWD.
4. The wholesale water rates proposed by ALMU would allow for positive revenues.

4.2 PHASE 2 REPORT

This recommendation was then further explored in the Phase 2 Water System Study dated March 2012, which also concluded it would be beneficial for the City of Westlake to utilize ALMU as a secondary water source. A hydraulic model was created for the Phase 2 Study to evaluate the proposed capital improvements and to verify that the existing distribution system is adequate for the secondary water supplier. From the modeling the following was concluded:

1. The projected Average Day Demand of 5.7 MGD was revised to 6.2 MGD to reflect recent zoning changes within the City. ALMU can still provide water at this revised flow rate.
2. Only one transmission line is required to connect Westlake to ALMU, which would be along Schwartz Road.
3. The existing water distribution system in Westlake would only require minor improvements. The existing water distribution system in Westlake has two pressure zones and the new system would only have one.
4. With water supplied by ALMU the pressures modeled in the new system for Average Day and Maximum Day are in acceptable ranges. For Peak Hour additional water would be required from storage tanks to maintain acceptable pressures.
5. The new system would have a minimum available fire flow rate of 1,000 gpm at all locations.
6. Revised Preliminary Capital Improvement Cost to $18.9 M.
    a. One transmission line along Schwartz Road to connect Westlake to ALMU
    b. One 2 MG tank
    c. Replacement of existing distribution mains in Westlake
    d. Installation of shut-off valves at of various points to CWD.

4.3 WATER DEMANDS

The following chart shows the water demands that HNTB used for the hydraulic model. The existing demand was determined from the 2010 water consumption of 167,351 MCF.

TABLE 4.1 DEMAND SCHEDULE

MGD	AVERAGE DAY	MAXIMUM DAY	PEAK HOUR
FORMULA		2 X AVG. DAY	2 X MAX. DAY
EXISTING SYSTEM	3.4	6.8	13.6
PROPOSED SYSTEM	6.2	12.3	24.6

4.4 DESIGN PROCESS

The following items were evaluated with the hydraulic model of the proposed water distribution system to evaluate the most logical infrastructure improvements:

- One or two connections to ALMU transmission main
- Location of connection to ALMU transmission main and connection to Westlake system
- Single or multiple pressure zones
- Location and size of finished water storage
- Viability of utilizing CWD assets
- Improvements required to existing water distribution system

4.5 INFRASTRUCTURE IMPROVEMENTS

HNTB concluded that only one connection to ALMU would be sufficient to provide the water capacity to the City of Westlake and the most logical location of that would be along Schwartz Road. It was also determined that a single pressure zone with a pressure reducing valve at the corporation limit would provide adequate water pressure to the entire water distribution system. The incoming pressure from ALMU along the transmission line will be adjusted based on the demand of the system. The location of the storage tank was determined to be at Columbia Road and Center Ridge Road and would need to be 2 million gallons at total build out with an average day demand of 6.2 MGD.

The majority of the existing water distribution system will not require improvements if Westlake utilizes ALMU as a secondary water source. The minor improvements that would be required are as follows:

- Increase the water main size on Porter Road and Southbridge Road
- Install shut-off valves at point of connection to CWD and neighboring Cities.
- Installation of various new water lines.

The following table shows all the infrastructure improvements required within the City of Westlake to obtain water from ALMU.

TABLE 4.2 OVERVIEW OF PROPOSED IMPROVEMENTS[8]

ITEM	LOCATION	QUANTITY
2 STORAGE TANK	COLUMBIA / CENTER RIDGE	1
PUMP STATION	COLUMBIA / CENTER RIDGE	1
30" TRANSMISSION LINE	SCHWARTZ ROAD	2,400 FT
24" TRANSMISSION LINE	SCHWARTZ & BRADLEY	4,400 FT
16" WATER LINE	CROCKER ROAD	1,400 FT
16" WATER LINE	AT VARIOUS LOCATIONS	10,300 FT
12" WATER LINE	SOUTHBRIDGE & PORTER	2,100 FT
12" WATER LINE	AT VARIOUS LOCATIONS	9,400 FT
MASTER METER	CITY LINE @ SCHWARTZ	1
PRESS. REDUCING VALVE	CITY LINE @ SCHWARTZ	1
SERVICE METERS	ALL STRUCTURES	11,000
SHUT OFF VALVE MAINTENANCE OR REPLACEMENT	CWD TRANSMISSION LINES	TBD
SHUT OFF VALVE	NEIGHBORING CITIES	26

4.6 HNTB OPINION OF PROBABLE CONSTRUCTION COST

Based on the recommendations of improvements that would be required to obtain water from ALMU an estimated construction cost of about $19 million was calculated. See table below.

TABLE 4.3 ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST[9]

ITEM / DESCRIPTION	QUANTITY	UNIT	UNIT PRICE'	AMOUNT[2]
Storage Tanks				
2 Million Gallon Ground Storage Tank	1	EA	$1,500,000	$1,500,000
Package Pump Station	1	EA	$450,000	$450,000
Water Mains				
30" DI Pipe for New Transmission Main (Schwartz Road)	2,400	LF	$200	$480,000
24" DI Pipe for New Transmission Main (Schwartz Road)	4,400	LF	$130	$572,000
16" pipe for Replacement Mains	10,300	LF	$100	$1,030,000
16" pipe for New Transmission Main Crocker (Crocker Road)	1,400	LF	$100	$140,000
12" DI Pipe for Replacement Mains	9,400	LF	$75	$705,000
12" DI Pipe for New Transmission Main (Porter Rd and Southbridge Circle)	2,100	LF	$125	$263,000
30" - 90° Bend	4	EA	$5,000	$20,000
30" - 45° Bend	8	EA	$4,000	$32,000
24" - 90° Bend	4	EA	$4,650	$19,000

[8] HNTB, "Water System Study Phase 2", March 2012 Pg. 6-1
[9] HNTB, "Water System Study Phase 2", March 2012, Pg. 5-1

ITEM / DESCRIPTION	QUANTITY	UNIT	UNIT PRICE[1]	AMOUNT[2]
24" - 45" Bend	6	EA	$3,500	$21,000
16" - 90" Bend	6	EA	$1,500	$9,000
16" - 45° Bend	12	EA	$1,500	$18,000
12" - 90° Bend	6	EA	$750	$5,000
12" - 45" Bend	12	EA	$650	$8,000
Valves				
30" Butterfly	8	EA	$20,000	$160,000
24" Butterfly	4	EA	$15,000	$60,000
16" Butterfly	12	EA	$3,750	$45,000
12" Butterfly	28	EA	$2,250	$63,000
Wet Taps				
30" x 12" - Schwartz Rd and ALMU ETL1	1	EA	$15,000	$15,000
24" x 12" - Schwartz Rd and Hilliard Boulevard	1	EA	$7,500	$8,000
24" x 12" - Schwartz Rd and Crocker	1	EA	$7,500	$8,000
Meter Pits & Meters				
30" Pressure Reducing Valve	1	EA	$75,000.00	$75,000
Casing Bores				
48" Casing Bore for 30" Carrier pipe	150	LF	$800	$120,000
28" Casing Bore for 12" Carrier Pipe	150	LF	$400	$60,000
Miscellaneous Construction				
Granular Backfill	13,500	CY	$25	$338,000
Pavement Repair[3]	2,500	SY	$40	$100,000
Sidewalk Repair[3]	2,500	SY	$30	$75,000
Curb Repair[3]	2,000	LF	$20	$40,000
Service Meter Replacements	11,000	EA	$350	$3,850,000
Electrical @ Wholesale Meter Pits	1	EA	$7,500	$8,000
Radio Telemetry @ Wholesale Meter Pits	1	EA	$5,000	$5,000
Repair or replace shut-off valves on CWD transmission lines	33	EA	$7,500	$248,000
Install valves on Mains Leaving Westlake (to North Olmstead, Fairview Park and Bay Village)	26	EA	$7,500	$195,000
Clean up & Restoration	1	LS	$50,000	$50,000
SUB-TOTAL				**$10,795,000**
Mobilization/Demobilization/Insurance (10%)				$1,080,000
SUBTOTAL				$11,875,000
Non-Construction Costs - Project Financing, Legal Services, Engineering (25%)				$2,969,000
Third Party Retainer for Emergency Water Main Break Repairs during system start-up	1	LS	$300,000	$300,000
SUBTOTAL				$15,144,000
Contingency (25%)				$3,786,000
			Estimated Total Project Costs	**$18,930,000[4]**

Notes:

1. Unit price estimate includes installation.
2. Rounded to the nearest $1,000.
3. Does not include complete street rehabilitation.
4. Does not reflect any work outside the City of Westlake Corporate Limits.

This estimate is significantly lower than the Phase 1 study since fewer assumptions were made due to the hydraulic modeling that was performed. Also this cost does not include items outside the City of Westlake.

4.7 PERFORMANCE OF THE PROPOSED SYSTEM

Ultimately, the proposed improvements, coupled with ALMU as the new water supplier to the City of Westlake, will provide numerous benefits to Westlake's water customers. The most significant benefit is the improvement of pressures in the northern area of Westlake. According to the hydrant testing performed in November 2010, pressures in the area north of Detroit Road currently range between 44 psi and 60 psi. The Average Day pressures in the proposed water system improvements scenario range from 102 psi to 125 psi. Not only is the pressure available in the northern area of Westlake improved, but the distribution of pressure throughout the system is reduced. While the existing system had a pressure differential of 72 psi (between 44 psi and 116 psi), the proposed system has a pressure differential of 53 psi (between 124 psi and 70 psi) for average day demand. In addition to the pressure improvements, the City of Westlake will see improved fire protection due to the ability of the system to meet the fire flow demands of a greater number of its users. This is discussed in more detail further in this report.

Table 4.4 below, provides the range of system pressures that can be expected with the proposed water distribution system. These pressures are based on the use of a pressure reducing valve (PRV) installed at the 30-inch connection to the Avon Lake ETL1 transmission main. The pressure setting on the PRV at that location can be adjusted to provide the City of Westlake the ability to regulate the pressures within the distribution system. For average day demand the pressure is regulated to 110 psi and for maximum day demand, the pressure is regulated to 120 psi. The pressure is not regulated in the peak hour scenario. Maps of the pressure distribution throughout the City of Westlake's water system are given in Appendix A for each of the demand scenarios.

TABLE 4.4 PRESSURES (PSI) FOR PROPOSED SYSTEM[10]

DEMAND SCENARIO	MAX. PRESSURE	AVERAGE PRESSURE	MIN. PRESSURE
AVERAGE DAY	124	95	70
MAXIMUM DAY	118	89	61
PEAK HOUR	126	82	45

4.8 HNTB CONCLUSION

HNTB believes that the proposed utilization of a secondary water purveyor has numerous benefits to the City of Westlake's water users and recommends that Westlake continues to pursue this path.

[10] HNTB, "Water System Study Phase 2", March 2012, Pg 6-2

Section 5 Arcadis U.S., Inc. Review

5.1 ARCADIS REPORT

The City of Cleveland hired Arcadis U.S., Inc. to review all aspects of the City of Westlake's utilization of ALMU as a secondary water supplier. The report included comments and observations regarding the City of Westlake's efforts to establish a separate water system. Their comments can be separated into three categories and were presented in a report dated December 12, 2011:

- Comments associated with the hydraulic analysis of HNTB in the Phase 2 Draft Report
- Comments associated with the ALMU transmission system and treatment plant
- Comments associated with the City of Westlake's preliminary financial cost model

The next sections outline all of the observations made by Arcadis in italic and the City of Westlake response below each item:

5.2 EPA REGULATION ISSUES

The proposed water system as presented to Ohio EPA in April 2011 was different than the proposed system In the Phase 2 Report dated November 2011. Controlling leaching of lead from existing services was not addressed.

The meeting that was conducted with the Ohio EPA was a preliminary meeting and the final configuration of the proposed water system was not completed at that time. The City of Westlake water distribution system is a relatively newer system with 77% of the water mains being less than 50 years old so that decreases the concentration of lead found in the water supply. Also the water quality tests published for 2010 have a lead concentration for ALMU under 3 ppm and for CWD was 4.3 ppm so the treatment of lead in the water is not a concern. Also the fewer amounts of chemicals added to the water supply is healthier for all.

5.3 GROUND STORAGE TANK

The proposed 1 MG ground storage tank is insufficient to meet peak hour demand. The volume of storage needed to accommodate the peak hour demand is 2 MG, and has an opinion of cost of $11.2 million. More importantly, CWD hydraulic modeling shows that the storage cannot be fully recharged during the off-peak hours of a maximum day. The system will fail during maximum demand days (summer).

The final recommended size of the ground storage tank by HNTB was 2 MG as calculated by Arcadis. The sizing of the storage tank was based on the need for equalization storage to cover the peak hour demand for the new proposed system. The peak hour demand of 24.6 MGD can't be fully supplied by ALMU so the tank would be the supplemental supply of water. So during a peak hour demand ALMU will provide 15,700 gpm and the pump for the ground storage tank will provide the balance of 1,400 gpm. The tank will also provide emergency water storage and yields about 32% of the average daily demand of 6.2 MGD.

An extended period simulation (EPS) was performed for the storage tank with a maximum day demand of 12.3 MGD. Keep in mind ALMU can provide this demand without the storage tank. So this simulation was performed to evaluate the drafting of the tank. This hydraulic simulation illustrated that the storage tank can be filled in off peak hours without a drastic effect of pressure within the system contrary to Arcadis' claim. The EPS analysis had the storage tank's pump station operating in the morning hours (4 AM to 8 AM) and in the

evening hours (4 PM to 11 PM) with a flow rate of only 1,300 gpm. Arcadis calculated the flow rate of the pumping station to be 8,500 gpm, which is not valid for this model. During the non-peak hours the tank was filling at a flow rate of 1,030 gpm. The pressure drop in the system with filling the tanks was not significant so the system did not fail as Arcadis claimed:

- 4 psi pressure drop in the north-west section of the City
- 8 psi pressure drop in the south-east section of the City

Arcadis claimed the storage tank would be a cost of $11 million and HNTB calculated it to be $3.4 million with contingencies. The main discrepancy in this cost is the pump station. Arcadis miscalculated the pump stations flow rate to be 8,500 gpm and according to the HNTB hydraulic model a flow rate of 1,400 gpm is only required. The high flow rate of Arcadis required an additional transmission line to fill the tank, which is not required because the existing pipe network is sufficient based on the ESP analysis.

5.4 SINGLE PRESSURE ZONE

Converting the existing two pressure zones to one pressure zone will result in higher pressures (as much as 50 psi higher in the existing Low Service area) that will increase incidents of water main breaks and adversely affect indoor plumbing and fire suppression systems.

The proposed water distribution system for the City of Westlake will be one pressure zone and it is acknowledged that the existing pressures at some locations will increase to higher favorable pressures at the water mains. It is intended that all water meters will have a pressure reducer installed allowing the owners the flexibility of increasing or maintaining their existing pressures. Certified plumbers will be on hand to increase the pressures of structures at the owner's request to verify no damage to the existing indoor plumbing will occur

The existing low pressure zone identified as "Low" yields multiple complaints from the residents in regards to low pressure. This is most notably occurring in the north east section of the City in the Melrose, Belmont, Concord, and Maybelle area. So currently a new water line is being installed in this area and a pilot program will occur at the completion of this project to switch the area into the higher pressure zone. This is being performed in cooperation with CWD. So the lessons learned from this pilot program will be implemented in the future.
Fire suppression systems will not be affected with the increase in pressure since they are designed for it. During a fire the sprinkler system can have the pressure increased from a fire engine's pump at the Siamese connection. That is why pressure tests are conducted on fire suppression systems within buildings to account for this pressure increase. So this point is not valid with standard fire fighting practices.

Water mains can break from a rapid increase pressure. A good testament of this is when the pressure at Crown Filtration is increased to compensate for another treatment plant being off line for maintenance. When this occurs the frequency of water main breaks does increase. The key to this is a rapid change in pressure. The proposed utilization of ALMU as a secondary water source is potentially planned to occur of a long period of time (2-3 months). The pressure in the mains will slowly increase as opposed to a rapid change. This will decrease the occurrences of water main breaks. It is understood that some water main breaks will occur and the City of Westlake has contingency money within the construction budget to hire third party contractors to assist in these repairs so the public will not be affected.

Water main breaks occur at points of weakness within the system. To better understand how structurally sound the system is a comprehensive leak detection survey will be conducted on all water mains in the distribution system owned by the City of Westlake. From this survey the locations with leaks will be repaired prior to the

connection to ALMU. In receiving proposals for this work it has been noted a similar sized water distribution system leak detection survey identified 37 leaks that contributed to about 400,000 GPD of water loss.

5.5 PRESSURE TRANSIENTS

The system proposed by HNTB in Westlake is a "closed" system, with no floating storage. Such systems are very susceptible to sudden and dramatic pressure spikes that can cause a large rash of water main and related plumbing failures. The presence of a large 30" pressure regulator on the main feed from Avon Lake will only make Westlake more susceptible to pressure spikes and water main breaks.

It is agreed that the “closed system” is more prone to transient effects without the dampening effect of an open boundary within the system. So HNTB performed some transient analysis to see the effects of the following possible scenarios that would generate large transients within the system:

- Power loss or failure to the storage tank pump station (pump flow rate drops to 0 instantaneously)
- Water main break (1,400 gpm to atmosphere) in low elevation area-Clemens Road near Bradley Road
- Water main break (1,400 gpm to atmosphere) in high elevation area- Columbia Road near Hall Road

Air or vapor pocket formations within water lines occur when the water column separates. Water column separation can occur if the pipe line pressure drops below the vapor pressure of the liquid. When the pocket later closes, the two columns of liquid collide, resulting in cavitations and a large increase in pressure that can be destructive to the system. The hydraulic analysis of the three above scenarios did not generate the formation of air or vapor pockets to form in the distribution system. Also there was no significant upsurge or down surge events caused by any of the transients.

A transient analysis was not conducted on the 30” pressure reducing valve for the primary transmission line from ALMU. With diligent design of this valve hydraulic transient events can be successfully avoided. The Moore Road pumping station for ETL1 has variable frequency drives that slowly ramp up and down the flow rate to eliminate transients caused in the major transmission lines. ALMU has had no known incidents of transient pressure gradients in the system causing breakage of lines within a bulk water customers’ water distribution system.

The lack of significant elevation difference across the water distribution system is a great benefit in the prevention of damaging transient effects and the Westlake proposed storage tank pumping system will utilize variable frequency drives as well. So caution should be taken for a “closed” system when designing the infrastructure and the majority of the transient events can be either prevented or significantly reduced.

5.6 FIRE FLOWS

CWD modeling of the proposed system and field testing in the existing system show significantly lower fire flow capacities and availability after a connection to ALMU than currently provided in the CWD system.

In the Phase 2 water study report HNTB compared fire flow rates (maximum day demand) from the proposed system to the 27 locations as tested by the Insurance Services Offices, Inc. on July 15, 2010. The ISO is a third party who establishes appropriate fire insurance premiums for residential and commercial properties. Insurance companies need reliable, up-to-date information about a community’s fire-protection services. ISO provides that information through the Public Protection Classification program in which fire flow rates are used to help determine that rating. CWD performed fire

flow testing November 2011 to some of the 27 ISO sites. It is interesting to note that their fire flow results were extremely higher than the ISO data with increases from 25% to 250% (100% avg.). The difference in fire flows can be accounted from the following:

- The ISO testing was performed in summer during high demand and the CWD testing was performed in late fall with minimal demand.
- The pressures in the distribution system could have been increased since 2010.
- Isolation valves in the adjacent areas may have been closed for the ISO testing and subsequently opened to increase capacity. See table 2.11 of the alarming number of valves found closed for the flow testing to determine the C factor.

Since the ISO performs these fire flow analysis for every municipality in the country and their experience is second to none, it would be difficult to find fault in their data. So the ISO fire flow rates shall be used as the comparison in lieu of the suspect CWD data.

HNTB calculated fire flow without the 2 MG tank to show the worse-case scenario. When HNTB calculated the available fire flow from the model the maximum day demand of 12.3 MGD (total build out of City) was used. It is assumed that when the ISO performed fire flow analysis on July 15, 2010 the demand was near maximum day since the weather was in the low 90's degree F. with sun. So that maximum day demand can be figured from the known 2010 yearly consumption of 167,351 MCF, which provides an average day demand of 3.4 MGD. So the maximum day demand is twice that of the average day demand so the maximum day demand is about 6.8 MGD for the ISO testing.

Since the HNTB model's demand schedule is established from total build out of the City the HNTB average day demand of 6.2 MGD is close to that of the ISO testing so that shall be used for comparing the fire flows of the existing distribution system of to what is proposed. For the following table and the data in yellow indicates locations that did not meet the ISO required fire flows. The data in green indicates sites that the available fire flow has increased in the proposed system.

The following table compares the available fire flow rates of the 27 ISO tests sites to that of the proposed system with an average day demand and a maximum day demand.

TABLE 5.1 ISO FIRE FLOW COMPARISON BETWEEN EXISTING AND PROPOSED

ISO TEST SITE NUMBER	CAD NODE	ISO REQUIRED FIRE FLOW	EXISTING SYSTEM (GPM)			HNTB MODEL (GPM) NO TANK	
			ISO (7-15-10)	CWD (11-11)		AVG. DAY 6.2 MGD	MAX. DAY 12.3 MGD
1	1020	3,000	4,600			2,634	2,196
2	410	3,500	3,700			5,012	3,509
3	273	3,000	2,800	6,000		4,112	3,433
4	59	2,500	3,100			4,954	3,670
5	1028	4,000	4,000			6,000	4,645
6	169	2,500	3,200			6,326	5,314
7	244	3,000	3,100			6,431	5,396
8	238	3,500	2,500	5,008		6,380	5,468
9	36	3,500	2,400	3,013		8,363	7,329
10	229	3,500	3,300			6,000	5,806
11	1001	4,000	4,200			8,000	7,587
12	15	2,500	2,700	5,500		6,011	5,582
13	21	750	2,000	8,853		15,000	14,059
14	77	2,500	4,500			3,551	3,350
15	86	3,000	9,000			6,159	5,470
16	293	1,000	2,900			4,757	3,909
17	95	3,000	3,200			5,000	4,621
18	440	4,500	3,300	5,453		6,692	5,631
19	4	4,000	3,400	5,453		5,000	4,970
20	277	3,500	4,200			4,834	3,824
21	103	4,500	3,800	5,103		4,102	3,034
22	378	3,500	5,600			4,564	3,218
23	372	3,000	5,900			5,014	3,370
24	268	3,500	8,000			5,475	3,642
25	1012	5,000	8,000			6,752	4,974
26	386	3,000	2,000	5,987		3,583	2,676
27	579	1,500	1,400	4,882		3,650	3,435

In comparing the 27 random ISO sites throughout the City of Westlake with a similar demand the proposed system has superior fire flow coverage then the existing system. This can be summarized as follows:

- 9 sites of the existing system did not meet the ISO fire flow requirements.
- Only 2 sites did not meet the ISO fire flow requirements for the proposed system.
- 20 sites of the proposed system had increased available fire flows from the existing system.
- Only 7 sites of the proposed system had a decrease in the available fire from the existing system.

In the Arcadis report CWD performed fire flow testing to various fire hydrants near medical and educational facilities to attempt to illustrate the existing system is superior then the proposed water distribution system. However, the majority of the sites they selected were on the eastern part of town close to their existing transmission water line

interconnects. So this was not a fair and uniform sample of the City. Also Arcadis calculated the proposed system with their own model, which does not match the HNTB that model, was diligently generated and calibrated. So those values are not shown for clarity. See table below.

TABLE 5.2 FIRE FLOW AVAILABILITY AT SEVERAL MEDICAL AND EDUCATIONAL FACILITIES

FACILITY	ADDRESS	CAD NODE	EXISTING CWD FIELD TEST (11-11) (GPM)	HNTB MODEL NO TANK (GPM)	
				AVG. DAY	MAX. DAY
THERAPY SERVICE WEST	826 WESTPOINT PARKWAY	799	4,686	3,518	2,960
COMMUNITY PEDIATRICS	805 COLUMBIA ROAD	270	5,176	5,000	3,628
WESTLAKE FAMILY HEALTH	30033 CLEMENS ROAD	237	4,466	5,010	5,000
ST. JOHN MEDICAL CNTR	29000 CENTER RIDGE ROAD	86	8,009	6,159	5,469
WESTLAKE HIGH SCHOOL	27200 HILLIARD BLVD.	361	13,818	5,006	5,000
ACHIEVEMENTS CENTER	24211 CENTER RIDGE ROAD	105	5,221	3,719	2,778

Even though the majority of the available fire flow rates are lower than these non-random locations they are more than likely to meet the ISO requirements.

Also in the Arcadis report CWD performed fire flow tests to various areas in the City Of Westlake to illustrate a large reduction in fire flow with the proposed system. Once again these locations are on the eastern part of town and were strategically selected since they are close to the transmission line.

TABLE 5.3 LOCATIONS ARCADIS CLAIMS HAVE A LARGE REDUCTION IF FIRE FLOW

LOCATION	CAD NODE	EXISTING CWD FIELD TESTING (11-11) (GPM)	HNTB MODEL NO TANK (GPM)	
			AVG. DAY	MAX. DAY
WALTER N/O MAPLE RIDGE	207	2,579	3,055	2,406
CLAGUE N/O WESTWOOD	381	30,345	4,415	3,163
ROSE E/O CANTERBURY	628	4,602	4,574	3,482
WOODPATH E/O WILLOW	550	5,214	2,998	2,367
CENTER RIDGE E/O HORSESHOE	108	8,854	4,139	3,007
HILLIARD E/O HORSESHOE	376	14,847	4,391	3,232
DETROIT E/O CLAGUE	1020	5,261	2,643	2,196
WESTWOOD E/O CLAGUE	383	7,924	3,124	2,381
DETROIT E/O DOVER	53	5,290	5,000	4,532
DETROIT E/O COLUMBIA	1025	3,860	5,000	3,615
HILLIARD E/O COLUMBIA	367	13,795	5,000	3,547
HILLIARD E/O DOVER	514	13,587	5,000	4,239

The proceeding fire flow rates in yellow are areas that are in close proximity to a transmission main interconnect, which provides increase flow rates. If you remove those locations the remaining sites are similar in flow rates to that of the proposed system. If the same logic that was applied for this table was used for the proposed system then along the west side of town the majority of the fire flow rates would be much larger than the existing system but that would not be a fair comparison.

So if you compare fire flow rates of a random sampling of sites as the ISO conducted than the proposed system is superior to that of the existing system when the water demands are the same. Arcadis through CWD testing was misconceiving their point with strategically selected locations close to high pressures and did not take account the larger demand that HNTB was using for fire flow calculations.

5.7 CONNECTION POINTS TO ADJACENT CITIES

The proposed water system has only one connection to the water supplier, compared to the existing 65 points of connection provided by CWD to the Westlake distribution system. It would be extremely imprudent to expect to repair a 30" main failure in 4 hours. Such repairs can take days. Emergency connection(s) - The proposed water system has no emergency connections as CWD will not provide any emergency backup or peak flow connections to Westlake.

The City of Westlake is currently reviewing this issue and evaluating possible contingency plans. The most logical contingency plan would be master meters at multiple locations connected to the CWD transmission lines that would provide water along with ALMU as the secondary source. Currently, the following non CWD distribution systems have this arrangement and this would establish precedent:

1. Berea
2. North Ridgeville
3. Hudson Village

Another approach to this issue is have connection points to ALMU at Center Ridge Road (12" main) and Detroit Road (12" main) with the 2 MG storage tank. The hydraulic analysis has not been performed on this.

5.8 ENVIRONMENTAL ISSUES

The proposed system will introduce an extra 1.5 million tons of carbon into the atmosphere per year, due to extra pumping (approximately $81,000 per year of additional energy costs).

Some additional energy may be required to maintain a single pressure zone. However, the benefits of the single pressure zone outweigh this issue. If a carbon foot print is a major issue then the smaller service area of Westlake as its own water supplier will decrease the carbon foot print of vehicular traffic from CWD Harvard yard and other locations that CWD personal dispatch from outside the City limits.

5.9 COSTS TO CURE

The proposed water system does not provide an acceptable level of cure for the adjacent communities of Bay Village, North Olmsted, Rocky River and Fairview Park.

The existing City of Westlake water distribution system is connected to the adjacent Cities at most major streets and when the proposed system is implemented those 26 locations will fitted with valves that eliminate flow through to the adjacent City. It is understood that by installing valves at these locations the water mains will then

have a dead end configuration. CWD contention is that dead end runs will result in decreased fire flows and poor water quality issues. The City of Westlake's plan is the same rationale used by CWD in separating the two pressure zones within the City of Westlake. The existing water system in Westlake is divided into two pressure zones by the closure of mainline water valves on various sections of pipe runs. This has resulted in the following dead end runs:

1. Bradley Road south of Detroit Road
2. Savannah Pkwy south of Detroit Road
3. Crocker Road south of Detroit Road
4. East end of Corporate Circle
5. West end of Sunset Drive
6. Basset Road north of Holden Arbor Run
7. Settler's Reserve Way south of Detroit Road
8. North end of Dover Center between Hilliard Blvd. and Detroit Road
9. South end of Dover Center between Hilliard Blvd. and Detroit Road
10. Mendelssohn Drive south of Detroit
11. North end of Canterbury Drive between Hilliard Blvd. and Detroit Road
12. South end of Canterbury Drive between Hilliard Blvd. and Detroit Road
13. Cobblestone Chase south of Detroit Road (assumed)
14. North end of Columbia Road between Hilliard Blvd. and Detroit Road
15. South end of Columbia Road between Hilliard Blvd. and Detroit Road
16. Allen Drive south of Detroit Road
17. Queen Anne's Gate south of Detroit Road
18. North end of Clague Road between Hilliard Blvd. and Detroit Road
19. South end of Clague Road between Hilliard Blvd. and Detroit Road
20. East end of South Melrose at West Melrose
21. West end of South Melrose at West Melrose

These areas have not experienced any poor water quality as CWD has eluded that will occur at dead end runs. So it is assumed that the shut-off valves along the City limits will perform in the same manner. Since the proposed new water distribution system is only one pressure zone all these valves will be opened eliminating all these dead end runs. Also the amount of dead end lines will be about the same with the existing system to that of the proposed system. So based on this rational it is not warranted that all the valves are looped back into the system. The Phase 2 Draft Report did not have the fire analysis conducted on the valve connections of the surrounding Cities. Since then the fire flow analysis was conducted and the available fire flow can be seen on the following table:

TABLE 5.4 AVAILABLE FIRE FLOW OF PROPOSED SYSTEM AT NEW SHUT OFF VALVE LOCATIONS

LOCATION DESCRIPTION	AREA CLASSIFICATION	HNTB PROPOSED MAX. DAY DEMAND NO TANK FIRE FLOW (GPM)		EXISTING SYSTEM CWD FIELD TEST FOR AVAILABLE FIRE FLOW, 11-11 (GPM)
Bradley Road and Viking Parkway	COMMERCIAL	4,482		4,700
Bradley Road 4300 ft South of Center Ridge Road	RESIDENTIAL	2,071		4,846
Detroit Road at Brick Mill Run	RESIDENTIAL	1,194		
Center Ridge Road at Hunter's Point Lane	RESIDENTIAL	2,313		
Rose Road at Columbia Road	RESIDENTIAL	3,438		
Dover Center Road 400 ft north of 1st Street	COMMERCIAL	3,983		6,379
Dover Center Road at Primrose Lane	RESIDENTIAL	4,616		
Columbia Road 1000 ft south of Rose Road	RESIDENTIAL	2,862		
Walter Road at Maple Ridge Road	RESIDENTIAL	2,406		4,018
Canterbury Road at Primrose Lane	RESIDENTIAL	3,762		
Crocker Road at Bassett Road	INDUSTRIAL	4,991		5,203
Cahoon Road 900 ft north of Westchester Parkway	COMMERCIAL	4,663		3,231
Columbia Road at First Street	COMMERCIAL	3,643		4,230
Canterbury Road at First Street	INDUSTRIAL	3,559		5,304
Porter Road at Edgepark Boulevard	RESIDENTIAL	3,252		6,206
Edgepark Boulevard at Harding Drive	RESIDENTIAL	3,219		
Hall Road and Walter Road	RESIDENTIAL	2,306		
Meadow Lane and Walter Road	RESIDENTIAL	2,105		
Framingham Road and Walter Road	RESIDENTIAL	2,220		
Tricia Drive and Walter Road	RESIDENTIAL	2,626		
Hilliard Boulevard at Hunter's Point Lane	RESIDENTIAL	3,232		34,704
Clague Road at Stonehedge Drive	RESIDENTIAL	3,171		8,332
Westwood Road 1100 ft east of Interlachen Lane	RESIDENTIAL	1,634		7,875
Clague Road at Sperry Drive	COMMERCIAL	3,486		10,131
Lansing Drive 1600 ft south of Porter Road	RESIDENTIAL	1,089		
Woodpath Trail near Columbia Road	RESIDENTIAL	1,275		8,096

Even though the fire flow rates have decreased with implementation of the shut-off valves they are still within the acceptable range in accordance with Insurance Services Office, Inc. (ISO):

- Residential range was from 1,089 gpm to 4,616 gpm. HNTB concluded that 1,000 gpm is the average ISO requirement
- Commercial/Industrial- The fire flow rate of the existing building was determined and was found to be all in the acceptable range with the ISO Standards. See the following table.

TABLE 5.5 COMMERCIAL PROPERTIES REQUIRED FIRE FLOW RATE

ADDRESS	BUILDING USE	REQ. ISO FLOW RATE CALCULATED	PROPOSED WESTLAKE FIRE FLOW RATE	EX. FIRE FLOW RATE CALC. BY CWD
737 BRADLEY	OFFICE / MAINT. GARAGE	4,250	4,482	4,700
673 CAHOON	RESTAURANT / BAR	1,500	4,663	3,231
680 DOVER CNTR	RESTAURANT / BAR	3,000	3,983	6,379
777 CANTERBURY	CHEMICAL COMPANY	1,500	3,559	5,304
681 COLUMBIA	MEDICAL OFFICES	2,500	3,643	4,230

5.10 FINANCIAL ISSUES

- *Capital investment - The level and extent of capital investment needed is almost 2.5 times the level represented in the Phase 2 Report ($47 million compared to $19.0 million).*

  The large discrepancy is a factor of cost of cure. See the previous discussion on this issue.

- *ALMU projects outside Westlake - The City of Westlake's costs associated with Avon Lake's transmission mains and its water plant expansion projects are not factored into Westlake's financial projections.*

  The new financial model has the following capital improvement costs included with the model; see the financial model section later in this report for more details:

  Debt Service for 30" transmission line along Schwartz Road in Avon

  Debt Service for new ETL-3 transmission line.

- *Comparisons with CWD bills - The City of Westlake's comparisons with CWD bills are inaccurate due to miscalculating the first 0.6 MCF of quarterly consumption.*

  This was corrected in the financial model that is attached to this report within Appendix A

- *Estimated revenues and expenses - The City of Westlake's projection of revenue is inaccurate due to math errors associated with Regular Rate and Homestead Consumption, use of higher consumption than actual CWD Billed Consumption, use of lower unmetered water than CWD system historical experience and use of a higher than existing customer base.*

  This was corrected in the financial model that is attached to this report within Appendix A

- *CWD will enforce the provisions of the Water Service Agreement, including a full five year advance separation notice requirement*

  This is a legal issue outside the scope of this report.

SECTION 6 FINANCIAL INFORMATION

6.1 DATA FROM CWD

In order to determine a hypothetical water rate schedule[11] for the new Westlake Water Department some information was requested from CWD. The information is as follows:

- The total number of accounts in City of Westlake as of July 23, 2012.
  - Residential - 10,105
  - Commercial - 813
  - Fire Lines - 230
- The total number of Westlake Homestead Accounts as of March 1, 2012 was 171 with a revenue of $10,275 in 2011.
- The following table shows the commercial account meter distribution in the City of Westlake that is used to determine fixed charges since each meter size as a specific charge.

TABLE 6.1 METER DISTRIBUTION FOR COMMERCIAL ACCOUNTS

METER SIZE (IN.)	# OF ACCOUNTS
5/8	208
3/4	7
1	55
1.5	101
2	287
3	95
4	43
6	7
8	10

- The fire line revenue from the City of Westlake in 2011 was $230,391 with a connection size distribution as shown in the table below.

TABLE 6.2 FIRE LINE DISTRIBUTION FOR COMMERCIAL ACCOUNTS

CONNECTION SIZE (IN.)	# OF ACCOUNTS
2	2
4	10
6	70
8	140
10	6
12	2

[11] Margevicius, Alex, Cleveland Water Department, Letter to Mayor Clough, Westlake, July 25, 2012

6.2 WESTLAKE WATER CONSUMPTION

The City of Westlake billed water consumption has been decreasing over the past few years as with all the other CWD direct service communities. The table below illustrates the billed consumption for the City of Westlake from CWD with the amount of rain.

TABLE 6.3 WESTLAKE'S BILLED CONSUMPTION

YEAR	RAIN (IN.)	CONSUMPTION (MCF)
2007	41.4	194,667
2009	35.8	179,422
2010	35.4	167,351
2011	65.3	158,393

So even though in 2011 was an excessive amount of rain that consumption volume of 158,393 MCF shall be used for a conservative approach for Westlake's consumption for the financial model. The yearly consumption for 2012 should be higher due to the draught conditions for the majority of the year.

6.3 WATER LOSS

Since the City of Westlake will be a bulk water customer to ALMU all water leaks in the distribution system will be considered non-revenue water. This volume is critical in the financial model since the City will be purchasing water that is lost thru leaks, however will not acquire any revenue from such water.

In 2011 the American Water Works Association performed an audit of water loss in various water distribution systems and determined that the average non-revenue water loss was 21% (systems with less than 50,000 connections). After comparing the age and size of the City of Westlake's infrastructure to that of similar communities with published water loss it was determined that a fair and reasonable value of water loss would be 15%.

The City of Westlake is pursuing having a consultant perform a leak detection survey to all the water mains owned by the City of Westlake. This survey will locate and estimate the size of water leaks in the system. The goal is to have all the major leaks found from this survey repaired prior to connecting to ALMU. This will also provide a better assumption on the water loss for the Westlake system from known leaks not repaired upon Westlake's utilization of a secondary water source.

6.4 AVERAGE RESIDENTIAL ACCOUNT USAGE

In order to compare the proposed rate schedule to that of CWD, an average residential water usage demand needs to be used. According to CWD the average residential account consumes 2.5 MCF/Quarter of water. Also a report prepared by the University of Louisville in conjunction with the EPA titled "North America Residential Water Usage Trends Since 1992" has determined that the average residential account in the Cleveland has a water consumption of 2.2 MCF/Quarter. So the conservative approach is to use 2.2 MCF/Quarter for residential demand.

6.5 FINANCIAL MODEL

The scope of this report did not include the financial model of the new water system. However, since the Arcadis report mentioned the preliminary financial report the revised model has been included for clarity in Appendix A, which was generated by the Finance Department.

SECTION 7 CHALLENGES OF UTILIZING A SECONDARY WATER SUPPLY

7.1 GENERAL

There are many unforeseen conditions that could arise from utilizing a secondary water source. So HNTB provided an assessment of some of the foreseeable challenges that are addressed in the following sections. However, some of the issues not explored are the following:

- Scenario if ALMU can't provide the required flow rate and pressure at the connection to ETL1 as discussed and used in the hydraulic model.
- The hydraulic model as compiled by HNTB has flaws that do not accurately represent the Westlake distribution system, which could lead to lower pressures and flow rates then proposed.
- Pending litigation.
- Daily operation and duties of the proposed Westlake Water Department.

7.2 WATER MAIN BREAKS

Various portions of the City of Westlake's water distribution system have existing water mains that are currently lower in pressures than what would be seen with the proposed system. This issue is especially critical in the northwestern areas which have existing pressures between approximately 45 psi to 65 psi. These areas can expect pressures above 100 psi under several of the demand scenarios with the water supply from ALMU. This would effectively double the pressures currently being experienced by those mains.

Mains in the northwest area along Detroit Road, Bradley Road and Bassett Road were installed in the late 1920s and are most likely cast iron pipe. These water mains each have a diameter of 12-inches and all are critical for distributing water throughout the northwestern region of the distribution system. Although it may not be possible to prevent all failures in those 12-inch mains, a phased connection to ALMU's water system will allow the pressure to gradually increase that both reduce main breaks and allows time for work crews to handle individual repairs as they occur. Other mains in the northwestern region of the distribution system were installed in the mid-seventies or more recently and are ductile iron pipe. These mains have a lower probability of failure and are not as critical to operation as the three mains discussed above. The other regions of the distribution system will not see as large a pressure change upon the connection to ALMU as the northwestern section is expected to see. However, the other areas should still be monitored for water main failures both during the connection and for some time afterwards as the system equilibrates.

7.3 ELEVATION DIFFERENCE ACROSS THE SYSTEM

The elevation across the City's distribution network ranges from 629 ft. to 752 ft. This 123 ft. elevation difference represents an approximate 53 psi variation across the system. An elevation difference of this amount creates a challenge in keeping the system pressures within the target range of 60 to 80 psi for normal working pressures recommended by Ten States Standards. Ten States Standards also recommends that pressure reducing devices be provided on individual service lines in the distribution system where static system pressures exceed 100 psi. The State of Ohio Plumbing Code is more conservative than Ten States Standards, stating that where water pressure within a building exceeds 80 psi, a pressure reducing valve shall be installed to reduce the pressure in the building water piping to 80

psi or less. Therefore pressure reducing valves will need to be provided for all customers experiencing pressures above 80 psi. Pressures must be carefully balanced to keep the southeast portion of the distribution system high enough without causing the northwest area to get too far above 100 psi. The proposed storage tank with pump station at Center Ridge Road and Columbia Road will be capable of supplementing pressure to the southeast region during periods of higher demand without significant effect on the pressure in the northwestern area.

7.4 SINGLE SUPPLY LINE

The proposed improvements given in the Phase 2 Water System Study include a 2 million gallon (MG) ground storage tank that would not provide enough stored water as a back-up source if failure occurs to the transmission connection to ALMU. While the proposed tank would be capable of providing some supplemental pressure, it has been planned for operation as equalization storage, not as a backup to supply. Therefore, there is not sufficient storage or pump capacity to maintain the required minimum pressure in the distribution system from the proposed tank alone. So in order to have back-up to supply the following other options need to be explored:

- Connecting to CWD as back-up
- Connecting to North Ridgeville (Center Ridge Road) and/ or Avon (Detroit Road)
- Installation of ETL3 from ALMU treatment plant

7.5 COORDINATING THE SECONDARY WATER SUPPLIER CONNECTION

In order to maintain adequate pressure in the distribution system during the connection to the secondary supplier, the existing supply from CWD will need to remain connected at all points to the Westlake distribution system for a period of time while the ALMU water supply connection is brought online. This connection will have to be closely monitored to ensure the pressures within the system do not drop below 35 psi or too significantly exceed 100 psi, since higher pressures mean a greater probability of main breaks.

There are 33 connection points with CWD supply mains at which shut-off valves must be installed. Installing and closing these valves within a short period of time could be detrimental to both the Westlake distribution system and to CWD's water mains. A phased approach should therefore be taken to help minimize main breaks and allow the system to equilibrate to the additional water supply.

Another issue for this connection is the switch to one pressure zone. Coordinating the combining of the northern and southern pressure zones into one pressure zone may add another level of complexity. The integration of both water suppliers creates a challenge in billing for the City of Westlake. The master meter at the ALMU connection can provide accurate information on the amount of water being supplied to Westlake via ALMU, but the connections from CWD do not have meters. The City of Westlake will need to coordinate with CWD to determine how CWD will be compensated for the water still being provided to Westlake. Customer meter readings will not be able to accurately reflect the amount of water provided by CWD during this period due to the fact that ALMU will also be supplying water to Westlake's customers.

7.6 AVAILABLE FIRE FLOW

During maximum day demand (full built out) the available fire flow rates for the North-East section of town in the King James North area is questionable. This section of town is densely populated with high-rise apartment buildings so the required available fire flow rate is well above 1,000 gpm. Hydraulic modeling indicates when the fire flow exceeds 1,200 gpm in the area the water pressure in the water main is below acceptable levels. HNTB is currently reviewing this issue and additional infrastructure may be required in the future when the City's water demand increases.

SECTION 8 CONCLUSION

8.1 GENERAL

This report identified all the issues associated with the utilization of ALMU as a secondary water purveyor and is recommended that this path continues based on these findings, which can be summarized below for each section.

8.2 EXISTING CWD SYSTEM

It has been illustrated in this report that CWD's expenditures are increasing and consumption has been decreasing, which has lead to the new drastic water rate schedule that is in effect. This results in about a 50% water bill increase over 5 years. Also since City of Westlake is a direct service suburb to CWD the Westlake residents pay an additional 30% surcharge from that of Cleveland residents for the same water and service.

The estimated replacement cost with minimal restoration for all the water lines over 50 years old is about $45 million. These types of rehabilitation projects have been the City's of Westlake's responsibility with no water specific revenue stream for funding.

With a smaller service area of the proposed system it is believed customer service shall increase over the existing.

8.3 ALMU

From the supply point of view, utilizing ALMU as a secondary water source will have no impact on water quality and dependability. The main difference is that ALMU is more cost competitive then CWD and that savings can be passed on to the residents of Westlake and provide an additional revenue stream for future water replacement projects. Keep in mind that CWD has a 30% surcharge to direct service suburbs when ALMU only has a 10% surcharge.

8.4 HNTB

HNTB believes that the proposed utilization of a secondary water source has numerous benefits to the City of Westlake's water users and recommended that Westlake continues to pursue this path. The proposed water distribution system only requires minor modifications and the installation of a new transmission line along Schwartz Road to Lear Nagle Road in Avon for a total tentative construction cost of $19 million.

The proposed water distribution system has the following benefits over the existing CWD system:

- One pressure zone over two.
- Increased water main pressures throughout the system.
- Increased available fire flow rates in most areas.

8.5 ARCADIS

CWD hired Arcadis to review the HNTB Phase 2 report and had some legitimate questions and concerns; however some of their comments were misconstrued. The Phase 2 HNTB report was a draft when Arcadis reviewed it and some of their legitimate concerns were addressed in the final report issued by HNTB, which were the following:

- Transient analysis
- Ground storage tank

One of the misconstrued issues was the comparison of the available fire flow of the existing system to that of the proposed system. Arcadis was comparing existing fire flows from the CWD system during a demand at most to be 6.8 MGD to that of the HNTB modeled fire flows of a demand of 12.3 MGD. This is the main reason the available fire flows of the proposed system were lower than the existing system due to the large variation in demand. In order to compare both systems the same water demand needs to be used in which Arcadis did not perform. So all the issues raised by Arcadis have been addressed and no modifications to the proposed system are required.

8.6 CHALLENGES OF UTILIZING ALMU AS A SECONDARY SOURCE

Even though these are major challenges ahead, most of these issues can be resolved through diligent design and management. Also more information will be available once the final design is completed that will be invaluable in solving these issues.

8.7 MULTIPLE WATER PURVEYORS

Since deregulation of public utilities has occurred it is very common for communities to have multiple providers for utilities on the open market. Water should be no different than electric and gas. So the use of multiple water purveyors in a community maintains low costs for its residents because the community has a choice on whom to purchase water from in an "open market" like scenario.

The City of North Ridgeville[12] has taken advantage of multiple water purveyors to maintain low water costs to it residents. The City of North Ridgeville currently purchases the majority of its water from ALMU (about 3,000,000 gallons) and has now just recently entered into a contract with the City of Elyria to purchase up to 2,000,000 gallons at a lower unit cost. In order to purchase this amount of water from Elyria about $25,000 of infrastructure improvements are required that City of Elyria will fund. This is a perfect example of how a City can benefit with multiple water purveyors and the City of Westlake is attempting to achieve that goal. The chart below shows the savings per MCF that City of North Ridgeville will have with the new bulk water contract with the City of Elyria.

TABLE 8.1 NORTH RIDGEVILLE BULK WATER PURCHASE ($/mcf)

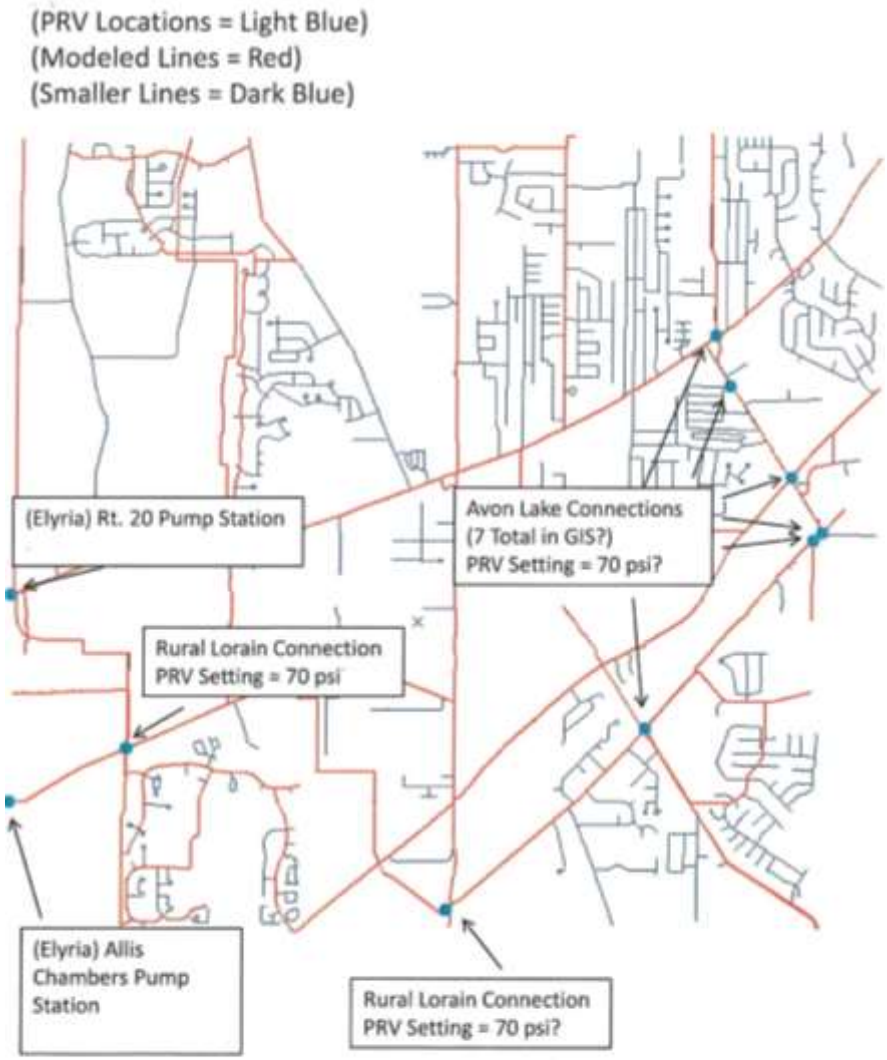
PURVEYOR	CUSTOMER		2012	2013	2014	2015	2016	2017
ELYRIA	RIDGEVILLE		$9.10	$9.10	$9.10	$9.10	$9.10	$9.10
ALMU	RIDGEVILLE		$10.52	$10.69	$10.85	$11.02	$11.26	$11.43

[12] North Ridgeville Community Connection Newsletter, October 2012

The City of North Ridgeville's water distribution system is very dynamic with the choice to purchase water from various water purveyors and is considered a blended system (water from one purveyor mixes with another). None of the water purveyors have an issue with this blended system. The following map identifies the various water purveyor connection points within the City of North Ridgeville for the following water authorities:

Avon Lake Municipal Utilities
City of Elyria Water
Rural Lorain County Water Authority
City of Cleveland (City of North Ridgeville was listed in CWD's annual report)

MAP 8.2 CITY OF NORTH RIDGEVILLE AND WATER SUPPLIER CONNECTIONS[13]



[13] Becker, Cathy, City of North Ridgeville, email correspondence to Director Kelly, City of Westlake, 10- 31-12

CITY OF WESTLAKE, OHIO

FINAL ENGINEERING ANALYSIS OF WATER SYSTEM STUDIES FOR UTILIZATION OF ALMU AS SECONDARY WATER SOURCE

APPENDIX A

DEPARTMENT OF FINANCE

FINANCIAL MODEL

City of Westlake

(Preliminary Draft) - Water Rate Comparison

Cleveland Division of Water (CWD) vs. Westlake Water Utility (*purchasing water from Avon Lake Municipal Utilities*)

Assumptions:

- *Westlake water rates billing "structure" identical to Cleveland Water Department (CWD)
- *Use published CWD water rates available thru 2015, cash flow modeling for 2016 and beyond at 2015 water rate
- *Westlake water rates implemented at 5% discount to CWD rates
- *Base year starts with 2012
- *Water consumption est. at 158,000 mcf/year
- *Water usage per household est. at 2.2 MCF/Quarter according to North American Water Use Study
- *Based on 10,105 residential customers
- *Based on 813 commercial customers

	A	B	C	D	E	F	G	Year 1 H	Year 2 I	Year 3 J	Year 4 K	Year 5 L
	Cleveland Division of Water (CWD) - Existing Retail Water Rates Corresponding to the CWD Low 1st High Service Area for Westlake thru 2015											
	Rate/Volume Increments	Unit Rates per 1,000 cf = 7,500 gal = 1 MCF 2012	2013	2014	2015	2016		Quarterly Rates @ 2.2 MCF Usage 2012	2013	2014	2015	2016
1	First .6 MCF discounted by .6%	20.47	22.11	23.63	25.04	25.04	⇨	12.28	13.27	14.18	15.02	15.02
2	Additional MCFs	41.70	42.01	42.53	42.56	42.56		66.72	67.216	68.05	68.10	68.10
3	Fixed Charge per Quarter	18.00	21.00	24.00	27.00	27.00	⇨	18.00	21.00	24.00	27.00	27.00
4	Customer Service Charge (expired 2011)							-	-	-	-	-
5	**Total Cleveland Water Rate per quarter**							$ 97.00	$ 101.48	$ 106.23	$ 110.12	$ 110.12

	Hypothetical Westlake Water System Revenue Per Customer Based on Proposed 5% Discount to CWD Water Rates											
	Rate/Volume Increments	Unit Rates per 1,000 cf = 7,500 gal = 1 MCF 2012	2013	2014	2015	2016		Quarterly Rates @ 2.2 MCF Usage 2012	2013	2014	2015	2016
6	First .6 MCF	19.45	21.00	22.45	23.79	23.79	⇨	11.67	12.60	13.47	14.27	14.27
7	All MCFs	39.62	39.91	40.40	40.43	40.43		63.38	63.86	64.65	64.69	64.69
8	Annual Rate Increase	n/a	0.74%	1.24%	0.07%	0.00%						
9	Fixed Charge per Quarter	17.1	19.95	22.8	25.65	25.65	⇨	17.10	19.95	22.80	25.65	25.65
10	**Total Westlake Water Rate per quarter**							$ 92.15	$ 96.41	$ 100.91	$ 104.61	$ 104.61
11	**Discount to CWD Water Rates**							-5%	-5%	-5%	-5%	-5%

City of Westlake, Ohio

(Preliminary Draft) Westlake Water Utility - Estimated Operating Revenues and Expenses

Assumptions:

- *Westlake water rates billing "structure" identical to Cleveland Water Department (CWD)
- *Use published CWD water rates available thru 2015; cash flow modeling for 2016 and beyond at 2015 water rates
- *Westlake water rates implemented at 5% discount to CWD rates
- *Base year starts with 2012
- *Water consumption est. at 158,000 mcf/year
- *Water usage per household est. at 2.2 MCF/Quarter according to North American Water Use Study
- *Non-revenue water loss estimated at 15%
- *Based on 10,105 residential customers
- *Based on 813 commercial customers
- *Bond debt service of $19.0, $3.5 and $7.0 million amortized over 20 year period at 5.0%

		Est. Year 1 (2012)	Assumptions for years 2-10	Est. Year 2 (2013)	Est. Year 3 (2014)	Est. Year 4 (2015)	Est. Year 5 (2016)
1	Annual Water Consumption in MCF	158,000	no growth or decline	158,000	158,000	158,000	158,000
	Revenues						
	Charges for services						
	Regular Rate Consumption (158,000 mcf/year)						
	Consumption for first 0.6 mcf (6,551)						
2	First .6 mcf (10,918 customers)	127,413		137,567	147,065	155,800	155,800
	Consumption for additional mcf (151,082)						
3	All additional mcf (10,918 customers)	6,000,417		6,044,330	6,118,540	6,123,083	6,123,083
4	Residential Fixed Charge	691,182		806,379	921,576	1,077,159	1,077,159
5	Commercial Fixed Charge	160,912		185,782	212,504	238,936	238,936
6	Homestead Consumption (estimated discount)	(50,000)	171 household units	(50,000)	(50,000)	(50,000)	(50,000)
7	Fire line Charge	239,736		242,399	245,876	255,290	255,293
8	**Total Revenues**	7,169,660		7,366,467	7,595,561	7,800,305	7,800,305
	Expenses						
	Operating expenses						
9	Personnel	737,890	2.5% annual increase	756,337	775,246	794,627	814,492
10	Contractual Services	449,792	2.0% annual increase	458,788	467,964	477,323	486,868
11	Supplies/Equipment	551,400	2.0% annual increase	562,428	573,677	585,150	596,853
12	Water Purchase (15% est water loss)	1,911,484	2.0% annual increase	1,949,714	1,988,708	2,028,482	2,069,052
13	***Subtotal: Operating Expenses***	3,650,566		3,727,267	3,805,594	3,885,582	3,967,267
	Debt service						
	Annual Debt Service						
14	$19.0 Million revenue bond amortized over 20 year period @ 5% interest rate	1,525,108	Core projects to implement water utility	1,525,108	1,525,108	1,525,108	1,525,108
15	$3.5 Million revenue bond amortized over 20 year period @ 5% interest rate	281,348	ETLW1 at City limits (1.5MM) and Water Dept Garage (2.0 MM)	281,348	281,348	281,348	281,348
16	*$7.0 Million revenue bond amortized over 20 year period @ 5% interest rate*	-	*ETLW3 connection at City border (start in year 6)*	-	-	-	-
17	***Subtotal: Debt service***	1,806,456		1,806,456	1,806,456	1,806,456	1,806,456
	Capital and Miscellaneous expenses						
18	$1.0 million (Canopy Meter Read System)	225,000	repaid over 5 years	225,000	225,000	225,000	225,000
19	capital replacement reserve fund	700,000		700,000	700,000	700,000	700,000
20	rate stabilization fund	200,000		200,000	200,000	200,000	200,000
21	***Subtotal: Miscellaneous revenues***	1,125,000		1,125,000	1,125,000	1,125,000	1,125,000
22	**Total Expenses**	6,582,022		6,658,723	6,737,050	6,817,038	6,898,723
23	**Revenue over operating expenses available for debt service**	3,519,094		3,639,200	3,789,967	3,914,723	3,833,038
24	Minimum Debt service coverage 1.25X (Revenues over operating expenses)	1.95		2.01	2.10	2.17	2.12
25	Total revenues over total expenses	587,638		707,744	858,511	983,267	901,583
26	**Cumulative Westlake Water Utility Year-End Fund Balance**	$ 587,638		$ 1,295,382	$ 2,153,893	$ 3,137,160	$ 4,038,742
27	**Cumulative Westlake Water Utility Stabilization Fund Year-End Balance**	$ 200,000		$ 400,000	$ 600,000	$ 800,000	$ 1,000,000
28	**Cumulative Westlake Water Utility Year-End Fund Balances**	$ 787,638		$ 1,695,382	$ 2,753,893	$ 3,937,160	$ 5,038,742

City of Westlake, Ohio

(Preliminary Draft) Westlake Water Utility - Estimated Operating Revenues and Expenses

Assumptions:

- *Westlake water rates billing "structure" identical to Cleveland Water Department (CWD)
- *Use published CWD water rates available thru 2015, cash flow modeling for 2016 and beyond at 2015 water rates
- *Westlake water rates implemented at 5% discount to CWD rates
- *Base year starts with 2012
- *Water consumption est. at 158,000 mcf/year
- *Water usage per household est. at 2.2 MCF/Quarter according to North American Water Use Study
- *Non-revenue water loss estimated at 15%
- *Based on 10,105 residential customers
- *Based on 813 commercial customers
- *Bond debt service of $19.0, $3.5 and $7.0 million amortized over 20 year period at 5.0%

		Est. Year 6 (2017)	Est. Year 7 (2018)	Est. Year 8 (2019)	Est. Year 9 (2020)	Est. Year 10 (2021)
1	Annual Water Consumption in MCF	158,000	158,000	158,000	158,000	158,000
	Revenues					
	Charges for services					
	Regular Rate Consumption (158,000 mcf/year)					
	Consumption for first 0.6 mcf (6,551)					
2	First .6 mcf (10,918 customers)	155,800	155,800	155,800	155,800	155,800
	Consumption for additional mcf (151,082)					
3	All additional mcf (10,918 customers)	6,123,083	6,123,083	6,123,083	6,123,083	6,123,083
4	Residential Fixed Charge	1,077,193	1,077,193	1,077,193	1,077,193	1,077,193
5	Commercial Fixed Charge	238,936	238,936	238,936	238,936	238,936
6	Homestead Consumption (estimated discount)	(50,000)	(50,000)	(50,000)	(50,000)	(50,000)
7	Fire line Charge	255,293	255,293	255,293	255,293	255,293
8	**Total Revenues**	7,800,305	7,800,305	7,800,305	7,800,305	7,800,305
	Expenses					
	Operating expenses					
9	Personnel	834,855	855,726	877,119	899,047	921,523
10	Contractual Services	496,607	506,539	516,670	527,003	537,543
11	Supplies/Equipment	608,790	620,966	633,385	646,053	658,974
12	Water Purchase (15% est water loss)	2,110,433	2,152,641	2,195,694	2,239,608	2,284,400
13	***Subtotal: Operating Expenses***	4,050,684	4,135,872	4,222,869	4,311,711	4,402,441
	Debt service					
	Annual Debt Service					
	$19.0 Million revenue bond amortized over 20					
14	year period @ 5% interest rate	1,525,108	1,525,108	1,525,108	1,525,108	1,525,108
	$3.5 Million revenue bond amortized over 20					
15	year period @ 5% interest rate	281,348	281,348	281,348	281,348	281,348
	$7.0 Million revenue bond amortized over 20					
16	*year period @ 5% interest rate*	562,196	562,196	562,196	562,196	562,196
17	***Subtotal: Debt service***	2,368,652	2,368,652	2,368,652	2,368,652	2,368,652
	Capital and Miscellaneous expenses					
18	$1.0 million (Canopy Meter Read System)					
19	capital replacement reserve fund	700,000	700,000	700,000	700,000	700,000
20	rate stabilization fund	200,000	200,000	200,000	200,000	200,000
21	***Subtotal: Miscellaneous revenues***	900,000	900,000	900,000	900,000	900,000
22	**Total Expenses**	7,319,336	7,404,524	7,491,521	7,580,363	7,671,093
	Revenue over operating expenses available for					
23	**debt service**	3,749,621	3,664,433	3,577,437	3,488,594	3,397,864
	Minimum Debt service coverage 1.2X (Revenues					
24	over operating expenses)	1.58	1.55	1.51	1.47	1.43
25	Total revenues over total expenses	480,969	395,781	308,785	219,942	129,212
	Cumulative Water Enterprise Year-End Fund					
26	**Balance**	$ 4,519,711	$ 4,915,491	$ 5,224,276	$ 5,444,218	$ 5,573,430
27	**Cumulative Water Enterprise Stabilization Fund**	$ 1,200,000	$ 1,400,000	$ 1,600,000	$ 1,800,000	$ 2,000,000
28	Cumulative Water Enterprise Fund Balances	$ 5,719,711	$ 6,315,491	$ 6,824,276	$ 7,244,218	$ 7,573,430

City of Westlake

Comparison of water revenues correlated with Consumption

total consumption		158,000	158,000	158,000	158,000	158,000	158,000	158,000	158,000	158,000	158,000	cumulative revenue
		1	2	3	4	5	6	7	8	9	10	
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
First .6 mcf of water consumption	cost	11.67	12.6	13.47	14.27	14.27	14.27	14.27	14.27	14.27	14.27	
	accounts	10,918	10,918	10,918	10,918	10,918	10,918	10,918	10,918	10,918	10,918	
	consumption in mcf (10,918 * .6)	6,551	6,551	6,551	6,551	6,551	6,551	6,551	6,551	6,551	6,551	
	Revenue	127,413	137,567	147,065	155,800	155,800	155,800	155,800	155,800	155,800	155,800	
Additional water consumption beyond .6 mcf	cost	39.62	39.91	40.4	40.43	40.43	40.43	40.43	40.43	40.43	40.43	
	accounts	10,918	10,918	10,918	10,918	10,918	10,918	10,918	10,918	10,918	10,918	
	consumption	151,449	151,449	151,449	151,449	151,449	151,449	151,449	151,449	151,449	151,449	
	Revenue	6,000,409	6,044,330	6,118,540	6,123,083	6,123,083	6,123,083	6,123,083	6,123,083	6,123,083	6,123,083	
	Total Revenue	6,127,822	6,181,896	6,265,605	6,278,883	6,278,883	6,278,883	6,278,883	6,278,883	6,278,883	6,278,883	62,527,504

Reduction in water consumption annually by 1% total consumption		158,000	156,420	154,856	153,307	151,774	150,256	148,754	147,266	145,794	144,336	
		1	2	3	4	5	6	7	8	9	10	
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
First .6 mcf of water consumption	cost	11.67	12.6	13.47	14.27	14.27	14.27	14.27	14.27	14.27	14.27	
	accounts	10,918	10,918	10,918	10,918	10,918	10,918	10,918	10,918	10,918	10,918	
	consumption in mcf (10,918 * .6)	6,551	6,551	6,551	6,551	6,551	6,551	6,551	6,551	6,551	6,551	
	Revenue	127,413	137,567	147,065	155,800	155,800	155,800	155,800	155,800	155,800	155,800	
Additional water consumption beyond .6 mcf	cost	39.62	39.91	40.4	40.43	40.43	40.43	40.43	40.43	40.43	40.43	
	accounts	10,918	10,918	10,918	10,918	10,918	10,918	10,918	10,918	10,918	10,918	
	consumption	151,449	149,869	148,305	146,756	145,223	143,706	142,203	140,716	139,243	137,785	
	Revenue	6,000,417	5,981,280	5,991,522	5,935,363	5,871,381	5,810,018	5,749,270	5,689,129	5,629,589	5,570,645	
	Total Revenue	6,127,830	6,118,847	6,138,587	6,085,163	6,027,181	5,965,818	5,905,070	5,844,929	5,785,389	5,726,444	59,729,258
Differential												2,798,247