



O'BRIEN & GERE

December 27, 2004

Water System Feasibility Study Steering Committee
c/o Mr. Roy Rose, PE
Anderson, Eckstein & Westrick, Inc.
51301 Schoenherr Road
Shelby Township, Michigan 48315

Re: Summary of Phase I Findings for Water
System Feasibility Study

File: 35437.010.001

Dear Participants of the Water System Feasibility Study:

O'Brien & Gere is pleased to submit our "Summary of Phase I Findings" for the Water System Feasibility Study.

We enjoyed working with you on Phase I of the study and look forward to future phases.

Very truly yours,

O'BRIEN & GERE ENGINEERS, INC.

George B. Rest, PE
Senior Vice President



Attachment A

Location Map for Study Participants



Attachment B

Flow-Weighted DWSD Wholesale Water Rate Computation

**Sample Flow-Weighted DWSD Wholesale Water Rate Computation
Southeastern Michigan Water System Feasibility Study**

Study Participant	FY2005 Rate (\$/1,000 CF)	FY2005 Volume (1,000 CF)	FY2005 Cost (\$)
Bloomfield Hills	13.36	77,618	1,036,976
Bloomfield Twp	15.83	339,100	5,367,953
Center Line	7.67	47,500	364,325
Eastpointe	6.2	161,700	1,002,540
Fraser	8.01	89,800	719,298
Grosse Pointe Shores	11.07	29,000	321,030
Madison Heights	7.15	218,100	1,559,415
Oak Park	9.47	153,600	1,454,592
Pontiac	11.97	451,100	5,399,667
St. Clair Shores	7.56	278,700	2,106,972
Seocwa System	7.57	1,456,700	11,027,219
Troy	13.61	593,100	8,072,091
Warren	7.47	1,032,100	7,709,787
Total		4,928,118	46,141,865
Flow-Weighted DWSD Wholesale Water Rate (\$/1,000 CF)			9.36

Water System Feasibility Study for Several Communities and Agencies in Southeast Michigan

Summary of Phase 1 Findings December 29, 2004

Introduction

Twenty-three communities in Oakland, Macomb, and Wayne Counties have joined together to conduct a Water System Feasibility Study to assess alternative approaches for supplying water to a population of approximately 800,000. The participating communities are current wholesale customers of the Detroit Water and Sewerage Department (DWSD). This document summarizes the findings and recommendations of Phase 1 of the Feasibility Study. O'Brien & Gere Engineers, Inc. presented these findings during their second workshop, on November 3, 2004.

The following communities and agencies are study participants:

Macomb County

- Center Line
- Eastpointe
- Fraser
- St. Clair Shores
- Warren

Wayne County

- Grosse Pointe Shores

Oakland County

- Bloomfield Township
- Bloomfield Hills
- Madison Heights
- Oak Park
- Pontiac
- Southeastern Oakland County Water Authority
- Troy

A figure showing the locations of the study participants is presented in Attachment A of this memorandum.

The Oakland County Drain Commissioner is serving as a member of the Steering Committee, along with Roy Rose, P.E., of the firm AEW, and representatives of three study participants - Southeastern Oakland County Water Authority, City of St. Clair Shores, and City of Warren.

The Feasibility Study serves as an objective evaluation by an independent party, and is focused on these goals:

1. Improve reliability of water system
 - Assure adequate level of service considering DWSD's aging infrastructure
 - Provide adequate storage for maximum hour demands and emergency needs
 - Enhance reliability and security of critical facilities, limit vulnerability and improve "mutual aid strategies"
2. Cost control / reduction
 - Control / reduce the cost of water over time
 - Assure fair allocation of costs

3. Maintain / enhance dialogue with DWSD. Should the participants ultimately decide to remain wholesale customers of DWSD, the Consultant's efforts may be directed toward enhancing the relationship between the participants and DWSD.

Study Approach

This study provides for an integrated evaluation of the necessary water supply components, their cost and financing, and the organizational / management approaches. The study uses series of workshops to present and discuss issues. Phase 1 of the study included two workshops:

- Workshop No. 1 was held on August 26, 2004 and served as a project kickoff.
- Workshop No. 2 was held on November 3, 2004 and addressed the results of Phase 1, which focused on development of preliminary costs estimates.

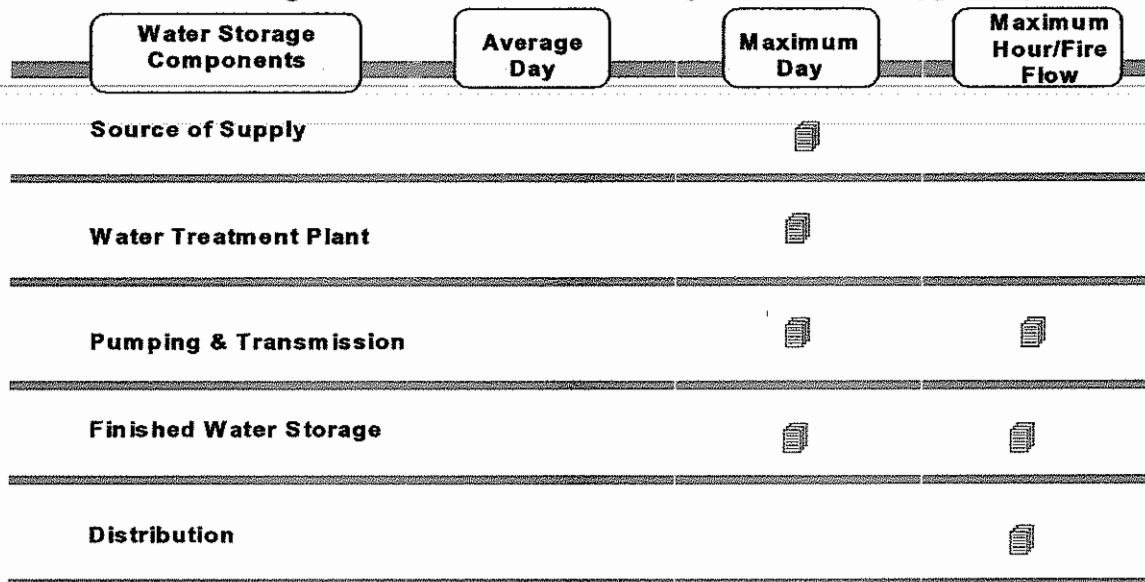
In order to develop cost estimates, Phase 1 addressed water demand projections, a review of three existing water treatment plants with some spare capacity and development of several alternatives other than continued service by DWSD.

Phase 1 Findings

Water Demands

Water demands are a critical element of the study, because their magnitude drives the size and cost of water supply facilities. Of particular importance is the maximum day water demand, because this criterion is typically used to size water treatment plants, source of supply/intakes and certain major pumping facilities. Sizing major pumping facilities and transmission for the maximum day water demand requires sufficient system storage to satisfy daily demands in excess of the available pumping capacity.

How Average and Peak Demand Projections Are Typically Used:



The study used the average day water demand projections from the recently published DWSD Comprehensive Water Master Plan (CWMP).

- Average day water demand is defined as the annual water consumption divided by 365 days. DWSD's average day projections through the year 2050 indicate very little growth in water demands for the communities participating in this study, which seems reasonable considering that these communities are approaching full development. However, it was noted that DWSD used maximum day water demands with a relatively high peaking factor.
- Maximum day water demand is defined as the maximum amount of water used in a 24-hour period for the target year.
- The peaking factor is defined as: maximum day water demand / average day water demand. DWSD used the historical record maximum day peaking factor of 2.6, which occurred in 1988. O'Brien & Gere used this factor to estimate costs, and also developed preliminary costs for a lower peaking factor. In our opinion, the use of the 2.6 factor should be reviewed because the peak event occurred 15 years ago, and the region has seen lower peaks in more recent years, even during dry conditions. The region's water use pattern may have flattened over time. It is also our general experience that a peaking factor of 2.6 is unusually high. We therefore selected a lower factor of 2.2 as a basis for comparison. It should be recognized that if the water system is designed to serve a 2.2 peaking factor, but experiences a higher demand, the water utility would call for temporary restrictions, such as limitations on lawn watering. The maximum day demands projected for the year 2050 ranges from 292 mgd (2.6 peaking factor) down to 245 mgd (2.2 peaking factor). These "conservative" and "less conservative" projections provide a set of "bookends" that should bracket the size and cost of water supply facilities. The cost curves illustrate both peaking factors.

Existing Water Treatment Plants

The evaluation of existing water treatment plants (WTP's) included assessments of the Highland Park, Mount Clemens and Grosse Pointe Farms WTP's. These three plants are in the vicinity of the participating communities, they all draw water from Lake St. Clair, and all were reported to have some excess capacity. Based on a site visit to each facility, our findings are:

- These WTP's demonstrate the ability to produce high quality water from Lake St. Clair.
- The available capacity (19 mgd) is a small fraction of total projected need in 2050 (292 mgd).
- There are opportunities for plant expansions, but additional intakes and raw water pipeline capacity are needed.

Alternatives

The Phase 1 Study compared continued purchase from DWSD to five options:

1. Option 1 - Baseline - Oakland/Macomb/Wayne Systems. This option would serve all 23 participating communities by providing a new water system, including water intakes into Lake St. Clair, water treatment plant, and new pumps and transmission mains.
2. Option 2 - Limited service area Macomb/Wayne Systems. Similar to Option 1, but only serves about one-third of the entire group. The purpose of this option is to assess the "economy of scale", and thereby determine whether a smaller water system could make financial sense.
3. Option 3 - Limited service area Macomb/Wayne Systems, optimize existing systems. Similar to Option 2, but utilizing the spare capacity of the three existing water treatment plants to reduce the size and cost of new facilities.

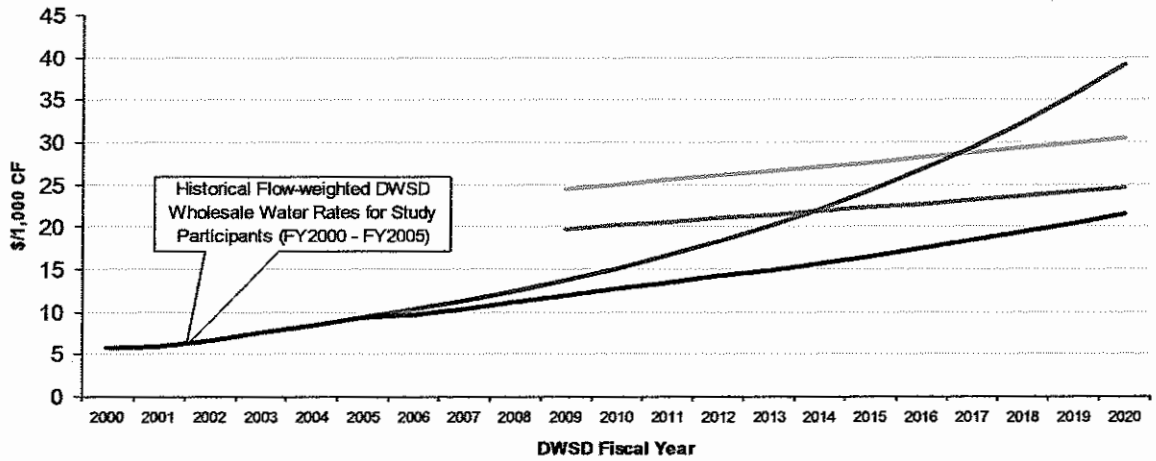
4. Option 4 - Expanded Regional Approach/Lake Huron. This option involves a larger regional approach, including Genesee County and City of Flint. This option is provided for discussion purposes, and costs have not been estimated. This option is discussed in more detail following the cost analysis.
5. Option 5 - Wholesale purchase from Genesee County. This option involves a larger regional approach and includes wholesale purchase of raw or finished water from Genesee County. This option is provided for discussion purposes, and costs have not been estimated.

Preliminary Cost Estimate

Preliminary cost estimates were developed for several alternatives, using a range of unit costs and demands, in order to illustrate the impact of these factors on the costs. For this preliminary review, O'Brien & Gere developed rule-of-thumb unit prices to estimate conceptual costs. We reviewed the unit prices used by DWSD in the Comprehensive Water Master Plan, and found them similar to those we typically use, although somewhat higher. We adopted the DWSD unit prices for this study, and added typical planning level "scale-ups" for contingency, permitting, engineering and administrative costs. Please note that O'Brien & Gere is not certain whether DWSD added similar "scale-ups", and we suspect that O'Brien & Gere's new system costs may have more "scale-up", making this analysis somewhat conservative. We recommend a closer review of these costs in Phase 2. In the case of pipelines, DWSD's unit costs are highly dependent on the density of development, which influences utility conflicts, site restoration, pavement replacement, and rate of construction progress. DWSD used a range for pipeline costs, higher in urban areas, lower in highway/rural areas. We applied the higher range of the pipeline cost (i.e., urban areas) to be conservative. Other significant issues in developing sound cost estimates are:

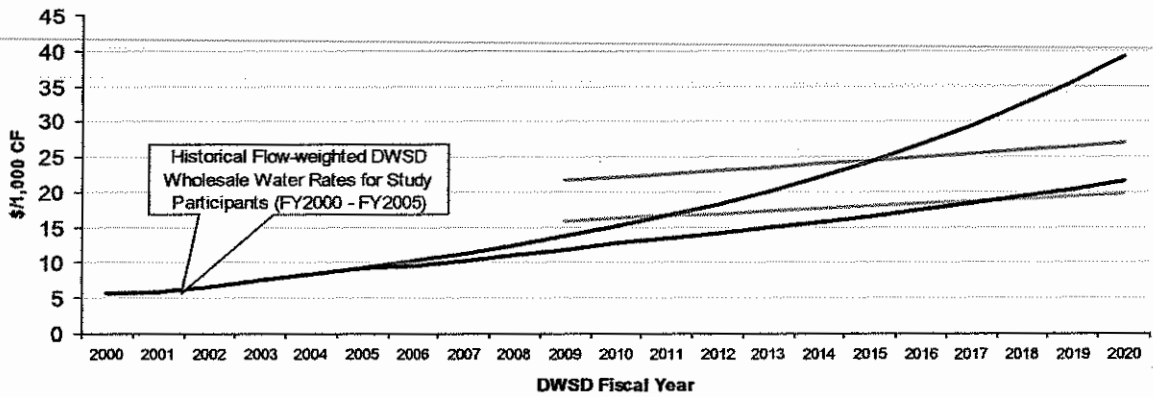
- O'Brien & Gere provided reliability and redundancy by including:
 - Two separate intakes and raw water pumping stations (each intake/PS sized to meet average day demand and the combined capacity to meet maximum day demand)
 - One WTP with parallel process trains so that the plant can function with an entire process train out of service.
 - Standby power to supply average day demands.
 - Additional finished water storage.
- O'Brien & Gere used the cost estimates to approximate the wholesale water rates over time, and to compare them with projected DWSD rates. The resulting cost curves are shown below, with estimated wholesale cost measured in dollars per thousand cubic feet (\$/1,000 CF). A brief explanation of each curve, from top (most expensive) to bottom (least expensive) follows.

Chart 1: Comparative Costs DWSD vs. Regional Supply (Full System)



- New Supply (DWSD PF @ 2.6 / Full System / Urban Cost)
- New Supply (Lower PF @ 2.2 / Full System / Urban Cost)
- Projected DWSD Wholesale Rate (10%)
- Projected DWSD Wholesale Rate (3.94%, 7.4% and 5.4%)

Chart 2: Comparative Costs DWSD vs. Regional Supply (Limited System)



- New Supply (DWSD PF @ 2.6 / Limited System / Urban Cost)
- New Supply (Lower PF @ 2.2 / Limited System / Urban Cost)
- New Supply (Lower PF @ 2.2 / Limited System - Optimized / Urban Cost)
- Projected DWSD Wholesale Rate (10%)
- Projected DWSD Wholesale Rate (3.94%, 7.4% and 5.4%)

Projected DSWD Wholesale Rate Curves (Charts 1 and 2)

- **Red curve** – This upper curve presents a projection of DWSD wholesale water rates, based on a continuation of the recent trend of double digit increases. Specifically, the red curve illustrates the effect of 10% annual rate increases, starting in fiscal year 2005 (FY2005) with the current wholesale rate (flow-weighted average) of \$9.36 / 1,000 cubic feet (see Attachment B of this memorandum). The red curve intersects the new system cost curves in Charts 1 and 2 between about 6 years (purple curve) and 12 years (green curve) from now. As a point of reference, it is likely that the time to plan, design and construct a new water system is roughly 5 to 10 years due to permitting, identification and evaluation of options, and potential difficulty associated with construction (i.e., selection of FY2009 for initiation of costs for new systems).
- **Dark blue curve** – This lower curve shows DWSD's projected increases in the wholesale water rate. The FY2006 rate is shown at 3.94%, based on the recent announcement by DWSD. Thereafter, the projected DWSD rates use the CWMP projected rate increases of 7.4% through 2010, and 5.4% for 2010-2020. The dark blue curve intersects the lowest of new system cost curves in about 12 years (purple curve), and does not reach the level of the other cost curves within the 20-year projection period.

New System Cost Curves for Full System (Chart 1)

- **Green curve** - DWSD peaking factor (2.6), full system, urban pipeline costs - the higher peaking factor (2.6) and larger system results in the highest total cost.
- **Brown curve** – Lower peaking factor (2.2), full system, urban pipeline costs – compared to the full system presented above (green curve), the lower peaking factor reduces the size of the water facilities and results in a lower total cost.

New System Cost Curves for Limited System (Chart 2)

- **Light blue curve** - DWSD peaking factor (2.6), limited system, urban pipeline costs – the smaller water system lowered the total cost compared to the green curve.
- **Yellow curve** - Lower peaking factor (2.2), limited system, urban pipeline costs – compared to the limited system presented above (light blue curve), the lower peaking factor reduces the size of the water facilities and results in a lower total cost.
- **Purple curve** - Lower peaking factor (2.2), limited system - optimized, urban pipeline costs – This curve combines all the factors in the yellow curve with the impact of optimizing use of the three existing water treatment plants, to produce the lowest unit costs. The impact of optimization is noticeable on the limited system with lower peaking factor (2.2), because it contributes about 19 mgd out of 73 mgd. If optimization was added to the full system with DWSD peaking factor (2.6), the impact (19 mgd out of 292 mgd) would be negligible.

Findings from Cost Analysis

The family of cost curves illustrates the impact of several factors on the cost for a new water system to serve the southeastern communities participating in this Feasibility Study:

- The cost of the new system may require higher wholesale rates than current and projected DWSD rates. At best, the analysis shows equivalent rates at about the time that construction would be complete, but using more conservative cost curves would project the break-even point much longer. The use of DWSD's recent rate projections, as opposed to the actual history of rate increases, has a significant effect on the economics of a new water system.
- The peaking factor is the primary cost variable. The lower costs result from a less conservative peaking factor which reduces the size of facilities. Phase 2 studies could assess the potential to realize these lower costs.
- Compared to the peaking factor variable, the economics of the full system and a limited system are of less significance. This finding is specific to the two options we considered, and would not be true for every variation of system size and configuration.

- The optimization of the three existing water treatment plants could reduce wholesale rates, particularly for a limited system, where the available capacity of the WTP's is a more significant part of the required capacity. There are many assumptions involved in this analysis, which should be further evaluated if this option is pursued.

Conclusions

Phase 1 investigations focused on development of preliminary costs, to provide a rough comparison of the cost for a new water system versus the cost of continued purchases from DWSD. In general, it appears that it may cost more in the near term to construct a new water system than to purchase water from DWSD. The relative costs are highly influenced by future DWSD rate increases. If the recent double-digit increases were to continue, the new water system will be much more financially attractive.

Phase 1 also included an initial identification of the advantages and disadvantages of the five alternatives, as presented in the following Alternatives Comparison Matrix. The new water system alternatives provide for independence from DWSD, and the inherent benefits of a new water system. Based on an initial, cursory review, it seems reasonable to assume that the new system alternatives will create a negative impact on DWSD due to under-utilization of certain assets, and their corresponding reduced revenue. We therefore suggest that Phase 2 investigations explore "win-win" approaches that benefit both the Southeastern Michigan communities and DWSD. One such approach could be *Option 4 - Expanded Regional Approach/Lake Huron*. This option involves a larger regional approach, including participation with Genesee County and City of Flint. If this option is to receive further consideration, we suggest an evaluation that explores transferring ownership of some DWSD facilities, which may no longer be useful to DWSD. For example, this larger regional system would use nearly all the water produced by DWSD's WTP at Port Huron. Therefore, one approach would be for the communities in the expanded region to acquire the existing water system facilities north of 8 Mile Road, including the DWSD WTP at Port Huron. The economics of this approach would be driven by the value of these assets, but could result in both lower water rates for the communities participating in this study, and the many potential benefits of debt reduction / cash availability for DWSD.

Alternatives Comparison Matrix
Southeastern Michigan Water System Feasibility Study

Alternative	Capacity (Maximum Day)	Estimated Project Cost (\$)	Advantages	Challenges
<p>Baseline Alternative</p> <p>New Oakland-Macomb-Wayne Infrastructure/New Lake St. Clair WTP</p>	292 mgd	1,425,000,000	<ul style="list-style-type: none"> ▪ Fully independent of DWSD ▪ New ▪ Reliable 	<ul style="list-style-type: none"> ▪ Disruptive construction ▪ More costly than DWSD ▪ Impact on DWSD
<p>Limited Alternative</p> <p>New Macomb-Wayne Infrastructure/New Lake St. Clair WTP</p>	73 mgd	363,000,000	<ul style="list-style-type: none"> ▪ Fully independent of DWSD ▪ New ▪ Reliable ▪ Smaller system may be easier to implement 	<ul style="list-style-type: none"> ▪ Disruptive construction ▪ Slightly more costly than DWSD ▪ Impact on DWSD
<p>Limited Optimized Alternative</p> <p>New Macomb-Wayne Infrastructure/Optimize Existing Supplies & New Smaller Lake St. Clair WTP</p>	54 mgd new plus 19 mgd existing	310,000,000	<ul style="list-style-type: none"> ▪ Fully independent of DWSD ▪ New ▪ Reliable ▪ Smaller system may be easier to implement ▪ Reduced cost by optimizing use of existing WTP's? ▪ About same cost as DWSD 	<ul style="list-style-type: none"> ▪ Disruptive construction ▪ Impact on DWSD
<p>Expanded Regional Alternative</p> <p>New Regional Supply with Genesee-Flint/Lake Huron WTP</p>	Not Available	Not Available	<ul style="list-style-type: none"> ▪ Fully independent of DWSD ▪ Avoids disruptive construction ▪ Reliable ▪ Facilitates expansion to unserved areas ▪ Potential "win-win" finances 	<ul style="list-style-type: none"> ▪ Requires agreements with DWSD, Genesee and Flint
<p>Wholesale Purchase Alternative</p> <p>Wholesale Purchase of Raw or Finished Water from Genesee</p>	Not Available	Not Available	<ul style="list-style-type: none"> ▪ Fully independent of DWSD ▪ Reliable ▪ Facilitates expansion to unserved areas 	<ul style="list-style-type: none"> ▪ Disruptive construction ▪ Requires agreements with Genesee

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