Tualatin Valley Water District

TVWD Long-Term Water Supply Planning
Technical Memorandum 3 – Economic and Financial Evaluation

To: TVWD Board of Commissioners

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RE: **Technical Memorandum 3 – Economic and Financial Evaluation – *FINAL***

1.0 INTRODUCTION

Tualatin Valley Water District (TVWD) is evaluating long-term water supply options to serve projected water supply needs through 2050. As part of the effort, TVWD staff worked with HDR to prepare economic, risk, and financial analyses. The economic and risk analyses were based on a long-term economic model that calculated the present value (PV) of each option. The financial analyses were based on a 30-year financial forecast of required cash flows and borrowing requirements to finance each option.

The current water supply evaluation efforts are summarized in a series of six technical memoranda. The purpose of this memorandum is to summarize the results of the economic, risk, and financial analyses for the TVWD Board of Commissioners (Board).

Several TMs prepared as part of the *City of Hillsboro's Water Master Plan Update* (Black & Veatch, 2012) were used in preparing this TM and are referenced within the text:

- *TM-8 – Summary of Water Supply Development Options* (Final, dated December 7, 2011
- *TM-9A – Hillsboro Water Supply Options Cost Estimating Detail* (Final, dated June 7, 2012)
- *TM-9B – Approach to Incorporating Cost Risk into the Financial Model (*Final, dated February 13, 2012)
- *TM-9C – Phasing of Water Supply Options* (Final, dated June 4, 2012
- *TM 9D – Economic Analysis* (Draft, dated June 7, 2012)
- *TM 9E* – Cost Share and NPV Analysis (Final, dated October 23, 2012)

2.0 SOURCE OPTIONS AND PLANNING SCENARIOS

The economic, risk, and financial analyses were applied to four long-term water supply options. These four options are presented in *TM 1 – Introduction and Supply Options*.

3.0 CAPITAL COSTS

Capital costs for the supply options are based on analysis by CH2M HILL which are documented in Hillsboro's *TM-9A – Hillsboro Water Supply Options Cost Estimating Detail*, dated June 7, 2012. The major components for each supply option are categorized as follows:

- Seismic improvements and dam raise (40 feet for Tualatin Basin Water Supply Project [TBWSP] option; and 9 feet for other options)

- Raw water river intake, pump station, and pipeline
- Water treatment plant
- Wells (Northern Groundwater option only)
- Booster pump station (finished water)
- 20-MG terminal reservoir
- Transmission lines

Table 1 on the following page summarizes the major capital cost components of the four supply options evaluated by TVWD.

Some refinements to the supply options as presented in Hillsboro's TM-8 (prepared by Black & Veatch) were made to the supply options to reflect more recent discussions with Hillsboro and TVWD that more accurately represent likely supply configurations. These changes are shown in updated figures for each of the supply options, included in *TM 1 – Introduction and Supply Options.* A brief discussion of each of the refinements is presented below.

Dam Costs. A correction was made to the total portion of the 40-foot dam raise allocated to municipal and industrial (M&I) users. The cost allocations shown in Hillsboro's TM 9C had Tualatin Valley Irrigation District (TVID) paying 54.5% of both the seismic portion and the dam raise portion of the overall costs. This was corrected to have TVID pay a share of the seismic portion only, increasing the M&I portion of the dam raise cost to $267,400,000.

Transmission Piping. Two refinements were made to the transmission piping for the Portland Supply option. The first refinement was to increase the capacity of the main transmission line from the Powell Butte Reservoirs to Hazeldale from 38 MGD to 46 MGD, to take into account required capacity to serve the Metzger area of TVWD. The diameter of this pipeline was increased from 48 to 54 inches, to maintain the same flow velocity in the pipeline. The cost for this segment was then scaled linearly according to the old and new diameters.

The second refinement eliminated the transmission piping between Hazeldale and the terminal storage reservoir, assuming that terminal storage could be located closer to the planned transmission lines. The cost for this segment was subtracted from the overall transmission line cost. The overall impact of these two refinements is a decrease to $472,411,000 for the cost of transmission piping for this option.

No changes were made to the transmission piping costs for the TBWSP. Only 25 MGD of the 80 MGD capacity of the STL2 is required to meet the projected transmission deficit, with the remainder used to replace existing capacity. Cash flows were refined for the TBWSP to have all transmission piping implemented in 2028, rather than a portion of piping implemented in 2021.

Future piping for individual partners was not included in this study. For the Mid-Willamette at Wilsonville option, additional transmission piping from the terminal storage reservoir to the West Hills area of the TVWD system is needed by TVWD.

Booster Pump Stations. Through the evaluation of cost shares, it was identified that the cost estimates presented in Hillsboro's TM-9A were missing the final booster pump station (boosting water from head at the terminal reservoir to overcome the head in the JWC transmission system) in the Mid-Willamette at Wilsonville option. The cost estimate for the booster pump station for the Portland Supply option was used to estimate the costs of this missing pump station; these costs were added onto the costs shown for booster pumping in Hillsboro's TM-9C.

Table 1: Summary of Total Capital Costs for TVWD Supply Options (Construction and Non-construction)

Component	Portland Supply	Mid-Willamette at Wilsonville	Tualatin Basin Water Supply Project	Northern Groundwater
Seismic improvements and dam raise[(1)]	$16,400,000	$16,400,000	$267,400,000	$16,400,000
Raw water river intake, pump station, and pipeline	N/A	$9,146,000	$250,875,000	N/A
Water treatment plant	$65,075,500	$85,625,313 + $17,125,063 (times 3 additional phases)	$174,375,000 + $58,125,000 (times one additional phase)	$183,315,860 + $26,187,980 (times 3 additional phases)
Wells	N/A	N/A	N/A	$30,062,500 + $6,012,500 (times 3 additional phases)
Booster pump station (finished water)	$9,564,500	$34,938,800	$4,375,000	$15,940,600
20 MG terminal reservoir	$15,840,500	$15,840,500	$15,321,250	$15,840,500
Transmission lines	$472,410,547 (+ $269,798,125 if TVWD only participating)	$319,689,500 $84,649,842 (to TVWD West Hills)	$140,500,000	$353,001,818 + $3,639,194 (times 3 additional phases)
Non-construction costs[(2)]	$316,150,519	$225,856,100	$141,696,250	$284,634,590

Notes:

(1) Tualatin Basin Supply option requires a 40-foot dam raise and all other options require a 9-foot dam raise. All options require seismic improvements ($83,400,000). The Federal cost share of the total cost shown is $472,600,000.

(2) Based on information from Hillsboro's TM-9C (Black & Veatch, June 4, 2012); includes total for all phases of supply option of non-construction services (20% of construction), easement acquisition, and property acquisition.

4.0 PROJECT PHASING

Project phasing of the supply options was based on information presented by Black and Veatch in Hillsboro's *TM-9C Phasing of Water Supply Options*, dated June 4, 2012. The phasing was refined based on TVWD's demands and timing for supply needs. In particular, TVWD's initial need for supply occurs in year 2026, so the initial construction of supply infrastructure for each supply option starts in year 2023 and is completed in 2026. The initial "Phase 1" and "Phase 2" construction periods in Hillsboro's TM-9C and the associated costs, were combined into a single phase for TVWD. The timing for subsequent expansion for treatment and transmission piping remained the same in later phases according to the original timing in Hillsboro's TM-9C. Table 2 presents a summary of the phasing and total cost allocation by supply option used in the cost analysis.

Table 2: Summary of Supply Option Phasing and Total Costs

	Non-Construction	Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines
Portland Supply								
Initial phase with 20 MGD WTP	$149,841,488 (2015-2022) $156,758,591 (2023-2028)	$16,400,000 (2023-2026)	N/A	N/A	$52,873,763 (2024-2028)	$4,782,050 (2025-2026)	$15,840,500 (2026-2027)	$269,798,125 (2022-2026)
Expansion period for WTP	$9,550,440 (2029-2033)	N/A	N/A	N/A	$12,201,638 (2034-2037)	N/A	N/A	N/A
Mid-Willamette at Wilsonville								
Initial phase with 50 MGD WTP	$207,187,688 (2015-2021) $5,524,616 (2022-2026)	$16,400,000 (2023-2026)	N/A	$9,146,000 (2025)	$85,625,313 (2023-2026)	$34,938,800 (2025-2026)	$15,840,500 (2025-2026)	$319,689,500 (2023-2026)
3 expansion phases for WTP	$4,381,266 @ (2027-2031) (2033-2037) (2041-2045)	N/A	N/A	N/A	$17,125,063 @ (2027-2031) (2033-2037) (2041-2045)	N/A	N/A	N/A
TBWSP								
Initial phase with 60 MGD WTP	$117,514,07 (2015-2021) $15,538,517 (2023-2028)	$267,400,000 (2022-2025)	N/A	$250,875,000 (2018-2021)	$174,375,000 (2023-2026)	$4,375,000 (2025-2026)	$15,231,250 (2025-2026)	$140,500,000 (2025-2028)
Expansion period for WTP	$8,643,662 (2035-2037)	N/A	N/A	N/A	$58,125,000 (2036-2037)	N/A	N/A	N/A
Northern Groundwater								
Initial phase with 50 MGD WTP and wells	$248,394,916 (2015-2021) $9,059,919 (2022-2026)	$16,400,000 (2023-2026)	$30,062,500 (2024-2025)	N/A	$181,315,860 (2023-2026)	$15,940,600 (2025)	$15,840,500 (2026-2027)	$353,001,818 (2023-2026)
3 expansion phases for well field and piping	$9,059,919 @ (2027-2031) (2033-2037) (2041-2045)	N/A	N/A	N/A	N/A	N/A	N/A	$3,639,194 @ (2029) (2036) (2044)

Notes: Values shown are total costs in 2012 dollars for each supply option component and the year planned for construction (when costs would be incurred). For those components with more than one range of years for a single cost, each range of years indicates the period for the expansion phase with the costs being the same for each expansion.

5.0 OPERATION AND MAINTENANCE COSTS

Hillsboro's *TM-9A – Hillsboro Water Supply Options Cost Estimating Detail*, dated June 7, 2012 also provided O&M costs with additional breakdown provided in this TM. All treatment costs were based on 2012 budgets for the JWC WTP. Estimated O&M cost breakdowns are described in Table 3. Additional information on the projected Portland wholesale rates used for the economic evaluation is presented in Attachment A.

Table 3: Anticipated Operations and Maintenance Costs

Supply	Costs ($/CCF) [1,2]	
	Chemicals	Power[3]
Tualatin Basin Supply [4]	$0.046	$0.070
Mid-Willamette at Wilsonville	$0.046	$0.140
Portland Supply [5,6]	$0.000	$0.000
Northern Groundwater	$0.046	$0.178

(1) CCF – hundred cubic feet of water; MGD – million gallons per day.
(2) All power costs based on total electric load connected at build-out (80 MGD additional capacity) and unit cost of $0.0730/kWh. Cost interpolated linearly for intermediate flows.
(3) Based on total connected electrical loads at build-out as follows: TBWSP – 4,280 kW; Willamette Wilsonville – 8,546 kW; and Northern Groundwater – 10,885 kW.
(4) O&M costs based on 2012 JWC WTP budget with total cost of $0.39/CCF, including fixed and variable O&M costs. All costs in 2012 dollars. TBWSP O&M costs also include estimated pump-back costs. Total pump-back energy requirements were based on modeling conducted by MWH as part of the TBWSP. Requirements were assumed to be the average of the "moderate" and "conservative" scenarios. The moderate scenario assumed 50% of build-out demands and less aggressive pump-back targets, resulting in total annual energy usage of 5.5 M KW*hr. The conservative scenario assumed build-out demands and aggressive pump-back targets, resulting in total annual energy usage of 8.9 M kW*hr.
(5) Portland O&M costs based on additional treated supply of 30 MGD and total new capacity of 80 MGD. Treatment, power and chemical costs apply to treated supply to Hillsboro only. The analyses assumes TVWD will continue to receive Portland water as is.
(6) Portland wholesale cost assumed to be $0.951/CCF in 2012. This rate is TVWD's wholesale rate from Portland in FY2012-13. The rate was adjusted in future years to take into account changes in total demands on the Portland system due to projected decrease in Tigard usage and increases in JWC usage; 95% of Portland costs were assumed to be fixed.
(7) Northern Groundwater option also includes periodic renewal and replacement costs of $10 million in 2030 and $14 million in 2040.

Fixed O&M costs and chemical costs were updated based on the planned FY 2012/13 operating budget for the JWC WTP. At the current JWC WTP capacity of 75 MGD, the fixed O&M budget is $3,537,000 (net of chemical and utilities costs). The following formula was used to calculate the fixed O&M cost for the water treatment facilities in each of the supply options:

$$Cost_{new} = Cost_{old} \times (1 + 0.25 \times (Capacity_{new} - Capacity_{old})/(Capacity_{old}))$$

Where: $Cost_{new}$ = *Fixed O&M cost for the year of evaluation*
$Cost_{old}$ = *Fixed O&M cost at 75 MGD*
$Capacity_{new}$ = *Capacity of WTP for year of evaluation*
$Capacity_{old}$ = *Capacity of the existing JWC WTP (75 MGD)*

Chemical cost at the JWC WTP for FY 2012/13 is projected at $642,000 at a total projected flow of 13,950,000 CCF, which is $0.046/CCF. This unit cost for chemicals was applied as variable costs to projected annual water usage in each year for each supply option.

6.0 ECONOMIC AND FINANCIAL ASSUMPTIONS

A number of values were varied within the economic and financial models. For general assumptions and variables, HDR researched historical indices to develop estimates for our projections. These estimates are described in Table 4.

Table 4: Variables Within the Economic Evaluation of Water Supply Options

Variable	Distribution	Expected Values
Capital project cost	Triangular distribution based on level of overall cost risk, as described in Hillsboro's TM 9B.	Varies by project risk level
Construction cost escalation	Construction Cost Index, Annual Averages (1930-2011); Engineering News Record.	4.76%
Variable O&M (power and chemicals) cost escalation	Average Retail Rate of Electricity for the Industrial Sector; Energy Information Administration.	5.23%
Fixed O&M cost escalation	General inflation (calculated average increase in gross domestic product, 1929-2011).	3.09%
Portland wholesale rate escalation	Average Annual Rate of Growth in Average Wholesale Rate, (2008-2013).	4.85%

7.0 APPROACH FOR CAPITAL COST SHARE ANALYSIS

The capital costs used in the analyses included the total regional costs—including the costs of serving other regional partners. To make the analyses relevant for TVWD, the team calculated TVWD's share of the cost for the major components of each supply options. These calculations are referred to as "cost shares."

TVWD's cost shares were generally derived based on projected water supply deficits through 2050.[1] For each JWC partner, the deficit in 2050 was calculated based on projected demands, net of existing treated supply capacity. Cost shares were then calculated based on TVWD's proportion of the total projected deficit. The general approach to calculating the cost shares for each major component is described below. Cost share calculations are shown in Attachment B.

Seismic Improvements and Dam Raise. The TBWSP option includes a 40-foot dam raise of Scoggins Dam and all other options include a 9-foot raise. Seismic improvements are required for all options. For the dam raise component of the 40-foot raise, TVWD's cost share is based on the ownership percentage stated in the Intergovernmental Agreement (IGA) associated with the TBWSP, which is 43.4% for TVWD. With Federal participation ($472,600,000) in the seismic improvements, TVWD's cost share is reduced to 29.9%. TVWD does not have any existing contract ownership of the stored volume, and therefore has no cost share for the Scoggins Dam seismic improvements for the other options.

[1] The demands are presented in *TM 2 – Population and Water Demand Projections.*

Raw Water Intake, Pump Station, and Pipeline. The cost share calculation for the "raw water intake, pump station, and pipeline" varies depending on the supply option. In general, the cost share for this component is based on TVWD's proportion of the projected water supply deficit as of 2021 to meet year 2050 projected demands. TVWD's current treatment capacity is 12.5 MGD with a 2050 demand of 61.4 MGD, leaving a deficit of 48.9 MGD. The combined deficit of the TVWD and Hillsboro is 80.25 MGD in 2050. TVWD's share is calculated by dividing 48.90 MGD by 80.25 MGD, which results in a 60.9% share based on total water supply deficit of the JWC partners that have a deficit in 2050. TVWD's share is further adjusted for the Mid-Willamette at Wilsonville option, because Hillsboro is paying an additional $2.5 million as buy-in to the existing Wilsonville Water Treatment Plant intake.[2] This buy-in would be paid by Hillsboro to TVWD, and becomes a "credit" to TVWD in calculating TVWD's cost of this option[3]. The resulting adjusted cost share for TVWD taking this credit into account is 33.6% for the Mid-Willamette at Wilsonville option.

The TBWSP option assumes that 50% of total cost for the raw water intake, pump station, and pipeline component applies to the raw water storage expansion and 50% applies to the water treatment plant improvements. That is, TVWD's cost share is based on TVWD's ownership in the raw water storage expansion (43.4%) times 50% of the component cost, plus TVWD's projected proportional ownership in the JWC WTP in 2050 (40.1%; including existing capacity) times 50% of the component cost. The value of 40.1% is based on the TVWD's 2050 demand of 61.40 MGD out of a projected total JWC demand of 153.3 MGD.

Because there is no need for additional raw water improvements, the Portland Supply option and Northern Groundwater options include no costs for the "raw water intake, pump station, and pipeline" component.

Water Treatment Plant. All of the supply options identify phased expansion of water treatment capacity, as described in Hillsboro's TM 9C (and adjusted by TVWD as documented in this TM). In general, the cost share for each expansion phase is based on the percentage of the total supply deficit met by the expansion before the next phase of expansion is needed. For example, the first phase of water treatment plant expansion for all options is adequate until 2026. Therefore, the cost share for the first phase of treatment expansion is based on the 2026 supply deficits. TVWD's 2026 demand is 48.0 MGD, with a supply deficit of 35.5 MGD net of the TVWD's existing 12.5 MGD capacity. The total JWC supply deficit in 2026 is 50.55 MGD net of the JWC WTP's existing 75 MGD capacity. TVWD's cost share (70.23%) for the first phase of the treatment expansion is calculated by the ratio of the TVWD's deficit (35.5 MGD) to the total deficit (50.55 MGD) addressed by the expansion.

These calculations are completed for each phase for expansion using the deficit values for the period by when the next phase of expansion is needed. The specific phases are detailed in Hillsboro's TM 9C. For the Portland Supply option, Hillsboro is responsible for 100% of costs for all treatment expansions; hence detailed cost share calculations were not required.

[2] The buy-in is based on assumptions included in the City of Hillsboro analyses and does not reflect the actual value (or even the carrying costs) of the facilities. The actual buy-in will be determined through negotiations with Hillsboro and could be significantly higher.

[3] This value is based on the capacity proportion of TVWD's available capacity assuming Hillsboro's capacity share is 36.6 MGD and TVWD's capacity share is 43.4 MGD. Existing water treatment plant (WTP) facilities include intake, intake pipeline, raw water wet well and raw water pump station building (excluding existing pumps).

Wells (Northern Groundwater option only). This component only applies to the Northern Groundwater option. Since the timing of the well expansion phasing coincides with the water treatment plant expansion (one year offset), and it addresses the supply deficit similarly, the basis for calculating cost share for the wells is the same as the corresponding water treatment plant expansion.

20-MG Terminal Reservoir. TVWD's cost share for the new 20-MG Terminal Storage is based on TVWD's share of the water supply deficit in 2050. This is the same cost share as the raw water intake, pump station, and pipelines. The same cost share of 60.9% is applied to all options.

Booster Pump Station (finished water). The methods to calculate cost share for the finished water booster pumping vary depending on the supply option, in part because finished water pumping at the treatment plant is included within the treatment plant costs for some options, and in the booster pumping costs for others. Approaches to cost shares on each option are as follows:

- TBWSP option needs a booster pump station to increase capacity of the existing STL, thereby delaying implementation of the STL2 until 2028. As with the water treatment plant expansion method, the cost share is calculated using the percent of the total deficit met by the booster pump based on 2028 demands. In this case, TVWD has a 2028 peak-day demand of 49.1 MGD, and total transmission capacity of 43.0 MGD, leaving a deficit of 6.1 MGD. This results in 92.4% TVWD cost share for this booster pump station.

- Mid-Willamette at Wilsonville option needs a booster pump station at the new water treatment plant. Same as the calculation for cost share of the intakes, the cost share for this booster pump is based on the proportion of 2050 supply deficit met by the new supply (60.9%).

- Mid-Willamette at Wilsonville and Portland supply options need a booster pump station for the Hillsboro extension line. The cost share for this booster pump is based on the total capacity desired by each partner. In this case, the analysis assumed that TVWD would need 12 MGD out of a total capacity of 36 MGD. This results in a 33.3% share for TVWD for this booster station.

- The Northern Groundwater option includes two pump stations, one at the water treatment facility and the second along the transmission line, with 50% of the total capacity in each station. The first station is included in the water treatment cost; whereas the second pump station is included in the booster pump station cost. TVWD's cost share for the booster pump station is the same as for the intakes (60.9%) based on proportion of 2050 supply deficit.

Transmission Lines. The methods to calculate cost share for the transmission lines vary depending on the supply option:

- TBWSP require the STL2 to increase transmission capacity from Fern Hill Reservoir to Hazeldale. The cost share for the STL2 is based on the transmission deficit met by the new pipeline in 2050. TVWD's deficit is 18.40 MGD (61.4 MGD demand – 43.0 MGD current transmission capacity), out of a total pipeline capacity of 80 MGD. The portion of the STL2 capacity that is needed for new capacity is 25 MGD. The major portion of the 80 MGD

capacity of the STL2 (55 MGD) is not needed to meet projected transmission needs and is instead allocated to redundancy (potential replacement of existing STL capacity). Based on its transmission capacity deficit of 18.4 MGD, TVWD's share of the *new capacity* is 73.6%, based on its deficit of 18.4 MGD; but in terms of the cost share of the total capacity cost, TVWD's share is 23.0%, or 18.4 MGD divided by the full 80 MGD.

- Mid-Willamette at Wilsonville supply and Northern Groundwater options require a new transmission line from their respective WTPs (or wells for the Northern Groundwater option) to the terminal storage reservoir (or Hillsboro connection for the Northern Groundwater option). TVWD's cost share for these lines is based on the 2050 supply deficit (69.0%), same as for the intakes for these options.

- Mid-Willamette at Wilsonville option requires a transmission line from terminal storage location to Hazeldale. The cost share for these lines is based on the supply deficit taking into account that 30 MGD of TVWD's demands will be met through the Willamette Eastern Extension pipeline. In this case, TVWD's deficit is 18.90 MGD, out of a total deficit of 50.25 MGD, resulting in a cost share of 37.6% for TVWD.

- The Portland option requires a 54-inch transmission line from Powell Butte to Hazeldale based on a deficit of 45.5 MGD in 2050 accounting for the existing capacity of the Washington County Supply Line (WCSL). A portion of the length of this transmission line needs to be up-sized to 54-inch (Powell Butte to TVWD's Portland meter). The costs derived in Hillsboro's TM-9A for this portion of the transmission line were scaled according to the adjusted pipeline diameter. For TVWD, the current transmission capacity from the JWC and WCSL is 47.2 MGD with 2050 demand of 61.4 MGD, leaving a deficit of 14.2 MGD. TVWD's current transmission capacity is 12.50 MGD from JWC and 34.7 MGD from WCSL. The combined deficit of the TVWD and Hillsboro is 45.5 MGD in 2050. TVWD's share is calculated by dividing 14.20 MGD by 45.5 MGD, which results in a 31.2% from Powell Butte to Hazeldale.

- All of the supply options have a new transmission line from Hazeldale to the North Transmission Line (except for the Northern Groundwater Option where the line only goes from the Beaverton meter to Hillsboro connection). It assumed that TVWD desired 12 MGD out of the total 36 MGD, which include 22 MGD for Hillsboro and 2 MGD for Beaverton. The cost share for this line is based on the total capacity desired by each partner to deliver water to their meter. In this case, TVWD is assumed to require 12 MGD out of a total capacity of 36 MGD. This results in a 33.3% cost share for TVWD for these transmission lines.

Operations and Maintenance Costs. O&M costs were divided into fixed and variable cost components. As most of the O&M costs are associated with treatment, the cost shares for the fixed costs were based on projected water treatment plant ownership in each option. For example, TVWD is projected to require 64.2% of the initial WTP expansion in the TBWSP supply option; a cost share of 64.2% was applied to fixed O&M costs for the years 2021 (year of implementation of Phase 1) through 2036 (year before implementation of the next expansion phase). Variable O&M costs were calculated as a cost per CCF based on projected total annual usage in each year.

8.0 ECONOMIC EVALUATION OF OPTIONS

This section presents the economic evaluation using a present value for the TVWD cost share. This economic evaluation was conducted for each of the four supply options: Portland Supply, Mid-Willamette at Wilsonville, TBWSP, and Northern Groundwater. Additional economic analyses were also conducted for the scenario where only TVWD pursued the Portland supply, and a scenario assuming no federal cost share were available for the TBWSP option. This results in a total of six economic evaluations.

The cost estimates and cost share calculations involve assumptions that yield uncertainty or "cost risk." In many cases, the risks are not symmetrical. In other words, the risk of a higher cost, for example, may be greater than the risk of a lower costs. This is typical in large capital project planning. These analyses accounts for this with risk-adjusted cost evaluations.

8.1 TVWD Cost Share Summary

Based on the cost share analysis described in Section 7, the cost share results are summarized in Table 5 on the following page. TVWD's cost share is presented by water supply option and for each major component of the option. The cost share is presented in terms of percent and by non-construction and construction costs (2012 dollars).

Table 5: TVWD Cost Share Summary

	TBWSP	TBWSP (no-Fed)	Willamette Supply	Portland Supply	Portland Supply (TVWD-only)	Northern Groundwater
Seismic/Dam Raise						
TVWD Cost Share (%)	29.9%	43.4%	0%	0%	0%	0%
TVWD Cost Share ($)	$ 79,856,000	$321,160,000	$ -	$ -	$ -	$ -
River Intake/PS, Pipeline						
TVWD Cost Share (%)	41.7%	41.7%	33.6%	0%	0%	0%
TVWD Cost Share ($)	$104,680,335	$104,680,335	$ 3,073,453	$ -	$ -	$ -
Water Treatment Plant (+ Wells for Northern Groundwater option)						
Phase 1 (%)	*64.2%*	*64.2%*	*67.2%*	*0.0%*	*0.0%*	*67.2%*
Phase 2 (%)	*51.0%*	*51.0%*	*50.5%*			*50.5%*
Phase 3 (%)			*50.2%*			*50.2%*
Phase 4 (%)			*49.6%*			*49.6%*
TVWD Cost Share ($)	$141,644,074	$141,644,074	$ 83,269,901	$ -	$ -	$ 191,757,842
Booster Pump Station						
TVWD Cost Share (%)	92.4%	92.4%	53.4%	33.3%	33.3%	60.9%
TVWD Cost Share ($)	$ 4,043,561	$ 4,043,561	$ 18,649,691	$ 3,188,033	$ 3,188,033	$ 97,131,144
20 MG Reservoir						
TVWD Cost Share (%)	60.9%	60.9%	60.9%	60.9%	60.9%	60.9%
TVWD Cost Share ($)	$ 9,280,913	$ 9,280,913	$ 9,652,149	$ 9,652,149	$ 9,652,149	$ 9,652,149
Transmission Lines						
TVWD Cost Share (%)	26.4%	26.4%	50.6%	31.4%	100%	58.4%
TVWD Cost Share ($)	$ 37,106,050	$ 37,106,050	$161,667,465	$148,522,221	$269,798,125	$211,472,279
Total TVWD Construction Cost Share ($)	$376,610,933	$617,914,933	$276,312,659	$161,362,403	$282,638,307	$510,013,414
Non-construction Costs						
TVWD Cost Share (%)	44.5%	46.9%	58.4%	27.9%	27.9%	58.7%
TVWD Cost Share ($)	$ 63,082,998	$ 66,401,883	$131,989,765	$ 88,064,285	$ 88,064,285	$161,175,474
Total TVWD Cost Share ($)	$439,693,931	$684,316,816	$408,302,424	$249,426,688	$370,702,592	$671,188,888

8.2 Present Value

The PV for each water supply option is presented in Table 6, with capital and O&M costs presented separately in Table 7 and Table 8, respectively. Included in each table are rankings for each option in order of least cost to highest cost. PV brings all future costs into a present-day cost basis using a discount rate, which is an estimate of a utility's weighted average cost of capital over time. The discount rate used in this analysis is 5.5%. Capital and O&M cash flows for the options are presented in Attachments C and D, respectively.

As shown in Table 6, TBWSP is projected to be the least-cost option (total including capital and O&M) for TVWD cost share, and is approximately $1 million less expensive than the next least

expensive options (Portland option with Hillsboro as a partner).[4] The Mid-Willamette at Wilsonville and Northern Groundwater options are next least expensive for TVWD (total) cost share. The highest cost option is the Portland Supply option, assuming TVWD is the only participant.

Table 6: Comparison of Projected Total Cash Flows

	Net Present Value Analysis			
Scenario	Net Present Value	Rank	% from Lowest	Diff. from Lowest
TBWSP	$961,000,000	1	0.0%	$0
Willamette-Wilsonville	964,000,000	3	0.3%	3,000,000
Portland - TVWD only	1,208,000,000	6	25.7%	247,000,000
Portland	962,000,000	2	0.2%	1,000,000
TBWSP - No Fed.	1,201,000,000	5	25.0%	240,000,000
Northern Groundwater	1,177,000,000	4	22.5%	216,000,000

Table 7: Comparison of Projected Cash Flows for Capital Costs

	Net Present Value Analysis			
Scenario	Net Present Value	Rank	% from Lowest	Diff. from Lowest
TBWSP	$420,000,000	4	76.3%	$182,000,000
Willamette-Wilsonville	383,000,000	3	60.8%	145,000,000
Portland - TVWD only	357,000,000	2	49.5%	118,000,000
Portland	238,000,000	1	0.0%	0
TBWSP - No Fed.	661,000,000	6	177.2%	422,000,000
Northern Groundwater	565,000,000	5	136.8%	326,000,000

Table 8: Comparison of Projected Cash Flows for O&M Costs

	Net Present Value Analysis			
Scenario	Net Present Value	Rank	% from Lowest	Diff. from Lowest
TBWSP	$540,000,000	1	0.0%	$0
Willamette-Wilsonville	580,000,000	3	7.4%	40,000,000
Portland - TVWD only	851,000,000	6	57.5%	311,000,000
Portland	724,000,000	5	33.9%	183,000,000
TBWSP - No Fed.	540,000,000	1	0.0%	0
Northern Groundwater	612,000,000	4	13.2%	72,000,000

8.3 Findings for Economic Evaluation of Options

This technical memo presents the TVWD cost share for four water supply options: Portland Supply, Mid-Willamette at Wilsonville, TBWSP, and Northern Groundwater. Additional cost analysis was also

[4] The City of Hillsboro as determined that it will not pursue the Portland option. Therefore, the only viable Portland option is TVWD without a partner. This option is presented merely for convenience.

conducted for the scenario where only TVWD was pursuing the Portland supply, and a scenario assuming no Federal cost share was available for the TBWSP option. Cost information was based on those developed as part of the *City of Hillsboro's Water Master Plan Update* in 2012, with the refinements discussed above. TVWD's cost share of each major component of the supply options were derived based on the appropriate application of existing contract share, treatment or transmission capacity and water demand information. In the analysis, an economic evaluation of cost risks or uncertainty in capital and O&M cost estimates was considered. TBWSP at a total risk-adjusted cost of $961 million ($420 million capital cost) is projected to be the least-cost option (total including capital and O&M) for TVWD cost share, and is approximately $7 million less expensive than the next least expensive options (Portland option).

9.0 RISK EVALUATION OF OPTIONS

As part of the overall evaluation of options, the team prepared a preliminary evaluation of the risks[5] of each water supply option using a statistical technique called Monte Carlo Analysis. Monte Carlo Analysis is a well-established technique of including risk into quantitative analyses. The analyses used for TVWD incorporate the risks described in Hillsboro's TM 9B. Outputs from the Monte Carlo Analysis are presented in Attachment E.

Each water supply option includes construction of improvements such as wells, dams, raw water intakes and pumping, water treatment plants, booster pumping stations, storage reservoirs, and raw and finished water pipelines. Each of the improvements included have a risk of the actual implementation costs being greater or less than anticipated costs ("cost risk"). The cost risks vary among the different types of improvements. For the improvements under consideration in this evaluation, the overall cost risk varies due to two main factors: project-type cost risk and design-completion cost risk. Definitions of the three types of risk being used for this evaluation are provided in Table 9.

Table 9: Definitions of the three types of cost risk

Project-type Cost Risk	Intended to capture the fact that some types of projects have an inherently higher risk of actual costs differing from estimated costs. For this evaluation, *project-type cost risk* is the inherent risk associated with each project type based on a planning level of design. For example, water treatment plant projects on existing sites have a low inherent risk because the site is already secured and conditions are well understood. Whereas dams have a high inherent risk, being vulnerable to significant unknowns such as rock availability.
Design-completion Cost Risk	Intended to capture the fact that some projects are further along in the design process than others, with projects ranging from conceptual to pre-design level of completion. Projects at a lower level of design completion were considered to have a higher risk of future cost increases.
Overall Cost Risk	Combination of the previous two factors, intended to capture the overall risk of future costs differing from current estimates.

[5] We acknowledge that there are many other types of project risks other than cost (e.g., schedule, ability to acquire water rights). These other risks are evaluated in TM 4 as part of the overall evaluation of the options and are not assessed here.

It is important to note that this analysis evaluated the cost risk only. A more detailed risk analysis should be conducted on the selected alternative as part of a broader value-engineering assessment.

9.1 Project-Type Cost Risk

Project-type cost risks were evaluated for each project type included in the options. Each project type was assigned a rating of low, medium, or high cost risk. A preliminary evaluation is summarized in Table 10.

Table 10: Assessment of project-type cost risk based on projects being at a planning level of design

Project Type	Preliminary evaluation of project-level risk
Wells	Medium
Dam construction	High
Raw intake and pumping	
Tualatin River	High
Willamette River	Medium
Water Treatment Plant	
Existing site	Low
New site (no site yet identified)	Medium
Booster Pump Stations	Low
20 MG Reservoir	
Existing site	Low
No site identified	Medium
Pipelines	
Anticipated average conditions	Medium
Anticipated challenging conditions (difficult traverse or heavily urbanized)	High

9.2 Design-Completion Cost Risk

Design-completion cost risks were evaluated for each individual improvement included in the options. Each improvement was assigned a level of design completion as follows:

- Conceptual – Assigned to improvements for which no planning study has yet been completed.
- Planning – Assigned to improvements for which a planning study has been completed.
- Pre-design – Assigned to improvements for which preliminary design has been completed.

The preliminary evaluations of design-completion cost risk are summarized in Table 11.

Table 11: Assessment of design-completion cost risk

Component	TBWSP	Mid-Willamette at Wilsonville	Portland Supply	Northern Groundwater
Wells	N/A	N/A	N/A	Conceptual
Dam construction	Planning	Conceptual	Conceptual	Conceptual
Raw intake and pumping	Planning	Pre-design	N/A	N/A
Water treatment facilities	Conceptual	Planning	Conceptual	Conceptual
Booster pump stations	Conceptual	Conceptual	Conceptual	Conceptual
20 MG reservoir	Conceptual	Conceptual	Conceptual	Conceptual
Pipelines	Conceptual	Planning	Conceptual	Conceptual

9.3 Overall Cost Risk

Overall cost risks were then evaluated for each improvement included in the options analysis, based on a combination of the project-type and design-completion cost risks and engineering judgment. The preliminary evaluations of overall cost risk are presented in Table 12. For each project, the table shows the overall cost risk in bold text, as well as the project-type and design-completion cost risks in parentheses.

Table 12: Assessment of overall cost risk

Component	Overall Cost Risk (Project-type Cost Risk/Design-completion Cost Risk)			
	TBWSP	**Mid-Willamette at Wilsonville**	**Portland Supply**	**Northern Groundwater**
Wells	**N/A**	**N/A**	**N/A**	**Medium** (M/C)
Dam construction	**High** (H/PL)	**High** (H/C)	**High** (H/PL)	**High** (H/PL)
Raw intake and pumping	**High** (H/PL)	**Low** (M/PD)	**N/A**	**N/A**
Water treatment facilities	**Low** (L/C)	**Low** (L/PL)	**Medium** (M/C)	**High** (M/C)
Booster pump stations	**Low** (L/C)	**Low** (L/C)	**Low** (L/C)	**Low** (L/C)
20 MG reservoir	**Medium** (M/C)	**Medium** (M/C)	**Medium** (M/C)	**Medium** (M/C)
Pipelines	**Medium** (M/C)	**Medium** (M/PL)	**High** (H/C)	**High** (H/C)
Project-type Cost Risk defined as: L – Low; M – Medium; or H – High. Design-completion Cost Risk defined as: C – Conceptual; PL – Planning level; or PD – Pre-design completed.				

9.4 Application of Overall Cost Risk

Based on the evaluation of overall cost risk, a triangular probability distribution was applied to the capital cost for each individual project within the economic risk model. The probability ranges associated with each level of overall cost risk are summarized in Table 13.

Table 13: Distributions applied to each overall cost risk level

Level of overall cost risk	Applied cost variability	
	Low	**High**
Low	-5%	+10%
Medium	-10%	+20%
High	-20%	+40%
Variability applied as a triangular distribution, with the current cost estimate at the peak of the triangle.		

9.5 Findings from Risk Analysis

The risk analyses confirmed the overall findings from the economic analysis. Detailed outputs from the cost risk model are provided in Attachment 1. The Mid-Willamette at Wilsonville option was

consistently the least-cost option. Close to it was the Portland option that assumes Hillsboro would participate.

Figure 1 presents the relative distributions of the PV of each of the supply options analyzed. The risk analysis suggests that the relative risks for the TBWSP with Federal Funding, the Mid-Willamette at Wilsonville, and the Portland Supply with Partners are the least-cost options. The results are consistent with the findings from the PV analysis.

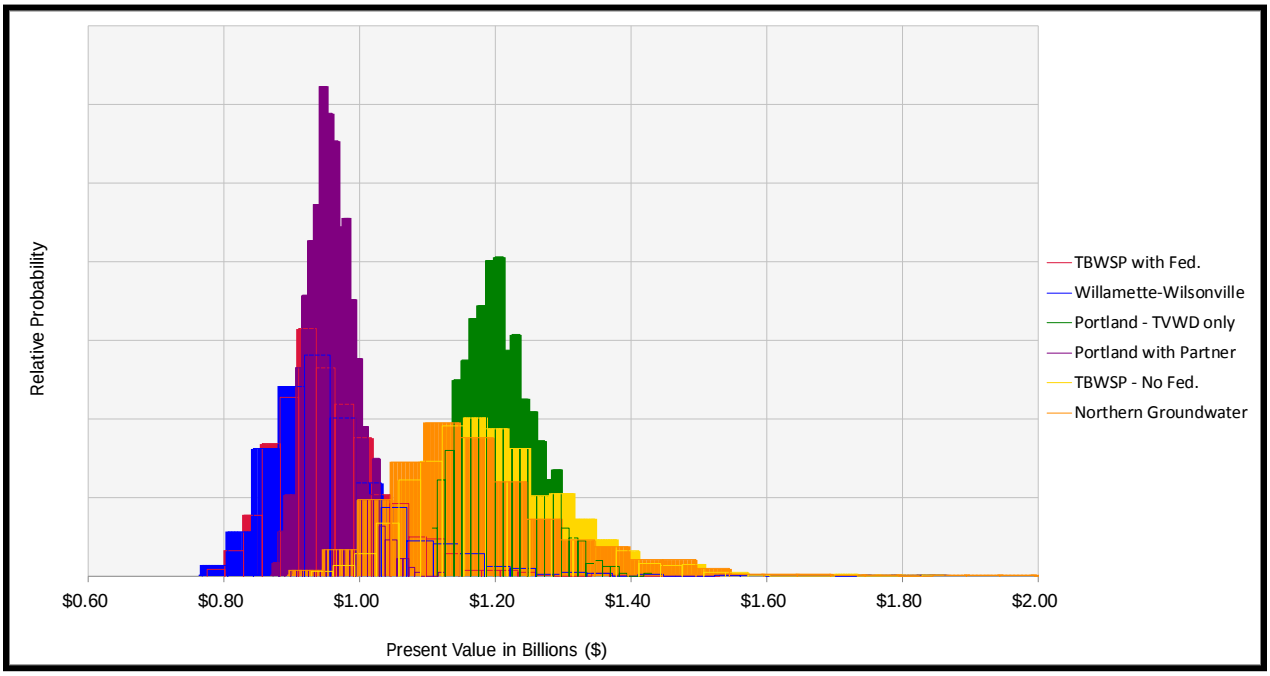

Figure 1: Relative Distribution of PV for Supply Options

The information presented in Figure 1 includes several supply options that overlap and are somewhat difficult to read. For ease of presentation, Figure 2 presents a cumulative probability distribution for four of the options.

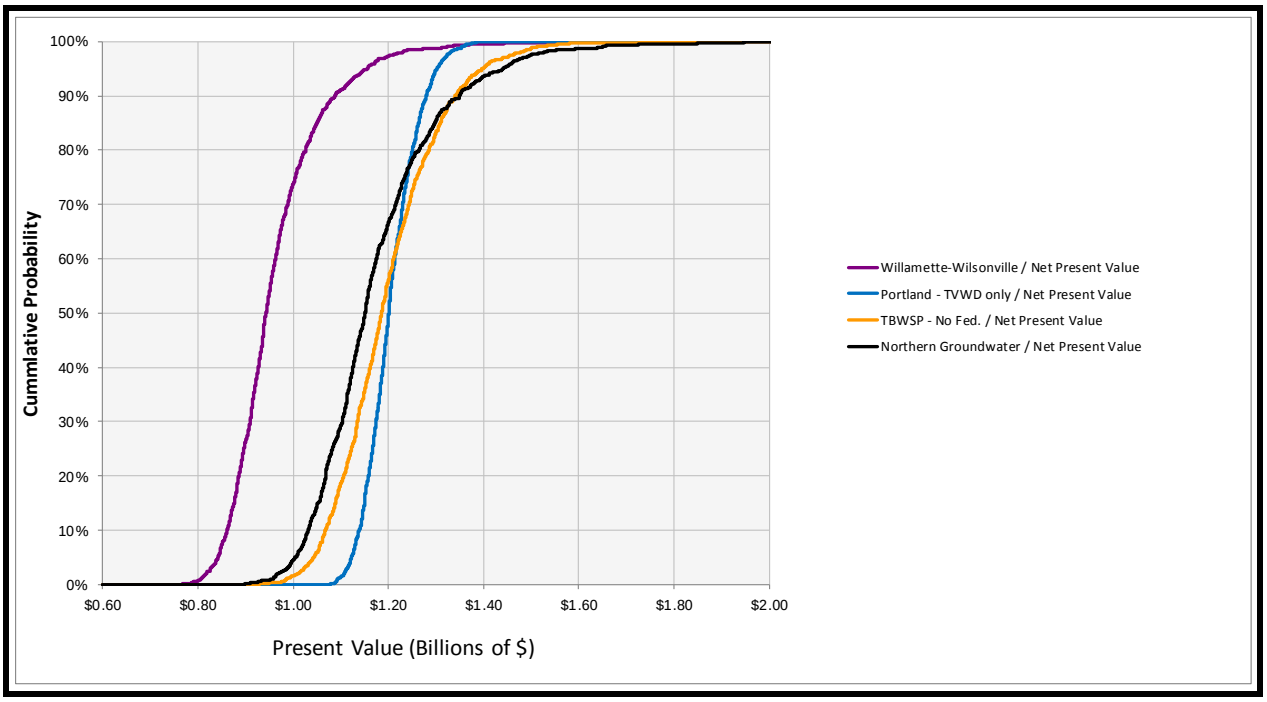

Figure 2: Cumulative Probability Distribution of PV by Supply Option

10.0 FINANCIAL EVALUATION OF OPTIONS

The economic and risk evaluation looked at the overall cost of each supply option using a PV framework. In addition to evaluating the PV, the team evaluated the relative impacts on water rates that would be expected from each of the supply options. This evaluation is referred to as the financial evaluation because it looks at the impacts of financing decisions on the water supply options.

The exact financing arrangement for TVWD's future water supply option will be determined after that selection is made. The exact financing arrangements will be determined in conjunction with other capital and operating requirements of TVWD at that time. To focus the technical analyses on the specific issue of selecting a water supply option, the team compared the relative rate impacts of implementing TVWD's then-expected capital improvements plan along with TVWD's 2007 preferred water supply option (TBWSP with Federal Funding) to each of the other water supply options. The baseline for comparing water rates is the likely future increase or decrease in costs beyond those that would be expected for the *TBWSP 2007 Decision*. The cost associated with the *TBWSP 2007 Decision* is based on the costs presented in Table 5 assuming the federal funding for seismic upgrades to Hagg Lake.

The analyses included approximately $287.4 million in non-water supply CIP through 2038. That CIP was added to the capital costs for each water supply option presented in Table 5 of this TM to set the total funding requirements for the supply option.

The CIP was combined with projections of operating expenses for the water supply option, and current forecasts of adjusted operating expenses for TVWD to develop a 30-year financial forecast of revenue

requirements. The difference between each water supply option and TBWSP 2007 Decision were then compared.

Figure 3 presents the results of the analyses. The values shown in the graph are the expected impact on monthly bills above or below the baseline TBWSP 2007 Decision. The values are not cumulative, but rather the values shown on the vertical axis of Figure 3 are to total impact on the bill for the corresponding year on the horizontal scale.

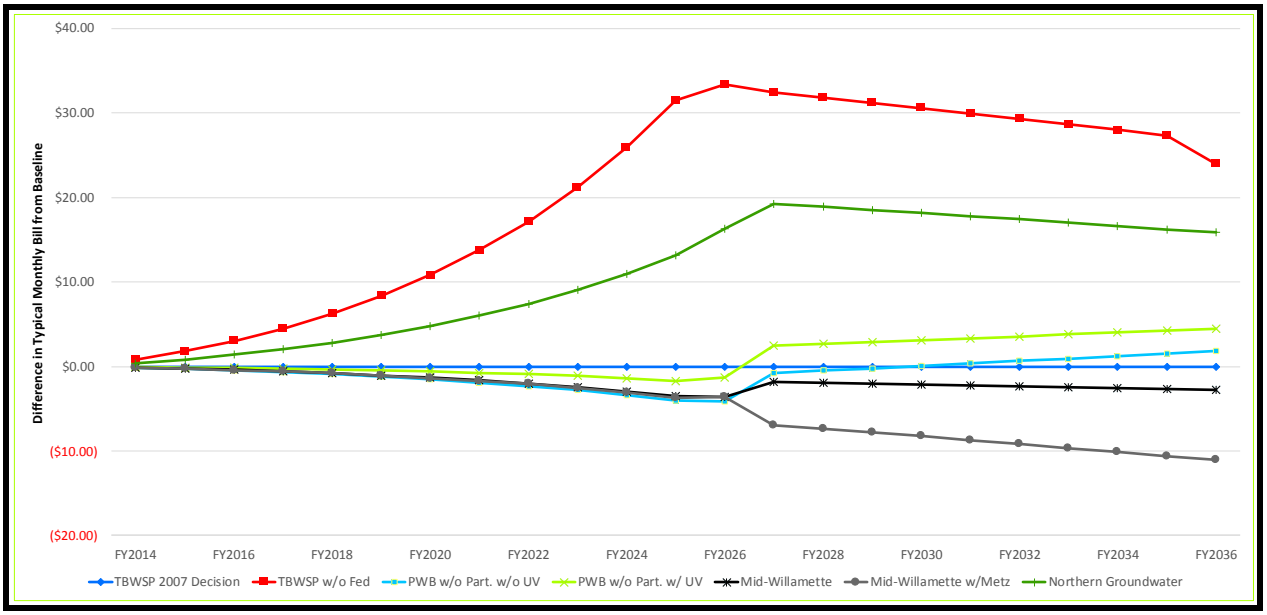

Figure 3: Comparison of Rate Impacts of Water Supply Options

11.0 SUMMARY OF FINDINGS

The differences among the water supply options for the economic, risk, and financial analyses suggest three options have the least cost. These least-cost options are the TBWSP with federal funding, Portland supply with Hillsboro as a partner, and the Mid-Willamette at Wilsonville. Neither the Portland supply with Hillsboro as a partner nor the TBWSP with federal funding appear to be viable options. Of the remaining options considered viable, the Mid-Willamette at Wilsonville option is least expensive with lowest future rate impacts. Therefore, non-economic criteria, as discussed in *TM 4 – Non-financial Criteria Evaluation*, may well be more important to the overall decision.

Attachment A
Projected City of Portland Wholesale Rates

Table 47
Tualatin Valley Water District
Source Options PV Analysis
PWB Adjustment Analysis
Average-Day Demands (MGD)

TVWD mgd from PDX 13.2
TVWD % from PDX 16.5%
Fixed Cost % 95.2%

	Common Assumptions						TVWD-only Analysis			Including Hillsboro					Metzger Demands Only starting 2026				
Year	TVWD Total PDD	JWC + Grabhorn ASR	Net TVWD Portland	Equivalent ADD	TVWD Contract - ADD (MGD)	Tigard Deduct	Portland Adjusted Demands	% Change to PWB Total	Adj. to Baseline Escalation	Hillsboro ADD	Hillsboro Contract Amounts	PWB Adj. Demands w/ COH	% Change to PWB Total	Adj. to Baseline Escalation	Metzger Demand from Portland	TVWD Contract - ADD (MGD)	PWB Adj. Demands	% Change to PWB Total	Adj. to Baseline Escalation
2012	49.2	15.5	33.7	16.0	13.2		80.0			0.0		80.0			0.0	13.2	80.0		
2013	49.5	15.5	34.0	16.2	13.2		80.0			0.0		80.0			0.0	13.2	80.0		
2014	49.9	15.5	34.4	16.4	13.2		80.0			0.0		80.0			0.0	13.2	80.0		
2015	50.3	15.5	34.8	16.6	13.2		80.0			0.0		80.0			0.0	13.2	80.0		
2016	50.9	15.5	35.4	16.8	19.4	(6.0)	80.2	0.3%	(0.0)	0.0	7.9	88.1	10.1%	(0.1)	5.2	19.4	80.2	0.0	(0.0)
2017	51.4	15.5	35.9	17.1	19.4	(6.0)	80.2			0.0	7.9	88.1			5.3	19.4	80.2		
2018	52.0	15.5	36.5	17.4	19.4	(6.0)	80.2			0.0	7.9	88.1			5.4	19.4	80.2		
2019	52.6	15.5	37.1	17.7	19.4	(6.0)	80.2			0.0	7.9	88.1			5.4	19.4	80.2		
2020	53.2	15.5	37.7	17.9	19.4	(6.0)	80.2			0.0	7.9	88.1			5.5	19.4	80.2		
2021	53.8	15.5	38.3	18.2	19.4	(6.0)	80.2			4.5	7.9	88.1			5.6	19.4	80.2		
2022	54.4	15.5	38.9	18.5	19.4	(6.0)	80.2			5.3	7.9	88.1			5.6	19.4	80.2		
2023	55.0	15.5	39.5	18.8	19.4	(6.0)	80.2			6.2	7.9	88.1			5.7	19.4	80.2		
2024	55.6	15.5	40.1	19.1	19.4	(6.0)	80.2			7.0	7.9	88.1			5.8	19.4	80.2		
2025	56.3	15.5	40.8	19.4	19.4	(6.0)	80.2			7.9	7.9	88.1			5.8	19.4	80.2		
2026	56.9	15.5	41.4	19.7	22.5	(6.0)	83.3	3.9%	(0.0)	8.7	13.9	97.2	10.4%	(0.1)	5.9	6.6	67.4	(0.2)	0.2
2027	57.5	15.5	42.0	20.0	22.5	(6.0)	83.3			9.6	13.9	97.2			6.0	6.6	67.4		
2028	58.2	15.5	42.7	20.3	22.5	(6.0)	83.3			10.4	13.9	97.2			6.0	6.6	67.4		
2029	58.8	15.5	43.3	20.6	22.5	(6.0)	83.3			11.3	13.9	97.2			6.1	6.6	67.4		
2030	59.5	15.5	44.0	20.9	22.5	(6.0)	83.3			11.7	13.9	97.2			6.2	6.6	67.4		
2031	60.1	15.5	44.6	21.3	22.5	(6.0)	83.3			12.1	13.9	97.2			6.3	6.6	67.4		
2032	60.8	15.5	45.3	21.6	22.5	(6.0)	83.3			12.6	13.9	97.2			6.3	6.6	67.4		
2033	61.4	15.5	45.9	21.9	22.5	(6.0)	83.3			13.0	13.9	97.2			6.4	6.6	67.4		
2034	62.1	15.5	46.6	22.2	22.5	(6.0)	83.3			13.5	13.9	97.2			6.5	6.6	67.4		
2035	62.8	15.5	47.3	22.5	22.5	(6.0)	83.3			13.9	13.9	97.2			6.6	6.6	67.4		
2036	63.4	15.5	47.9	22.8	25.5	(6.0)	86.3	3.6%	(0.0)	14.3	17.3	103.6	6.5%	(0.1)	6.6	7.3	68.1	0.0	(0.0)
2037	64.0	15.5	48.5	23.1	25.5	(6.0)	86.3			14.6	17.3	103.6			6.7	7.3	68.1		
2038	64.7	15.5	49.2	23.4	25.5	(6.0)	86.3			14.9	17.3	103.6			6.8	7.3	68.1		
2039	65.3	15.5	49.8	23.7	25.5	(6.0)	86.3			15.3	17.3	103.6			6.8	7.3	68.1		
2040	65.9	15.5	50.4	24.0	25.5	(6.0)	86.3			15.6	17.3	103.6			6.9	7.3	68.1		
2041	66.5	15.5	51.0	24.3	25.5	(6.0)	86.3			15.9	17.3	103.6			7.0	7.3	68.1		
2042	67.2	15.5	51.7	24.6	25.5	(6.0)	86.3			16.3	17.3	103.6			7.1	7.3	68.1		
2043	67.8	15.5	52.3	24.9	25.5	(6.0)	86.3			16.6	17.3	103.6			7.1	7.3	68.1		
2044	68.4	15.5	52.9	25.2	25.5	(6.0)	86.3			17.0	17.3	103.6			7.2	7.3	68.1		
2045	69.1	15.5	53.6	25.5	25.5	(6.0)	86.3			17.3	17.3	103.6			7.3	7.3	68.1		
2046	69.7	15.5	54.2	25.8	26.9	(6.0)	87.7	1.6%	(0.0)	17.6	18.8	106.5	2.8%	(0.0)	7.3	7.6	68.4	0.0	(0.0)
2047	70.3	15.5	54.8	26.1	26.9	(6.0)	87.7			17.9	18.8	106.5			7.4	7.6	68.4		
2048	70.8	15.5	55.3	26.4	26.9	(6.0)	87.7			18.2	18.8	106.5			7.5	7.6	68.4		
2049	71.4	15.5	55.9	26.6	26.9	(6.0)	87.7			18.5	18.8	106.5			7.5	7.6	68.4		
2050	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2051	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2052	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2053	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2054	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2055	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2056	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2057	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2058	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2059	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2060	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2061	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2062	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2063	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2064	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2065	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2066	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2067	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2068	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2069	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2070	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2071	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2072	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		

Table 47
Tualatin Valley Water District
Source Options PV Analysis
PWB Adjustment Analysis
Average-Day Demands (MGD)

TVWD mgd from PDX 13.2
TVWD % from PDX 16.5%
Fixed Cost % 95.2%

	Common Assumptions						TVWD-only Analysis			Including Hillsboro					Metzger Demands Only starting 2026				
Year	TVWD Total PDD	JWC + Grabhorn ASR	Net TVWD Portland	Equivalent ADD	TVWD Contract - ADD (MGD)	Tigard Deduct	Portland Adjusted Demands	% Change to PWB Total	Adj. to Baseline Escalation	Hillsboro ADD	Hillsboro Contract Amounts	PWB Adj. Demands w/ COH	% Change to PWB Total	Adj. to Baseline Escalation	Metzger Demand from Portland	TVWD Contract - ADD (MGD)	PWB Adj. Demands	% Change to PWB Total	Adj. to Baseline Escalation
2073	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2074	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2075	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2076	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2077	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2078	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2079	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2080	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2081	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2082	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2083	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2084	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2085	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2086	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2087	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2088	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2089	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2090	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2091	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2092	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2093	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2094	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2095	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2096	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2097	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2098	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2099	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2100	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2101	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2102	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2103	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2104	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2105	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2106	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2107	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2108	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2109	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2110	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2111	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		
2112	72.0	15.5	56.5	26.9	26.9	(6.0)	87.7			18.8	18.8	106.5			7.6	7.6	68.4		

Table 48
Tualatin Valley Water District
Source Options PV Analysis
Purchased Water Costs

		Portland System w/ Hillsboro						Portland System - TVWD Only						Portland System - Metzger Only (All non-Portland options)					
Year	Metzger Demand from Portland	Rate Change	Portland Rate	TVWD Contract - ADD (MGD)	Cost of TVWD Water	Cost of Metzger Water	Total Purchased Water Costs	Rate Change	Portland Rate	TVWD Contract - ADD (MGD)	Cost of TVWD Water	Cost of Metzger Water	Total Purchased Water Costs	Rate Change	Portland Rate	TVWD Contract - ADD (MGD)	Cost of TVWD Water	Cost of Metzger Water	Total Purchased Water Costs
2012	0.0	4.85%	$0.951	13.2			$6,125,133	4.85%	$0.951	13.2			$6,125,133	4.85%	$0.951	13.2			$6,125,133
2013	0.0	4.85%	0.997	13.2			6,422,202	4.85%	0.997	13.2			6,422,202	4.85%	0.997	13.2			6,422,202
2014	0.0	4.85%	1.045	13.2			6,733,679	4.85%	1.045	13.2			6,733,679	4.85%	1.045	13.2			6,733,679
2015	0.0	4.85%	1.096	13.2			7,060,263	4.85%	1.096	13.2			7,060,263	4.85%	1.096	13.2			7,060,263
2016	5.2	-4.30%	1.049	19.4	$7,249,676	$2,683,989	9,933,665	4.59%	1.147	19.4	$7,923,634	$2,933,503	10,857,137	4.59%	1.147	19.4	$7,923,634	$2,933,503	10,857,137
2017	5.3	4.85%	1.100	19.4	7,566,828	2,848,619	10,415,448	4.85%	1.202	19.4	8,270,270	3,113,438	11,383,708	4.85%	1.202	19.4	8,270,270	3,113,438	11,383,708
2018	5.4	4.85%	1.153	19.4	7,897,914	3,022,683	10,920,597	4.85%	1.260	19.4	8,632,134	3,303,684	11,935,817	4.85%	1.260	19.4	8,632,134	3,303,684	11,935,817
2019	5.4	4.85%	1.209	19.4	8,243,315	3,206,931	11,450,246	4.85%	1.322	19.4	9,009,645	3,505,060	12,514,705	4.85%	1.322	19.4	9,009,645	3,505,060	12,514,705
2020	5.5	4.85%	1.268	19.4	8,603,643	3,401,940	12,005,583	4.85%	1.386	19.4	9,403,470	3,718,198	13,121,668	4.85%	1.386	19.4	9,403,470	3,718,198	13,121,668
2021	5.6	4.85%	1.329	19.4	8,979,351	3,608,502	12,587,854	4.85%	1.453	19.4	9,814,106	3,943,963	13,758,069	4.85%	1.453	19.4	9,814,106	3,943,963	13,758,069
2022	5.6	4.85%	1.394	19.4	9,369,233	3,829,132	13,198,365	4.85%	1.523	19.4	10,240,233	4,185,102	14,425,335	4.85%	1.523	19.4	10,240,233	4,185,102	14,425,335
2023	5.7	4.85%	1.461	19.4	9,775,613	4,062,872	13,838,485	4.85%	1.597	19.4	10,684,392	4,440,572	15,124,964	4.85%	1.597	19.4	10,684,392	4,440,572	15,124,964
2024	5.8	4.85%	1.532	19.4	10,199,374	4,310,278	14,509,652	4.85%	1.675	19.4	11,147,547	4,710,978	15,858,525	4.85%	1.675	19.4	11,147,547	4,710,978	15,858,525
2025	5.8	4.85%	1.607	19.4	10,641,244	4,572,126	15,213,370	4.85%	1.756	19.4	11,630,495	4,997,168	16,627,663	4.85%	1.756	19.4	11,630,495	4,997,168	16,627,663
2026	5.9	-4.55%	1.533	22.5	12,417,726	4,417,849	16,835,575	1.14%	1.776	22.5	14,381,977	5,116,670	19,498,647	23.90%	2.175	6.6		6,957,085	6,957,085
2027	6.0	4.85%	1.608	22.5	12,966,595	4,685,506	17,652,100	4.85%	1.862	22.5	15,017,667	5,426,665	20,444,332	4.85%	2.281	6.6		7,294,504	7,294,504
2028	6.0	4.85%	1.686	22.5	13,535,698	4,972,529	18,508,227	4.85%	1.952	22.5	15,676,792	5,759,090	21,435,882	4.85%	2.392	6.6		7,648,287	7,648,287
2029	6.1	4.85%	1.768	22.5	14,129,504	5,276,372	19,405,876	4.85%	2.047	22.5	16,364,526	6,110,996	22,475,522	4.85%	2.508	6.6		8,019,229	8,019,229
2030	6.2	4.85%	1.853	22.5	14,749,069	5,597,992	20,347,061	4.85%	2.146	22.5	17,082,096	6,483,489	23,565,585	4.85%	2.629	6.6		8,408,162	8,408,162
2031	6.3	4.85%	1.943	22.5	15,395,497	5,938,397	21,333,894	4.85%	2.250	22.5	17,830,776	6,877,740	24,708,516	4.85%	2.757	6.6		8,815,958	8,815,958
2032	6.3	4.85%	2.037	22.5	16,069,934	6,298,654	22,368,587	4.85%	2.360	22.5	18,611,896	7,294,982	25,906,879	4.85%	2.890	6.6		9,243,532	9,243,532
2033	6.4	4.85%	2.136	22.5	16,773,578	6,679,886	23,453,464	4.85%	2.474	22.5	19,426,843	7,736,519	27,163,362	4.85%	3.031	6.6		9,691,843	9,691,843
2034	6.5	4.85%	2.240	22.5	17,507,674	7,083,283	24,590,957	4.85%	2.594	22.5	20,277,060	8,203,725	28,480,785	4.85%	3.178	6.6		10,161,897	10,161,897
2035	6.6	4.85%	2.348	22.5	18,273,522	7,510,096	25,783,618	4.85%	2.720	22.5	21,164,051	8,698,052	29,862,103	4.85%	3.332	6.6		10,654,749	10,654,749
2036	6.6	-1.28%	2.318	25.5	21,357,805	7,496,334	28,854,138	1.37%	2.757	25.5	25,400,833	8,915,388	34,316,222	3.81%	3.459	7.3		12,259,949	12,259,949
2037	6.7	4.85%	2.431	25.5	22,309,593	7,943,972	30,253,564	4.85%	2.891	25.5	26,532,794	9,447,764	35,980,558	4.85%	3.626	7.3		12,854,557	12,854,557
2038	6.8	4.85%	2.549	25.5	23,303,435	8,417,427	31,720,862	4.85%	3.031	25.5	27,714,771	10,010,844	37,725,616	4.85%	3.802	7.3		13,478,003	13,478,003
2039	6.8	4.85%	2.672	25.5	24,341,202	8,918,121	33,259,324	4.85%	3.178	25.5	28,948,988	10,606,320	39,555,308	4.85%	3.987	7.3		14,131,686	14,131,686
2040	6.9	4.85%	2.802	25.5	25,424,818	9,447,583	34,872,401	4.85%	3.332	25.5	30,237,731	11,236,009	41,473,740	4.85%	4.180	7.3		14,817,072	14,817,072
2041	7.0	4.85%	2.938	25.5	26,556,287	10,007,425	36,563,712	4.85%	3.494	25.5	31,583,387	11,901,829	43,485,217	4.85%	4.383	7.3		15,535,700	15,535,700
2042	7.1	4.85%	3.080	25.5	27,737,703	10,599,349	38,337,052	4.85%	3.663	25.5	32,988,446	12,605,804	45,594,250	4.85%	4.595	7.3		16,289,182	16,289,182
2043	7.1	4.85%	3.230	25.5	28,971,250	11,225,149	40,196,399	4.85%	3.841	25.5	34,455,503	13,350,068	47,805,571	4.85%	4.818	7.3		17,079,207	17,079,207
2044	7.2	4.85%	3.386	25.5	30,259,205	11,886,720	42,145,925	4.85%	4.027	25.5	35,987,267	14,136,874	50,124,141	4.85%	5.052	7.3		17,907,549	17,907,549
2045	7.3	4.85%	3.551	25.5	31,603,944	12,586,058	44,190,002	4.85%	4.223	25.5	37,586,565	14,968,597	52,555,162	4.85%	5.297	7.3		18,776,065	18,776,065
2046	7.3	2.14%	3.627	26.9	34,635,308	12,969,288	47,604,596	3.26%	4.361	26.9	41,643,755	15,593,620	57,237,375	4.37%	5.529	7.6		20,477,130	20,477,130
2047	7.4	4.85%	3.803	26.9	36,184,320	13,729,099	49,913,419	4.85%	4.572	26.9	43,506,209	16,507,179	60,013,388	4.85%	5.797	7.6		21,470,270	21,470,270
2048	7.5	4.85%	3.987	26.9	37,815,124	14,519,096	52,334,219	4.85%	4.794	26.9	45,467,005	17,457,032	62,924,037	4.85%	6.078	7.6		22,511,578	22,511,578
2049	7.5	4.85%	4.180	26.9	39,519,000	15,353,429	54,872,429	4.85%	5.026	26.9	47,515,661	18,460,191	65,975,853	4.85%	6.373	7.6		23,603,390	23,603,390
2050	7.6	4.85%	4.383	26.9	41,299,203	16,234,539	57,533,742	4.85%	5.270	26.9	49,656,087	19,519,594	69,175,682	4.85%	6.682	7.6		24,748,154	24,748,154
2051	7.6	4.85%	4.596	26.9	43,302,214	17,021,914	60,324,128	4.85%	5.526	26.9	52,064,408	20,466,295	72,530,702	4.85%	7.006	7.6		25,948,440	25,948,440
2052	7.6	4.85%	4.819	26.9	45,402,372	17,847,477	63,249,849	4.85%	5.794	26.9	54,589,531	21,458,910	76,048,441	4.85%	7.346	7.6		27,206,939	27,206,939
2053	7.6	4.85%	5.052	26.9	47,604,387	18,713,080	66,317,466	4.85%	6.075	26.9	57,237,124	22,499,667	79,736,791	4.85%	7.702	7.6		28,526,476	28,526,476
2054	7.6	4.85%	5.297	26.9	49,913,199	19,620,664	69,533,863	4.85%	6.369	26.9	60,013,124	23,590,901	83,604,025	4.85%	8.075	7.6		29,910,010	29,910,010
2055	7.6	4.85%	5.554	26.9	52,333,990	20,572,266	72,906,256	4.85%	6.678	26.9	62,923,761	24,735,060	87,658,820	4.85%	8.467	7.6		31,360,645	31,360,645
2056	7.6	4.85%	5.824	26.9	54,872,188	21,570,021	76,442,209	4.85%	7.002	26.9	65,975,563	25,934,710	91,910,273	4.85%	8.878	7.6		32,881,637	32,881,637
2057	7.6	4.85%	6.106	26.9	57,533,489	22,616,167	80,149,656	4.85%	7.342	26.9	69,175,378	27,192,543	96,367,921	4.85%	9.308	7.6		34,476,396	34,476,396
2058	7.6	4.85%	6.402	26.9	60,323,863	23,713,051	84,036,915	4.85%	7.698	26.9	72,530,384	28,511,382	101,041,765	4.85%	9.760	7.6		36,148,501	36,148,501
2059	7.6	4.85%	6.713	26.9	63,249,571	24,863,134	88,112,705	4.85%	8.071	26.9	76,048,107	29,894,184	105,942,291	4.85%	10.233	7.6		37,901,703	37,901,703
2060	7.6	4.85%	7.038	26.9	66,317,175	26,068,996	92,386,171	4.85%	8.462	26.9	79,736,440	31,344,052	111,080,492	4.85%	10.729	7.6		39,739,936	39,739,936
2061	7.6	4.85%	7.380	26.9	69,533,558	27,333,343	96,866,900	4.85%	8.873	26.9	83,603,658	32,864,238	116,467,896	4.85%	11.250	7.6		41,667,323	41,667,323
2062	7.6	4.85%	7.738	26.9	72,905,935	28,659,010	101,564,945	4.85%	9.303	26.9	87,658,435	34,458,154	122,116,589	4.85%	11.795	7.6		43,688,188	43,688,188
2063	7.6	4.85%	8.113	26.9	76,441,873	30,048,972	106,490,845	4.85%	9.754	26.9	91,909,869	36,129,374	128,039,244	4.85%	12.367	7.6		45,807,065	45,807,065
2064	7.6	4.85%	8.506	26.9	80,149,304	31,506,347	111,655,651	4.85%	10.228	26.9	96,367,498	37,881,649	134,249,147	4.85%	12.967	7.6		48,028,708	48,028,708
2065	7.6	4.85%	8.919	26.9	84,036,545	33,034,405	117,070,950	4.85%	10.724	26.9	101,041,322	39,718,909	140,760,231	4.85%	13.596	7.6		50,358,100	50,358,100
2066	7.6	4.85%	9.351	26.9	88,112,318	34,636,573	122,748,891	4.85%	11.244	26.9	105,941,826	41,645,276	147,587,102	4.85%	14.255	7.6		52,800,468	52,800,468
2067	7.6	4.85%	9.805	26.9	92,385,765	36,316,447	128,702,212	4.85%	11.789	26.9	111,080,004	43,665,072	154,745,076	4.85%	14.947	7.6		55,361,291	55,361,291
2068	7.6	4.85%	10.281	26.9	96,866,475	38,077,795	134,944,270	4.85%	12.361	26.9	116,467,384	45,782,828	162,250,212	4.85%	15.672	7.6		58,046,313	58,046,313
2069	7.6	4.85%	10.779	26.9	101,564,499	39,924,568	141,489,067	4.85%	12.960	26.9	122,116,053	48,003,295	170,119,348	4.85%	16.432	7.6		60,861,560	60,861,560
2070	7.6	4.85%	11.302	26.9	106,490,377	41,860,909	148,351,286	4.85%	13.589	26.9	128,038,681	50,331,455	178,370,136	4.85%	17.229	7.6		63,813,345	63,813,345
2071	7.6	4.85%	11.850	26.9	111,655,160	43,891,163	155,546,324	4.85%	14.248	26.9	134,248,557	52,772,530	187,021,088	4.85%	18.064	7.6		66,908,293	66,908,293
2072	7.6	4.85%	12.425	26.9	117,070,436	46,019,885	163,090,320	4.85%	14.939	26.9	140,759,612	55,331,998	196,091,610	4.85%	18.940	7.6		70,153,345	70,153,345
2073	7.6	4.85%	13.027	26.9	122,748,352	48,251,849	171,000,201	4.85%	15.663	26.9	147,586,453	58,015,600	205,602,053	4.85%	19.859	7.6		73,555,782	73,555,782

Table 48
Tualatin Valley Water District
Source Options PV Analysis
Purchased Water Costs

		Portland System w/ Hillsboro						Portland System - TVWD Only						Portland System - Metzger Only (All non-Portland options)					
Year	Metzger Demand from Portland	Rate Change	Portland Rate	TVWD Contract - ADD (MGD)	Cost of TVWD Water	Cost of Metzger Water	Total Purchased Water Costs	Rate Change	Portland Rate	TVWD Contract - ADD (MGD)	Cost of TVWD Water	Cost of Metzger Water	Total Purchased Water Costs	Rate Change	Portland Rate	TVWD Contract - ADD (MGD)	Cost of TVWD Water	Cost of Metzger Water	Total Purchased Water Costs
2074	7.6	4.85%	13.659	26.9	128,701,647	50,592,064	179,293,711	4.85%	16.423	26.9	154,744,396	60,829,357	215,573,753	4.85%	20.822	7.6		77,123,237	77,123,237
2075	7.6	4.85%	14.322	26.9	134,943,677	53,045,779	187,989,456	4.85%	17.220	26.9	162,249,500	63,779,580	226,029,080	4.85%	21.832	7.6		80,863,714	80,863,714
2076	7.6	4.85%	15.016	26.9	141,488,445	55,618,499	197,106,944	4.85%	18.055	26.9	170,118,600	66,872,890	236,991,490	4.85%	22.891	7.6		84,785,604	84,785,604
2077	7.6	4.85%	15.745	26.9	148,350,635	58,315,996	206,666,631	4.85%	18.930	26.9	178,369,352	70,116,225	248,485,578	4.85%	24.001	7.6		88,897,706	88,897,706
2078	7.6	4.85%	16.508	26.9	155,545,640	61,144,322	216,689,963	4.85%	19.849	26.9	187,020,266	73,516,862	260,537,128	4.85%	25.165	7.6		93,209,245	93,209,245
2079	7.6	4.85%	17.309	26.9	163,089,604	64,109,822	227,199,426	4.85%	20.811	26.9	196,090,749	77,082,430	273,173,179	4.85%	26.386	7.6		97,729,893	97,729,893
2080	7.6	4.85%	18.148	26.9	170,999,450	67,219,148	238,218,598	4.85%	21.821	26.9	205,601,150	80,820,928	286,422,078	4.85%	27.666	7.6		102,469,793	102,469,793
2081	7.6	4.85%	19.028	26.9	179,292,923	70,479,277	249,772,200	4.85%	22.879	26.9	215,572,806	84,740,743	300,313,549	4.85%	29.007	7.6		107,439,578	107,439,578
2082	7.6	4.85%	19.951	26.9	187,988,630	73,897,522	261,886,152	4.85%	23.989	26.9	226,028,087	88,850,669	314,878,756	4.85%	30.414	7.6		112,650,398	112,650,398
2083	7.6	4.85%	20.919	26.9	197,106,078	77,481,552	274,587,630	4.85%	25.152	26.9	236,990,449	93,159,926	330,150,376	4.85%	31.889	7.6		118,113,942	118,113,942
2084	7.6	4.85%	21.934	26.9	206,665,723	81,239,407	287,905,130	4.85%	26.372	26.9	248,484,486	97,678,183	346,162,669	4.85%	33.436	7.6		123,842,468	123,842,468
2085	7.6	4.85%	22.997	26.9	216,689,011	85,179,518	301,868,529	4.85%	27.651	26.9	260,535,984	102,415,575	362,951,558	4.85%	35.057	7.6		129,848,828	129,848,828
2086	7.6	4.85%	24.113	26.9	227,198,428	89,310,725	316,509,153	4.85%	28.992	26.9	273,171,979	107,382,730	380,554,709	4.85%	36.758	7.6		136,146,496	136,146,496
2087	7.6	4.85%	25.282	26.9	238,217,552	93,642,295	331,859,847	4.85%	30.398	26.9	286,420,820	112,590,792	399,011,612	4.85%	38.541	7.6		142,749,601	142,749,601
2088	7.6	4.85%	26.508	26.9	249,771,103	98,183,946	347,955,049	4.85%	31.872	26.9	300,312,230	118,051,446	418,363,676	4.85%	40.410	7.6		149,672,957	149,672,957
2089	7.6	4.85%	27.794	26.9	261,885,001	102,945,868	364,830,869	4.85%	33.418	26.9	314,877,373	123,776,941	438,654,314	4.85%	42.370	7.6		156,932,095	156,932,095
2090	7.6	4.85%	29.142	26.9	274,586,424	107,938,742	382,525,166	4.85%	35.039	26.9	330,148,926	129,780,123	459,929,048	4.85%	44.425	7.6		164,543,302	164,543,302
2091	7.6	4.85%	30.555	26.9	287,903,865	113,173,771	401,077,637	4.85%	36.738	26.9	346,161,148	136,074,459	482,235,607	4.85%	46.579	7.6		172,523,652	172,523,652
2092	7.6	4.85%	32.037	26.9	301,867,203	118,662,699	420,529,902	4.85%	38.520	26.9	362,949,964	142,674,070	505,624,034	4.85%	48.838	7.6		180,891,049	180,891,049
2093	7.6	4.85%	33.591	26.9	316,507,762	124,417,840	440,925,602	4.85%	40.388	26.9	380,553,037	149,593,762	530,146,800	4.85%	51.207	7.6		189,664,265	189,664,265
2094	7.6	4.85%	35.220	26.9	331,858,389	130,452,105	462,310,494	4.85%	42.347	26.9	399,009,860	156,849,060	555,858,919	4.85%	53.690	7.6		198,862,982	198,862,982
2095	7.6	4.85%	36.929	26.9	347,953,521	136,779,032	484,732,553	4.85%	44.401	26.9	418,361,838	164,456,239	582,818,077	4.85%	56.294	7.6		208,507,837	208,507,837
2096	7.6	4.85%	38.720	26.9	364,829,266	143,412,815	508,242,082	4.85%	46.554	26.9	438,652,387	172,432,367	611,084,754	4.85%	59.025	7.6		218,620,467	218,620,467
2097	7.6	4.85%	40.597	26.9	382,523,486	150,368,337	532,891,823	4.85%	48.812	26.9	459,927,028	180,795,336	640,722,364	4.85%	61.887	7.6		229,223,559	229,223,559
2098	7.6	4.85%	42.566	26.9	401,075,875	157,661,201	558,737,076	4.85%	51.180	26.9	482,233,489	189,563,910	671,797,399	4.85%	64.889	7.6		240,340,902	240,340,902
2099	7.6	4.85%	44.631	26.9	420,528,055	165,307,770	585,835,824	4.85%	53.662	26.9	505,621,813	198,757,760	704,379,573	4.85%	68.036	7.6		251,997,436	251,997,436
2100	7.6	4.85%	46.796	26.9	440,923,665	173,325,196	614,248,862	4.85%	56.265	26.9	530,144,471	208,397,511	738,541,982	4.85%	71.336	7.6		264,219,311	264,219,311
2101	7.6	4.85%	49.065	26.9	462,308,463	181,731,468	644,039,932	4.85%	58.993	26.9	555,856,478	218,504,791	774,361,268	4.85%	74.796	7.6		277,033,948	277,033,948
2102	7.6	4.85%	51.445	26.9	484,730,424	190,545,445	675,275,868	4.85%	61.855	26.9	582,815,517	229,102,273	811,917,790	4.85%	78.423	7.6		290,470,094	290,470,094
2103	7.6	4.85%	53.940	26.9	508,239,849	199,786,899	708,026,748	4.85%	64.855	26.9	611,082,069	240,213,733	851,295,802	4.85%	82.227	7.6		304,557,894	304,557,894
2104	7.6	4.85%	56.556	26.9	532,889,482	209,476,563	742,366,045	4.85%	68.000	26.9	640,719,550	251,864,099	892,583,649	4.85%	86.215	7.6		319,328,952	319,328,952
2105	7.6	4.85%	59.299	26.9	558,734,622	219,636,177	778,370,798	4.85%	71.298	26.9	671,794,448	264,079,508	935,873,956	4.85%	90.396	7.6		334,816,406	334,816,406
2106	7.6	4.85%	62.175	26.9	585,833,251	230,288,531	816,121,782	4.85%	74.756	26.9	704,376,479	276,887,364	981,263,843	4.85%	94.780	7.6		351,055,002	351,055,002
2107	7.6	4.85%	65.190	26.9	614,246,164	241,457,525	855,703,688	4.85%	78.382	26.9	738,538,738	290,316,401	##########	4.85%	99.377	7.6		368,081,169	368,081,169
2108	7.6	4.85%	68.352	26.9	644,037,102	253,168,215	897,205,317	4.85%	82.183	26.9	774,357,867	304,396,747	##########	4.85%	104.197	7.6		385,933,106	385,933,106
2109	7.6	4.85%	71.667	26.9	675,272,902	265,446,873	940,719,775	4.85%	86.169	26.9	811,914,223	319,159,989	##########	4.85%	109.250	7.6		404,650,861	404,650,861
2110	7.6	4.85%	75.143	26.9	708,023,638	278,321,047	986,344,684	4.85%	90.348	26.9	851,292,063	334,639,248	##########	4.85%	114.549	7.6		424,276,428	424,276,428
2111	7.6	4.85%	78.787	26.9	742,362,784	291,819,617	##########	4.85%	94.730	26.9	892,579,728	350,869,252	##########	4.85%	120.105	7.6		444,853,835	444,853,835
2112	7.6	4.85%	82.609	26.9	778,367,379	305,972,869	##########	4.85%	99.325	26.9	935,869,845	367,886,411	##########	4.85%	125.930	7.6		466,429,246	466,429,246
	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Attachment B
TVWD Cost Share Calculations

TVWD Cost Shares - TBWSP with Federal Cost Share

Dam Costs (including 40' dam raise and seismic improvements)

Seismic Portion

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Existing Scoggins Storage (AC/FT)	4000	5000	4500	500	16900	37000	-	67900
Existing Contract %	7.46%	9.32%	8.39%	0.93%	23.52%	50.38%	0.00%	100.00%
Cost (15% of $556 million)	$ 6,221,640	$ 7,772,880	$ 6,997,260	$ 775,620	$ 19,615,680	$ 42,016,920	$ -	$ 83,400,000

40' Expansion Portion

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Participant IGA Percent	3.77%	21.70%			31.13%		43.40%	100.00%
Total Dam Cost				$740,000,000				
Seismic Participation				(83,400,000)				
Federal Participation				(472,600,000)				
Local Share Dam Cost				$184,000,000				
Participant Cost	$ 6,936,800	$ 39,928,000			$ 57,279,200		$ 79,856,000	$ 184,000,000
Seismic Participant Cost	$ 6,221,640	$ 7,772,880	$ 6,997,260	$ 775,620	$ 19,615,680	$ 42,016,920	$ -	$ 83,400,000
Total Cost	$ 13,158,440	$ 47,700,880	$ 6,997,260	$ 775,620	$ 76,894,880	$ 42,016,920	$ 79,856,000	$ 267,400,000
Cost Share	4.92%	17.84%	2.62%	0.29%	28.76%	15.71%	29.86%	

Raw Water Intake, Pump Station & Pipeline ($250,875,000 with 50% cost to new raw water storage; 50% cost to treatment plant)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Storage Component								
Storage Component Cost				$125,437,500				
Participant Cost	$ 4,728,994	$ 27,219,938			$ 39,048,694		$ 54,439,875	$ 125,437,500
Treatment Component								
2050 PDD (MGD)	16.5	65.1	10.3				61.4	153.3
Percentage of PDD	10.76%	42.47%	6.72%				40.05%	100.00%
Treatment Component Cost				$125,437,500				
Participant Cost	$ 13,501,101	$ 53,267,979	$ 8,427,960				$ 50,240,460	$ 125,437,500
Total Participant Cost	$ 18,230,095	$ 80,487,917	$ 8,427,960	$ -	$ 39,048,694	$ -	$ 104,680,335	$ 250,875,000
Cost share	7.27%	32.08%	3.36%	0.00%	15.57%	0.00%	41.73%	100.00%

Phase 1 Water Treatment Plant Expansion (40 MGD @ $116,250,000)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)	18.75	33.75	10.00				12.50	75.00
2026 PDD (MGD)	12.60	48.80	6.70				48	116.10
Surplus / (Deficit) (MGD)	6.15	(15.05)	3.30				(35.50)	(41.10
Deficit Only (MGD)		(15.05)					(35.50)	(50.55)
Deficit Percentage		29.77%	0.00%				70.23%	100.00%
Treatment Cost				$116,250,000				
Participant Cost		$ 34,612,246	$ -				$ 81,637,754	$ 116,250,000
Cost share	0.00%	29.77%	0.00%	0.00%	0.00%	0.00%	70.23%	

Phase 2 Water Treatment Plant Expansion (20 MGD @ $58,1250,000)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)	18.75	45.66	10.00				40.59	115.00
2037 PDD (MGD)	14.40	58.20	8.30				54.3	135.20
Surplus / (Deficit) (MGD)	-	(12.54)	-				(13.71)	(20.20
Deficit Only (MGD)		(12.54)	-				(13.71)	(26.25)
Deficit Percentage		47.78%	0.00%				52.22%	100.00%
Treatment Cost				$58,125,000				
Participant Cost		$ 27,770,696	$ -				$ 30,354,304	$ 58,125,000
Cost share		35.78%					64.22%	
		$ 62,382,941					$ 111,992,059	$ 174,375,000

Phase 3 Water Treatment Plant Expansion (20 MGD @ $58,1250,000)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)	18.75	50.44	10.00				45.82	125.00
2050 PDD (MGD)	16.50	65.10	10.30				61.4	153.30
Surplus / (Deficit) (MGD)	2.25	(14.66)	(0.30)				(15.58)	(28.30
Deficit Only (MGD)		(14.66)	(0.30)				(15.58)	(30.55)
Deficit Percentage		48.00%	0.99%				51.01%	100.00%
Treatment Cost				$58,125,000				
Participant Cost		$ 27,897,443	$ 575,542				$ 29,652,015	$ 58,125,000
Cost share	0.00%	48.00%	0.99%	0.00%	0.00%	0.00%	51.01%	

Reservoir (20 MG @ $15,321,250)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)		33.75					12.50	46.25
2050 PDD (MGD)		65.10					61.4	126.50
Greatest Value (MGD)		31.35					48.90	80.25
Ownership Percentage	0.00%	39.07%	0.00%	0.00%	0.00%	0.00%	60.93%	100.00%
Reservoir Cost				$15,840,500				
Participant Cost	$ -	$ 6,188,351	$ -				$ 9,652,149	$ 15,840,500
Cost share	0.00%	39.07%	0.00%	0.00%	0.00%	0.00%	60.93%	

Booster Pump Station on STL ($4,375,000) - based on capacity needs in 2028 (implementation year for STL2)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current STL Capacity (MGD)	14.00	20.00					4.00	38.00
Current Non-Emergency NTL Capacity (MGD)	2.00	39.00					39.00	80.00
Total Trans. Capacity (MGD)	16.00	59.00					43.00	118.00
2028 PDD (MGD)	16.50	51.70					49.1	117.30
Surplus / (Deficit) (MGD)	(0.50)	7.30					(6.10)	0.70
Deficit Only	(0.50)	-					(6.10)	(6.60)
Deficit Percentage	7.58%	0.00%					92.42%	100.00%
Treatment Cost				$4,375,000				
Participant Cost	$ 331,439	$ -					$ 4,043,561	$ 4,375,000
Cost share	7.58%	0.00%	0.00%	0.00%	0.00%	0.00%	92.42%	

Transmission Lines ($140,500,000)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current STL Capacity (MGD)	14.00	20.00					4.00	38.00
Current Non-Emergency NTL Capacity (MGD)	2.00	39.00					39.00	80.00
Total Trans. Capacity (MGD)	16.00	59.00					43.00	118.00
2050 PDD (MGD)	16.50	65.10					61.4	143.00
Surplus / (Deficit) (MGD)	(0.50)	(6.10)					(18.40)	(25.00)
Percentage of Total 80 mgd capacity	0.63%	7.62%					23.00%	31.25%
Transmission Line Cost				$140,500,000				
Total Length (assume all pipe same unit cost)				93600				
Total Cost for STL2 Main Segment				$140,500,000				
Reservoir to Hazeldale (LF)				59100				
Reservoir to Hazeldale ($)				$94,135,000				
Participant Cost	$588,344	$7,177,794					$21,651,050	$29,417,188
Hazeldale to NTL (LF)				34500				
Hazeldale to NTL ($)				$46,365,000				
Assumed Capacity Desired (MGD)	2	22					12	36
Participation Percentage	5.56%	61.111%					33.33%	100%
Participant Cost	$2,575,833	$28,334,167					$15,455,000	$46,365,000
Total Trans. Line Participant Cost ($)	$3,164,177	$35,511,960					$37,106,050	$75,782,188
Total Trans. Line Participation (%)	4.18%	46.86%					48.96%	100.00%
e as proportion of overall transmission project costs	2.25%	25.28%	0.00%	0.00%	0.00%	0.00%	26.41%	53.94%

Total

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Supply Participant Cost	$21,725,711	$212,468,612	$9,003,502	$0	$39,048,694	$0	$297,126,168	$579,372,688
40' Dam Construction Cost+seismic	$ 13,158,440	$ 47,700,880	$ 6,997,260	$ 775,620	$ 76,894,880	$ 42,016,920	$ 79,856,000	$ 267,400,000
Total	$34,884,151	$260,169,492	$16,000,762	$775,620	$115,943,574	$42,016,920	$376,982,168	$846,772,688
Overall share of costs	4.12%	30.72%	1.89%	0.09%	13.69%	4.96%	44.52%	
Check Number		$ 303,705,428					Cost in TM 9C	865428250
							Adjustment in portion of transmission for redundancy	(64,717,813)
							Adjustment in total dam cost (reduction in TVID contribution)	$ 45,453,000
							Adjusted cost	$846,163,438

Approximate non construction (30%) $253,849,031.25

Actual non-construction costs $141,696,250

TVWD Cost Shares - Mid-Willamette

Dam Raise Cost								
Seismic Upgrade Portion								
	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Existing Scoggins Storage (AC/FT)	4000	5000	4500	500	16900	37000	-	67900
Existing Contract %	7.46%	9.32%	8.39%	0.93%	23.52%	50.38%	0.00%	100.00%
Cost (15% of $556 million)	$ 6,221,640	$ 7,772,880	$ 6,997,260	$ 775,620	$ 19,615,680	$ 42,016,920	$ -	$ 83,400,000
9' Expansion Portion								
Scoggins Storage (Discounted, AC/FT)	3,912	4,890	4,401	489	12,340	26,428	-	52,460
Barney Storage (Discounted, AC/FT)	3,360	4,845	391	-	1,563	-	5,471	15,630
Natural Flow (184-day, AC/FT)		5,109						5,109
Total Storage (Discounted, AC/FT)	7,272	14,844	4,792	489	13,903	26,428	5,471	73,199
2050 Demand (AC/FT)	7,272	14,844	4,792	489	62,641	26,428	5,471	93,938
Surplus (Deficit) (AC/FT)	-	-	-	-	(48,738)	-	-	(48,738)
Deficit only (AC/FT)	-	-			(48,738)		-	(48,738)
Participant Percent Deficit	0.00%	0.00%			100.00%		0.00%	100.00%
Total Dam Cost				$489,000,000				
Seismic Participation				(83,400,000)				
Federal Participation				(472,600,000)				
Expansion Portion of the Dam Cost				(67,000,000)				
Participant Cost	$ -	$ -			$ (67,000,000)		$ -	$ (67,000,000)
Seismic Participant Cost	$ 6,221,640	$ 7,772,880	$ 6,997,260	$ 775,620	$ 19,615,680	$ 42,016,920	$ -	$ 83,400,000
Total Cost	$ 6,221,640	$ 7,772,880	$ 6,997,260	$ 775,620	$ (47,384,320)	$ 42,016,920	$ -	$ 16,400,000
Cost share	37.94%	47.40%	42.67%	4.73%	-288.93%	256.20%	0.00%	100.00%

Raw Water Pump Station & Pipeline ($9,146,800								
	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)	18.75	33.75	10.00				12.50	75.00
2050 PDD (MGD)	16.50	65.10	10.30				61.40	153.30
Surplus / (Deficit) (MGD)	2.25	(31.35)	(0.30)				(48.90)	(78.30
Deficit Only (MGD)		(31.35)					(48.90)	(80.25)
Deficit Percentage		39.07%					60.93%	100.00%
Pmp Station & Pipe Cost				$9,146,800				
Buy-in		$ 2,500,000					(2,500,000)	
Participant Cost		$ 3,573,347					$ 5,573,453	$ 9,146,800
Total Cost		$ 6,073,347					$ 3,073,453	$ 9,146,800
Cost share	0.00%	66.40%	0.00%	0.00%	0.00%	0.00%	33.60%	

Phase 1 Water Treatment Plant Expansion (40 MGD @ $68,500,250								
	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)	18.75	33.75	10.00				12.50	75.00
2026 PDD (MGD)	12.60	48.80	6.70				48	116.10
Surplus / (Deficit) (MGD)	6.15	(15.05)	3.30				(35.50)	(41.10
Deficit Only (MGD)		(15.05)					(35.50)	(50.55)
Deficit Percentage		29.77%	0.00%				70.23%	100.00%
Treatment Cost				$68,500,250				
Participant Cost		$ 20,395,247	$ -				$ 48,105,003	$ 68,500,250
Cost share	0.00%	29.77%	0.00%	0.00%	0.00%	0.00%	70.23%	

Phase 2 Water Treatment Plant Expansion (10 MGD @ $17,125,063)								
	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)	18.75	45.66	10.00				40.59	115.00
2031 PDD (MGD)	13.40	54.10	7.40				50.9	125.80
Surplus / (Deficit) (MGD)	-	(8.44)	-				(10.31)	(10.80
Deficit Only (MGD)		(8.44)	-				(10.31)	(18.75)
Deficit Percentage		45.02%	0.00%				54.98%	100.00%
Treatment Cost				$17,125,063				
Participant Cost		$ 7,709,964	$ -				$ 9,415,099	$ 17,125,063
Cost share		32.82%					67.18%	
		$ 28,105,211					$ 57,520,101	$ 85,625,313

Phase3 Water Treatment Plant Expansion (10 MGD @ $17,125,063)								
	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)	18.75	50.16	10.00				46.09	125.00
2037 PDD (MGD)	14.40	58.20	8.30				54.3	135.20
Surplus / (Deficit) (MGD)	4.35	(8.04)	1.70				(8.21)	(10.20
Deficit Only (MGD)		(8.04)	-				(8.21)	(16.25)
Deficit Percentage		49.47%	0.00%				50.53%	100.00%
Treatment Cost				$17,125,063				
Participant Cost		$ 8,472,421	$ -				$ 8,652,641	$ 17,125,063
Cost share	0.00%	49.47%	0.00%	0.00%	0.00%	0.00%	50.53%	

Phase 4 Water Treatment Plant Expansion (10 MGD @ $17,125,063								
	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)	18.75	55.11	10.00				51.14	135.00
2045 PDD (MGD)	15.90	62.70	9.40				58.8	146.80
Surplus / (Deficit) (MGD)	2.85	(7.59)	-				(7.66)	(11.80
Deficit Only (MGD)		(7.59)	-				(7.66)	(15.25)
Deficit Percentage		49.78%	0.00%				50.22%	100.00%
Treatment Cost				$17,125,063				
Participant Cost		$ 8,525,610	$ -				$ 8,599,453	$ 17,125,063
Cost share	0.00%	49.78%	0.00%	0.00%	0.00%	0.00%	50.22%	

Phase 5 Water Treatment Plant Expansion (10 MGD @ $17,125,063)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)	18.75	60.09	10.00				56.16	145.00
2050 PDD (MGD)	16.50	65.10	10.30				61.4	153.30
Surplus / (Deficit) (MGD)	2.25	(5.01)	(0.30)				(5.24)	(8.30
Deficit Only (MGD)		(5.01)	(0.30)				(5.24)	(10.55)
Deficit Percentage		47.51%	2.87%				49.62%	100.00%
Treatment Cost				$17,125,063				
Participant Cost		$ 8,136,331	$ 491,027				$ 8,497,705	$ 17,125,063
Cost share	0.00%	47.51%	2.87%	0.00%	0.00%	0.00%	49.62%	
		$ 53,239,573						

Reservoir (20 MG @ $15,840,500)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)		33.75					12.50	46.25
2050 PDD (MGD)		65.10					61.4	126.50
Greatest Value (MGD)		31.35					48.90	80.25
Ownership Percentage	0.00%	39.07%	0.00%	0.00%	0.00%	0.00%	60.93%	100.00%
Reservoir Cost				$15,840,500				
Participant Cost	$ -	$ 6,188,351	$ -				$ 9,652,149	$ 15,840,500
Cost share	0.00%	39.07%	0.00%	0.00%	0.00%	0.00%	60.93%	

Booster Pump Stations

Pump Station at the WTP ($25,374,700) - cost share according to share of new supply

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)	18.75	33.75	10.00				12.50	75.00
2050 PDD (MGD)	16.50	65.10	10.30				61.40	153.30
Surplus / (Deficit) (MGD)	2.25	(31.35)	(0.30)				(48.90)	(78.30
Deficit Only (MGD)		(31.35)					(48.90)	(80.25)
Deficit Percentage		39.07%					60.93%	100.00%
Pmp Station & Pipe Cost				$25,374,700				
Participant Cost		$ 9,913,042					$ 15,461,658	$ 25,374,700
Booster Pump Station on the Hillsboro Extension Line ($15,840,500) - cost copied over from Portland supply, was missing in original Willamette estimates								
Assumed Capacity Desired (MGD)	2	22					12	36
Participation Percentage	5.56%	61.11%					33.33%	100%
Participant Cost	$531,339	$5,844,728					$3,188,033	$9,564,100
Total Booster Pumping Participant Cost ($)	$531,339	$15,757,770					$18,649,691	$34,938,800
Total Trans. Line Participation (%)	1.52%	45.10%					53.38%	100.00%
Cost share	1.52%	45.10%	0.00%	0.00%	0.00%	0.00%	53.38%	

Transmission Lines ($319,689,500)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current JWC Capacity (MGD)		33.75					12.50	46.25
2050 PDD (MGD) Surplus		65.10					61.40	126.50
/ (Deficit) (MGD) Deficit		(31.35)					(48.90)	(80.25)
Percentage		39.07%					60.93%	100.00%
Transmission Line Cost				$319,689,500				
Total Length (assume all pipe same unit cost)				137500				
WTP to Terminal Storage (LF)				71800				
WTP to Terminal Storage (LF)				$187,697,922				
Participant Cost	$0	$73,327,267					$114,370,655	$187,697,922
Current JWC Capacity (MGD)		33.75					12.50	46.25
Willamette Eastern Ext Capacity (MGD)		-					30.00	30.00
2050 PDD (MGD) Surplus		65.10					61.40	126.50
/ (Deficit) (MGD) Deficit		(31.35)					(18.90)	(50.25)
Percentage		62.39%					37.61%	100.00%
Terminal Storage to Hazeldale (LF)				103000				
Terminal Storage to Hazeldale ($)				$77,174,953				
Participant Cost	$0	$48,150,351					$29,024,602	$77,174,953
Hazeldale to NTL (LF)				34500				
Hazeldale to NTL ($)				$54,816,625				
Assumed Capacity Desired (MGD)	2	22					12	36
Participation Percentage	5.56%	61.11%					33.33%	100%
Participant Cost	$3,045,368	$33,499,048					$18,272,208	$54,816,625
Total Trans. Line Participant Cost ($)	$3,045,368	$154,976,667					$161,667,465	$319,689,500
Total Trans. Line Participation (%)	0.95%	48.48%					50.57%	100.00%
Cost share	0.95%	48.48%	0.00%	0.00%	0.00%	0.00%	50.57%	100.00%

Transmission Line Cost - Eastern Extension to TVWD West Hills Area

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Assumed Capacity Desired (MGD)	0	0					30	30
Participation Percentage	0.00%	0.00%					100.00%	100%
Participant Cost	$0	$0					$84,649,842	$84,649,842
Cost share	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	

Total

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Sub Total Participant Cost	$3,576,707	$236,235,707	$491,027	$0	$0	$0	$360,962,501	$601,265,942
9' Dam Construction Cost+seismic	$ 6,221,640	$ 7,772,880	$ 6,997,260	$ 775,620	$ (47,384,320)	$ 42,016,920	$ -	$ 16,400,000
Total	$9,798,347	$244,008,587	$7,488,287	$775,620	(47,384,320)	$42,016,920	$360,962,501	$617,665,942
Overall share of cost (for non-construction costs	1.59%	39.50%	1.21%	0.13%	-7.67%	6.80%	58.44%	100.00%
Check Number		$ 333,232,914						$533,016,100

Original cost in TM 9C	$514,514,000
Adjustment for Dam Cost	8,938,000.00
Additional Pipeline to TVWD West Hills Area	$84,649,842
Additional Booster Pump Station	$9,564,100
Total	$617,665,942

TVWD Cost Shares - Portland with Partners

Cost shares without Partners not shown (all capital cost shares were 100%)

Dam Raise Cost

Seismic Upgrade Portion

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Existing Scoggins Storage (AC/FT)	4000	5000	4500	500	16900	37000	-	67900
Existing Contract %	7.46%	9.32%	8.39%	0.93%	23.52%	50.38%	0.00%	100.00%
Cost (15% of $556 million)	$ 6,221,640	$ 7,772,880	$ 6,997,260	$ 775,620	$ 19,615,680	$ 42,016,920	$ -	$ 83,400,000
9' Expansion Portion								
Scoggins Storage (Discounted, AC/FT)	3,912	4,890	4,401	489	12,340	26,428	-	52,460
Barney Storage (Discounted, AC/FT)	3,360	4,845	391	-	1,563	-	5,471	15,630
Natural Flow (184-day, AC/FT)		5,109						5,109
Total Storage (Discounted, AC/FT)	7,272	14,844	4,792	489	13,903	26,428	5,471	73,199
2050 Demand (AC/FT)	7,272	14,844	4,792	489	62,641	26,428	5,471	93,938
Surplus (Deficit) (AC/FT)	-	-	-	-	(48,738)	-	-	(48,738)
Deficit only (AC/FT)	-	-			(48,738)		-	(48,738)
Participant Percent Deficit	0.00%	0.00%			100.00%		0.00%	100.00%
Total Dam Cost				$489,000,000				
Seismic Participation				($83,400,000)				
Federal Participation				($472,600,000)				
Local Share Dam Cost				($67,000,000)				
Participant Cost	$ -	$ -			$ (67,000,000)		$ -	$ (67,000,000)
Seismic Participant Cost	$ 6,221,640	$ 7,772,880	$ 6,997,260	$ 775,620	$ 19,615,680	$ 42,016,920	$ -	$ 83,400,000
Total Cost	$ 6,221,640	$ 7,772,880	$ 6,997,260	$ 775,620	$ (47,384,320)	$ 42,016,920	$ -	$ 16,400,000
Cost share	37.94%	47.40%	42.67%	4.73%	-288.93%	256.20%	0.00%	100.00%

Water Treatment Plant Expansion ($65,075,500)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Participant Cost		$ 65,075,400						$ 65,075,400
Cost share	0.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	

Reservoir (20 MG @ $15,840,500)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)		33.75					12.50	46.25
2050 PDD (MGD)		65.10					61.4	126.50
Greatest Value (MGD)		31.35					48.90	80.25
Ownership Percentage	0.00%	39.07%	0.00%	0.00%	0.00%	0.00%	60.93%	100.00%
Reservoir Cost				$15,840,500				
Participant Cost	$ -	$ 6,188,351	$ -				$ 9,652,149	$ 15,840,500
Cost share	0.00%	39.07%	0.00%	0.00%	0.00%	0.00%	60.93%	

Booster Pump Station ($9,564,100)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
STL to NTL Segment Capacity	2	22					12	36
Ownership Percentage	5.56%	61.11%					33.33%	100%
Treatment Cost				$9,564,100				
Participant Cost	$ 531,339	$ 5,844,728	$ -				$ 3,188,033	$ 9,564,100
Cost share	5.56%	61.11%	0.00%	0.00%	0.00%	0.00%	33.33%	

Transmission Lines ($652,303,764)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current JWC Capacity (MGD)		33.75					12.50	46.25
Current WCSL Capcity (MGD)		-					34.70	34.70
Total Trans. Capacity (MGD)		33.75					47.20	80.95
2050 PDD (MGD) Surplus		65.10					61.40	126.50
/ (Deficit) (MGD) Deficit		(31.35)					(14.20)	(45.55)
Percentage		68.83%					31.17%	100.00%
Transmission Line Cost				$472,410,547				
Total Length (assume all pipe same unit cost)				162300				
Estimate Unit Cost ($/lf)				$2,910.72				
Powell Butte to Hazeldale (LF)				127800				
Powell Butte to Hazeldale ($)				$413,763,703				
Participant Cost	$0	$284,790,430					$128,973,274	$413,763,703
Hazeldale to NTL (LF)				34500				
Hazeldale to NTL ($)				$58,646,844				
Assumed Capacity Desired (MGD)	2	22					12	36
Participation Percentage	5.56%	61.11%					33.33%	100%
Participant Cost	$3,258,158	$35,839,738					$19,548,948	$58,646,844
Total Trans. Line Participant Cost ($)	$3,258,158	$320,630,168					$148,522,221	$472,410,547
Total Trans. Line Participation (%)	0.69%	67.87%					31.44%	100.00%
Cost share	0.69%	67.87%	0.00%	0.00%	0.00%	0.00%	31.44%	

Total	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Sub Total Participant Cost	$3,789,497	$397,738,646	$0	$0	$0	$0	$161,362,404	$562,890,547
9' Dam Construction Cost	$ 6,221,640	$ 7,772,880	$ 6,997,260	$ 775,620	$ (47,384,320)	$ 42,016,920	$ -	$ 16,400,000
Total	$10,011,137	$405,511,526	$6,997,260	$775,620	($47,384,320)	$42,016,920	$161,362,404	$579,290,547
Overall Percent	1.73%	70.00%	1.21%	0.13%	-8.18%	7.25%	27.86%	100.00%
Check Number		$ 626,821,333						

Original cost in TM 9C	$700,788,400
Adjustment for Dam Cost	$8,938,000
Adjustment for Pipeline Upsizing	$40,686,703
Adjustment for removing piping to/from terminal reservoir	($171,200,000)
Total	$579,213,103

TVWD Cost Shares - Northern Groundwater

Dam Raise Cost

Seismic Upgrade Portion

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Existing Scoggins Storage (AC/FT)	4000	5000	4500	500	16900	37000	-	67900
Existing Contract %	7.46%	9.32%	8.39%	0.93%	23.52%	50.38%	0.00%	100.00%
Cost (15% of $556 million)	$ 6,221,640	$ 7,772,880	$ 6,997,260	$ 775,620	$ 19,615,680	$ 42,016,920	$ -	$ 83,400,000
9' Expansion Portion								
Scoggins Storage (Discounted, AC/FT)	3,912	4,890	4,401	489	12,340	26,428	-	52,460
Barney Storage (Discounted, AC/FT)	3,360	4,845	391	-	1,563	-	5,471	15,630
Natural Flow (184-day, AC/FT)		5,109						5,109
Total Storage (Discounted, AC/FT)	7,272	14,844	4,792	489	13,903	26,428	5,471	73,199
2050 Demand (AC/FT)	7,272	14,844	4,792	489	62,641	26,428	5,471	93,938
Surplus (Deficit) (AC/FT)	-	-	-	-	(48,738)	-	-	(48,738)
Deficit only (AC/FT)	-	-			(48,738)		-	(48,738)
Participant Percent Deficit	0.00%	0.00%			100.00%		0.00%	100.00%
Total Dam Cost				$489,000,000				
Seismic Participation				($83,400,000)				
Federal Participation				($472,600,000)				
Local Share Dam Cost				($67,000,000)				
Participant Cost	$ -	$ -			$ (67,000,000)		$ -	$ (67,000,000)
Seismic Participant Cost	$ 6,221,640	$ 7,772,880	$ 6,997,260	$ 775,620	$ 19,615,680	$ 42,016,920	$ -	$ 83,400,000
Total Cost	$ 6,221,640	$ 7,772,880	$ 6,997,260	$ 775,620		$ 42,016,920	$ -	$ 16,400,000
Cost share	37.94%	47.40%	42.67%	4.73%	-288.93%	256.20%	0.00%	100.00%

Phase 1 Water Treatment Plant + Wells (40 MGD @ $157,127,880 + wells @ $24,050,000)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)	18.75	33.75	10.00				12.50	75.00
2026 PDD (MGD)	12.60	48.80	6.70				48	116.10
Surplus / (Deficit) (MGD)	6.15	(15.05)	3.30				(35.50)	(41.10
Deficit Only (MGD)		(15.05)					(35.50)	(50.55)
Deficit Percentage		29.77%	0.00%				70.23%	100.00%
Treatment Cost				$181,177,880				
Participant Cost		$ 53,943,857	$ -				$ 127,234,023	$ 181,177,880
Cost share	0.00%	29.77%	0.00%	0.00%	0.00%	0.00%	70.23%	

Phase 2 Water Treatment Plant Expansion + Wells (10 MGD @ $26,187,980 + pipeline @ $3,639,194 + wells @ $6,012,500)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)	18.75	45.66	10.00				40.59	115.00
2031 PDD (MGD)	13.40	54.10	7.40				50.9	125.80
Surplus / (Deficit) (MGD)	-	(8.44)	-				(10.31)	(10.80
Deficit Only (MGD)		(8.44)	-				(10.31)	(18.75)
Deficit Percentage		45.02%	0.00%				54.98%	100.00%
Treatment Cost				$35,839,674				
Participant Cost		$ 16,135,567	$ -				$ 19,704,107	$ 35,839,674
Cost share		32.29%					67.71%	
		$ 70,079,424					$ 146,938,130	$ 217,017,554

Phase 3 Water Treatment Plant Expansion + Wells (10 MGD @ $26,187,980 + pipeline @ $3,639,194 + wells @ $6,012,500)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)	18.75	50.16	10.00				46.09	125.00
2037 PDD (MGD)	14.40	58.20	8.30				54.3	135.20
Surplus / (Deficit) (MGD)	4.35	(8.04)	1.70				(8.21)	(10.20
Deficit Only (MGD)		(8.04)	-				(8.21)	(16.25)
Deficit Percentage		49.47%	0.00%				50.53%	100.00%
Treatment Cost				$35,839,674				
Participant Cost		$ 17,731,253	$ -				$ 18,108,421	$ 35,839,674
Cost share	0.00%	49.47%	0.00%	0.00%	0.00%	0.00%	50.53%	

Phase 4 Water Treatment Plant Expansion + Wells (10 MGD @ $26,187,980 + pipeline @ $3,639,194 + wells @ $6,012,500)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)	18.75	55.11	10.00				51.14	135.00
2045 PDD (MGD)	15.90	62.70	9.40				58.8	146.80
Surplus / (Deficit) (MGD)	2.85	(7.59)	-				(7.66)	(11.80
Deficit Only (MGD)		(7.59)	-				(7.66)	(15.25)
Deficit Percentage		49.78%	0.00%				50.22%	100.00%
Treatment Cost				$35,839,674				
Participant Cost		$ 17,842,567	$ -				$ 17,997,107	$ 35,839,674
Cost share	0.00%	49.78%	0.00%	0.00%	0.00%	0.00%	50.22%	

Phase 5 Water Treatment Plant Expansion + Wells (10 MGD @ $26,187,980 + pipeline @ $3,639,194 + wells @ $6,012,500)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)	18.75	60.09	10.00				56.16	145.00
2050 PDD (MGD)	16.50	65.10	10.30				61.4	153.30
Surplus / (Deficit) (MGD)	2.25	(5.01)	(0.30)				(5.24)	(8.30
Deficit Only (MGD)		(5.01)	(0.30)				(5.24)	(10.55)
Deficit Percentage		47.51%	2.87%				49.62%	100.00%
Treatment Cost				$35,839,674				
Participant Cost		$ 17,027,876	$ 1,027,630				$ 17,784,168	$ 35,839,674
Cost share	0.00%	47.51%	2.87%	0.00%	0.00%	0.00%	49.62%	
		$ 122,681,119	37.8%					$ 324,536,576

Reservoir (20 MG @ $15,840,500)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)		33.75					12.50	46.25
2050 PDD (MGD)		65.10					61.4	126.50
Greatest Value (MGD)		31.35					48.90	80.25
Ownership Percentage	0.00%	39.07%	0.00%	0.00%	0.00%	0.00%	60.93%	100.00%
Reservoir Cost				$15,840,500				
Participant Cost	$ -	$ 6,188,351	$ -				$ 9,652,149	$ 15,840,500
Cost share	0.00%	39.07%	0.00%	0.00%	0.00%	0.00%	60.93%	

Booster Pump Station ($15,940,600)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current Treatment Capacity (MGD)		33.75					12.50	46.25
2050 PDD (MGD)		65.10					61.4	126.50
Greatest Value (MGD)		31.35					48.90	80.25
Ownership Percentage	0.00%	39.07%	0.00%	0.00%	0.00%	0.00%	60.93%	100.00%
Reservoir Cost				$15,940,600				
Participant Cost	$ -	$ 6,227,456	$ -				$ 9,713,144	$ 15,940,600
Cost share	0.00%	39.07%	0.00%	0.00%	0.00%	0.00%	60.93%	

Transmission Lines ($363,919,400)

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Current JWC Capacity (MGD)		33.75					12.50	46.25
2050 PDD (MGD) Surplus		65.10					61.40	126.50
/ (Deficit) (MGD) Deficit		(31.35)					(48.90)	(80.25)
Percentage		39.07%					60.93%	100.00%
Transmission Line Cost				$349,362,624				
Total Length (assume all pipe same unit cost)				97,318				
Wellfield to Hillsboro Conn. (LF)				76,618				
Initial Wellfield plus Wellfield to Hillsboro Conn. ($)				$316,864,650				
Participant Cost	$0	$123,788,364					$193,076,286	$316,864,650
Hillsboro Conn. to Beaverton (LF)				20700				
Hillsboro Conn. to Beaverton ($)				$32,497,974				
Assumed Capacity Desired (MGD)	2.5	21.5					12	36
Participation Percentage	6.94%	59.72%					33.33%	100%
Participant Cost	$2,256,804	$19,408,512					$10,832,658	$32,497,974
Total Trans. Line Participant Cost ($)	$2,256,804	$143,196,877					$203,908,944	$349,362,624
Total Trans. Line Participation (%)	0.65%	40.99%					58.37%	100.00%
Cost share	0.65%	40.99%	0.00%	0.00%	0.00%	0.00%	58.37%	

Total

	Beaverton	Hillsboro	Forest Grove	Lake Oswego Corporation	CWS	TVID	TVWD	Total
Sub Total Participant Cost	$2,256,804	$278,293,803	$1,027,630	$0	$0	$0	$424,102,063	$705,680,300
9' Dam Construction Cost	$ 6,221,640	$ 7,772,880	$ 6,997,260	$ 775,620	$ (47,384,320)	$ 42,016,920	$ -	$ 16,400,000
Total	$8,478,444	$286,066,683	$8,024,890	$775,620	($47,384,320)	$42,016,920	$424,102,063	$722,080,300
Overall Percent	1.17%	39.62%	1.11%	0.11%	-6.56%	5.82%	58.73%	1
Check Number		$ 398,830,420						

Original cost in TM 9C	$713,142,300
Adjustment for Dam Cost	$ 8,938,000
Total	$722,080,300

Attachment C
Economic Evaluation
Capital Cash Flows for Each Option

Table 32
Tualatin Valley Water District
Source Options PV Analysis
TBWSP with Federal Cost Share Costs & TVWD Share

	Project Cost Estimates									TVWD Cost Share									TVWD Costs								
Year	Non-Construction Costs	40' Dam Construction	Short Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines	Non-Construction Costs	40' Dam Construction	Short Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines	Non-Construction Costs	40' Dam Construction	Short Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines
2012										44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	$0	$0	$0	$0	$0	$0	$0	$0	$0
2013										44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2014										44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2015	$6,500,000									44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	2,893,792	0	0	0	0	0	0	0	0
2016	$30,203,043									44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	13,446,358	0	0	0	0	0	0	0	0
2017	$10,906,047									44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	4,855,359	0	0	0	0	0	0	0	0
2018	$17,658,746				$62,718,750					44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	7,861,652	0	0	0	26,170,084	0	0	0	0
2019	$17,658,746				$62,718,750					44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	7,861,652	0	0	0	26,170,084	0	0	0	0
2020	$20,264,225				$62,718,750					44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	9,021,608	0	0	0	26,170,084	0	0	0	0
2021	$14,323,265				$62,718,750					44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	6,376,700	0	0	0	26,170,084	0	0	0	0
2022		$66,850,000								44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	0	19,964,000	0	0	0	0	0	0	0
2023	$1,553,852	$66,850,000				$21,796,875				44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	691,773	19,964,000	0	0	0	13,999,007	0	0	0
2024	$2,330,777	$66,850,000				$21,796,875				44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	1,037,659	19,964,000	0	0	0	13,999,007	0	0	0
2025	$4,534,159	$66,850,000				$65,390,625	$2,187,500	$7,615,625	$35,125,000	44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	2,018,602	19,964,000	0	0	0	41,997,022	2,021,780	4,640,456	9,276,513
2026	$4,534,159					$65,390,625	$2,187,500	$7,615,625	$35,125,000	44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	2,018,602	0	0	0	0	41,997,022	2,021,780	4,640,456	9,276,513
2027	$1,292,785								$35,125,000	44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	575,546	0	0	0	0	0	0	0	9,276,513
2028	$1,292,785								$35,125,000	44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	575,546	0	0	0	0	0	0	0	9,276,513
2029										44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2030										44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2031										44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2032										44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2033										44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2034										44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2035	$2,160,916									44.5%	29.9%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	962,037	0	0	0	0	0	0	0	0
2036	$3,241,373					$29,062,500				44.5%	29.9%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	1,443,055	0	0	0	0	14,826,008	0	0	0
2037	$3,241,373					$29,062,500				44.5%	29.9%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	1,443,055	0	0	0	0	14,826,008	0	0	0
2038										44.5%	29.9%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2039										44.5%	29.9%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2040										44.5%	29.9%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2041										44.5%	29.9%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2042										44.5%	29.9%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2043										44.5%	29.9%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2044										44.5%	29.9%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2045										44.5%	29.9%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2046										44.5%	29.9%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2047										44.5%	29.9%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2048										44.5%	29.9%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2049										44.5%	29.9%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2050										44.5%	29.9%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0

Table 40
Tualatin Valley Water District
Source Options PV Analysis
TBWSP without Federal Cost Share Costs & TVWD Share

	Project Cost Estimates									TVWD Cost Share									TVWD Costs								
Year	Non-Construction Costs	40' Dam Construction	Short Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines	Non-Construction Costs	40' Dam Construction	Short Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines	Non-Construction Costs	40' Dam Construction	Short Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines
2012										46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	$0	$0	$0	$0	$0	$0	$0	$0	$0
2013										46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2014										46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2015	$6,500,000									46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	3,046,039	0	0	0	0	0	0	0	0
2016	$30,203,043									46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	14,153,790	0	0	0	0	0	0	0	0
2017	$10,906,047									46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	5,110,806	0	0	0	0	0	0	0	0
2018	$17,658,746				$62,718,750					46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	8,275,265	0	0	0	26,170,084	0	0	0	0
2019	$17,658,746				$62,718,750					46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	8,275,265	0	0	0	26,170,084	0	0	0	0
2020	$20,264,225				$62,718,750					46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	9,496,248	0	0	0	26,170,084	0	0	0	0
2021	$14,323,265				$62,718,750					46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	6,712,187	0	0	0	26,170,084	0	0	0	0
2022		$185,000,000								46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	0	80,290,000	0	0	0	0	0	0	0
2023	$1,553,852	$185,000,000				$21,796,875				46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	728,168	80,290,000	0	0	0	13,999,007	0	0	0
2024	$2,330,777	$185,000,000				$21,796,875				46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	1,092,252	80,290,000	0	0	0	13,999,007	0	0	0
2025	$4,534,159	$185,000,000				$65,390,625	$2,187,500	$7,615,625	$35,125,000	46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	2,124,803	80,290,000	0	0	0	41,997,022	2,021,780	4,640,456	9,276,513
2026	$4,534,159					$65,390,625	$2,187,500	$7,615,625	$35,125,000	46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	2,124,803	0	0	0	0	41,997,022	2,021,780	4,640,456	9,276,513
2027	$1,292,785								$35,125,000	46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	605,827	0	0	0	0	0	0	0	9,276,513
2028	$1,292,785								$35,125,000	46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	605,827	0	0	0	0	0	0	0	9,276,513
2029										46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2030										46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2031										46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2032										46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2033										46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2034										46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2035	$2,160,916									46.9%	43.4%	0.0%	0.0%	41.7%	64.2%	92.4%	60.9%	26.4%	1,012,651	0	0	0	0	0	0	0	0
2036	$3,241,373					$29,062,500				46.9%	43.4%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	1,518,977	0	0	0	0	14,826,008	0	0	0
2037	$3,241,373					$29,062,500				46.9%	43.4%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	1,518,977	0	0	0	0	14,826,008	0	0	0
2038										46.9%	43.4%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2039										46.9%	43.4%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2040										46.9%	43.4%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2041										46.9%	43.4%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2042										46.9%	43.4%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2043										46.9%	43.4%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2044										46.9%	43.4%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2045										46.9%	43.4%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2046										46.9%	43.4%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2047										46.9%	43.4%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2048										46.9%	43.4%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2049										46.9%	43.4%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0
2050										46.9%	43.4%	0.0%	0.0%	41.7%	51.0%	92.4%	60.9%	26.4%	0	0	0	0	0	0	0	0	0

Table 34
Tualatin Valley Water District
Source Options PV Analysis
Mid-Willamette Costs & TVWD Share

	Project Cost Estimates									TVWD Cost Share									TVWD Costs								
Year	Non-Construction Costs	40' Dam Construction	Short Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines	Non-Construction Costs	40' Dam Construction	Short Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines	Non-Construction Costs	40' Dam Construction	Short Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines
2012										58.4%	0.0%	0.0%	0.0%	33.6%	67.2%	53.4%	60.9%	50.6%	$0	$0	$0	$0	$0	$0	$0	$0	$0
2013										58.4%	0.0%	0.0%	0.0%	33.6%	67.2%	53.4%	60.9%	50.6%	0	0	0	0	0	0	0	0	0
2014										58.4%	0.0%	0.0%	0.0%	33.6%	67.2%	53.4%	60.9%	50.6%	0	0	0	0	0	0	0	0	0
2015	$7,172,923									58.4%	0.0%	0.0%	0.0%	33.6%	67.2%	53.4%	60.9%	50.6%	4,191,839	0	0	0	0	0	0	0	0
2016	$34,310,344									58.4%	0.0%	0.0%	0.0%	33.6%	67.2%	53.4%	60.9%	50.6%	20,050,883	0	0	0	0	0	0	0	0
2017	$44,938,263									58.4%	0.0%	0.0%	0.0%	33.6%	67.2%	53.4%	60.9%	50.6%	26,261,813	0	0	0	0	0	0	0	0
2018	$44,774,420									58.4%	0.0%	0.0%	0.0%	33.6%	67.2%	53.4%	60.9%	50.6%	26,166,064	0	0	0	0	0	0	0	0
2019	$45,238,172									58.4%	0.0%	0.0%	0.0%	33.6%	67.2%	53.4%	60.9%	50.6%	26,437,080	0	0	0	0	0	0	0	0
2020	$17,447,833									58.4%	0.0%	0.0%	0.0%	33.6%	67.2%	53.4%	60.9%	50.6%	10,196,472	0	0	0	0	0	0	0	0
2021	$13,305,733									58.4%	0.0%	0.0%	0.0%	33.6%	67.2%	53.4%	60.9%	50.6%	7,775,838	0	0	0	0	0	0	0	0
2022	$795,610									58.4%	0.0%	0.0%	0.0%	33.6%	67.2%	53.4%	60.9%	50.6%	464,953	0	0	0	0	0	0	0	0
2023	$1,141,841		$1,025,000			$21,406,328			$79,922,375	58.4%	0.0%	0.0%	0.0%	33.6%	67.2%	53.4%	60.9%	50.6%	667,289	0	0	0	0	14,380,025	0	0	40,416,866
2024	$1,742,795		$2,009,000			$21,406,328			$79,922,375	58.4%	0.0%	0.0%	0.0%	33.6%	67.2%	53.4%	60.9%	50.6%	1,018,485	0	0	0	0	14,380,025	0	0	40,416,866
2025	$922,185		$8,519,800		$9,146,800	$21,406,328	$17,469,400	$7,920,250	$79,922,375	58.4%	0.0%	0.0%	0.0%	33.6%	67.2%	53.4%	60.9%	50.6%	538,923	0	0	0	3,073,453	14,380,025	9,324,846	4,826,075	40,416,866
2026	$922,185		$4,846,200			$21,406,328	$17,469,400	$7,920,250	$79,922,375	58.4%	0.0%	0.0%	0.0%	33.6%	67.2%	53.4%	60.9%	50.6%	538,923	0	0	0	0	14,380,025	9,324,846	4,826,075	40,416,866
2027	$627,919									58.4%	0.0%	0.0%	0.0%	33.6%	67.2%	53.4%	60.9%	50.6%	366,954	0	0	0	0	0	0	0	0
2028	$916,982					$4,281,266				58.4%	0.0%	0.0%	0.0%	33.6%	50.5%	53.4%	60.9%	50.6%	535,882	0	0	0	0	2,163,160	0	0	0
2029	$1,380,734					$4,281,266				58.4%	0.0%	0.0%	0.0%	33.6%	50.5%	53.4%	60.9%	50.6%	806,898	0	0	0	0	2,163,160	0	0	0
2030	$727,815					$4,281,266				58.4%	0.0%	0.0%	0.0%	33.6%	50.5%	53.4%	60.9%	50.6%	425,333	0	0	0	0	2,163,160	0	0	0
2031	$727,815					$4,281,266				58.4%	0.0%	0.0%	0.0%	33.6%	50.5%	53.4%	60.9%	50.6%	425,333	0	0	0	0	2,163,160	0	0	0
2032										58.4%	0.0%	0.0%	0.0%	33.6%	50.5%	53.4%	60.9%	50.6%	0	0	0	0	0	0	0	0	0
2033	$627,919									58.4%	0.0%	0.0%	0.0%	33.6%	50.5%	53.4%	60.9%	50.6%	366,954	0	0	0	0	0	0	0	0
2034	$916,982					$4,281,266				58.4%	0.0%	0.0%	0.0%	33.6%	50.2%	53.4%	60.9%	50.6%	535,882	0	0	0	0	2,149,863	0	0	0
2035	$1,380,734					$4,281,266				58.4%	0.0%	0.0%	0.0%	33.6%	50.2%	53.4%	60.9%	50.6%	806,898	0	0	0	0	2,149,863	0	0	0
2036	$727,815					$4,281,266				58.4%	0.0%	0.0%	0.0%	33.6%	50.2%	53.4%	60.9%	50.6%	425,333	0	0	0	0	2,149,863	0	0	0
2037	$727,815					$4,281,266				58.4%	0.0%	0.0%	0.0%	33.6%	50.2%	53.4%	60.9%	50.6%	425,333	0	0	0	0	2,149,863	0	0	0
2038										58.4%	0.0%	0.0%	0.0%	33.6%	50.2%	53.4%	60.9%	50.6%	0	0	0	0	0	0	0	0	0
2039										58.4%	0.0%	0.0%	0.0%	33.6%	50.2%	53.4%	60.9%	50.6%	0	0	0	0	0	0	0	0	0
2040										58.4%	0.0%	0.0%	0.0%	33.6%	50.2%	53.4%	60.9%	50.6%	0	0	0	0	0	0	0	0	0
2041	$627,919									58.4%	0.0%	0.0%	0.0%	33.6%	50.2%	53.4%	60.9%	50.6%	366,954	0	0	0	0	0	0	0	0
2042	$916,982					$4,281,266				58.4%	0.0%	0.0%	0.0%	33.6%	49.6%	53.4%	60.9%	50.6%	535,882	0	0	0	0	2,124,426	0	0	0
2043	$1,380,734					$4,281,266				58.4%	0.0%	0.0%	0.0%	33.6%	49.6%	53.4%	60.9%	50.6%	806,898	0	0	0	0	2,124,426	0	0	0
2044	$727,815					$4,281,266				58.4%	0.0%	0.0%	0.0%	33.6%	49.6%	53.4%	60.9%	50.6%	425,333	0	0	0	0	2,124,426	0	0	0
2045	$727,815					$4,281,266				58.4%	0.0%	0.0%	0.0%	33.6%	49.6%	53.4%	60.9%	50.6%	425,333	0	0	0	0	2,124,426	0	0	0
2046										58.4%	0.0%	0.0%	0.0%	33.6%	49.6%	53.4%	60.9%	50.6%	0	0	0	0	0	0	0	0	0
2047										58.4%	0.0%	0.0%	0.0%	33.6%	49.6%	53.4%	60.9%	50.6%	0	0	0	0	0	0	0	0	0
2048										58.4%	0.0%	0.0%	0.0%	33.6%	49.6%	53.4%	60.9%	50.6%	0	0	0	0	0	0	0	0	0
2049										58.4%	0.0%	0.0%	0.0%	33.6%	49.6%	53.4%	60.9%	50.6%	0	0	0	0	0	0	0	0	0
2050										58.4%	0.0%	0.0%	0.0%	33.6%	49.6%	53.4%	60.9%	50.6%	0	0	0	0	0	0	0	0	0

Table 38
Tualatin Valley Water District
Source Options PV Analysis
Portland with Partners Costs & TVWD Share

	Project Cost Estimates									TVWD Cost Share									TVWD Costs								
Year	Non-Construction Costs	40' Dam Construction	Short Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines	Non-Construction Costs	40' Dam Construction	Short Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines	Non-Construction Costs	40' Dam Construction	Short Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines
2012										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	$0	$0	$0	$0	$0	$0	$0	$0	$0
2013										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0
2014										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0
2015	$875,593									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	243,898	0	0	0	0	0	0	0	0
2016	$26,446,843									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	7,366,815	0	0	0	0	0	0	0	0
2017	$32,706,480									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	9,110,448	0	0	0	0	0	0	0	0
2018	$36,706,480									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	10,224,655	0	0	0	0	0	0	0	0
2019	$32,706,480									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	9,110,448	0	0	0	0	0	0	0	0
2020	$8,886,416									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	2,475,327	0	0	0	0	0	0	0	0
2021	$8,886,416									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	2,475,327	0	0	0	0	0	0	0	0
2022	$2,626,779								$5,493,146	27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	731,694	0	0	0	0	0	0	0	1,727,003
2023	$6,010,344		$1,025,000						$5,493,146	27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	1,674,192	0	0	0	0	0	0	0	1,727,003
2024	$19,233,100		$2,009,000			$10,168,031			$153,808,085	27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	5,357,414	0	0	0	0	0	0	0	48,356,072
2025	$32,756,373		$8,519,800			$13,218,441	$4,782,050		$153,808,085	27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	9,124,345	0	0	0	0	0	1,594,017	0	48,356,072
2026	$34,923,040		$4,846,200			$13,218,441	$4,782,050	$7,920,250	$153,808,085	27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	9,727,874	0	0	0	0	0	1,594,017	4,826,075	48,356,072
2027	$34,923,040					$13,218,441		$7,920,250		27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	9,727,874	0	0	0	0	0	0	4,826,075	0
2028	$28,912,696					$3,050,409				27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	8,053,682	0	0	0	0	0	0	0	0
2029	$390,456									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	108,762	0	0	0	0	0	0	0	0
2030	$664,996									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	185,236	0	0	0	0	0	0	0	0
2031	$2,831,663									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	788,765	0	0	0	0	0	0	0	0
2032	$2,831,663									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	788,765	0	0	0	0	0	0	0	0
2033	$2,831,663									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	788,765	0	0	0	0	0	0	0	0
2034						$3,050,409				27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0
2035						$3,050,409				27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0
2036						$3,050,409				27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0
2037						$3,050,409				27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0
2038										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0
2039										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0
2040										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0
2041										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0
2042										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0
2043										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0
2044										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0
2045										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0
2046										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0
2047										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0
2048										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0
2049										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0
2050										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	31.4%	0	0	0	0	0	0	0	0	0

Table 36
Tualatin Valley Water District
Source Options PV Analysis
Portland without Partners Costs & TVWD Share

	Project Cost Estimates									TVWD Cost Share									TVWD Costs								
Year	Non-Construction Costs	40' Dam Construction	Short Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines	Non-Construction Costs	40' Dam Construction	Short Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines	Non-Construction Costs	40' Dam Construction	Short Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines
2012										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
2013										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0
2014										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0
2015	$875,593									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	243,898	0	0	0	0	0	0	0	0
2016	$26,446,843									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	7,366,815	0	0	0	0	0	0	0	0
2017	$32,706,480									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	9,110,448	0	0	0	0	0	0	0	0
2018	$36,706,480									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	10,224,655	0	0	0	0	0	0	0	0
2019	$32,706,480									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	9,110,448	0	0	0	0	0	0	0	0
2020	$8,886,416									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	2,475,327	0	0	0	0	0	0	0	0
2021	$8,886,416									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	2,475,327	0	0	0	0	0	0	0	0
2022	$2,626,779								$3,137,188	27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	731,694	0	0	0	0	0	0	0	3,137,188
2023	$6,010,344		$1,025,000						$3,137,188	27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	1,674,192	0	0	0	0	0	0	0	3,137,188
2024	$19,233,100		$2,009,000			$10,168,031			$87,841,250	27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	5,357,414	0	0	0	0	0	0	0	87,841,250
2025	$32,756,373		$8,519,800			$13,218,441	$4,782,050		$87,841,250	27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	9,124,345	0	0	0	0	0	1,594,017	0	87,841,250
2026	$34,923,040		$4,846,200			$13,218,441	$4,782,050	$7,920,250	$87,841,250	27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	9,727,874	0	0	0	0	0	1,594,017	4,826,075	87,841,250
2027	$34,923,040					$13,218,441		$7,920,250		27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	9,727,874	0	0	0	0	0	0	4,826,075	0
2028	$28,912,696					$3,050,409				27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	8,053,682	0	0	0	0	0	0	0	0
2029	$390,456									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	108,762	0	0	0	0	0	0	0	0
2030	$664,996									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	185,236	0	0	0	0	0	0	0	0
2031	$2,831,663									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	788,765	0	0	0	0	0	0	0	0
2032	$2,831,663									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	788,765	0	0	0	0	0	0	0	0
2033	$2,831,663									27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	788,765	0	0	0	0	0	0	0	0
2034						$3,050,409				27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0
2035						$3,050,409				27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0
2036						$3,050,409				27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0
2037						$3,050,409				27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0
2038										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0
2039										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0
2040										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0
2041										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0
2042										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0
2043										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0
2044										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0
2045										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0
2046										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0
2047										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0
2048										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0
2049										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0
2050										27.9%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%	60.9%	100.0%	0	0	0	0	0	0	0	0	0

Table 42
Tualatin Valley Water District
Source Options PV Analysis
Northern Groundwater Costs & TVWD Share

	Project Cost Estimates									TVWD Cost Share									TVWD Costs								
Year	Non-Construction Costs	40' Dam Construction	Short Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines	Non-Construction Costs	40' Dam Construction	Short Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines	Non-Construction Costs	40' Dam Construction	Short Dam Construction	Wells	River Intake and Pumping	Water Treatment Plant	Booster Pumping Stations	20 MG Reservoir	Pipelines
2012										58.7%	0.0%	0.0%	67.2%	0.0%	67.2%	60.9%	60.9%	0.0%	$0	$0	$0	$0	$0	$0	$0	$0	$0
2013										58.7%	0.0%	0.0%	67.2%	0.0%	67.2%	60.9%	60.9%	0.0%	0	0	0	0	0	0	0	0	0
2014										58.7%	0.0%	0.0%	67.2%	0.0%	67.2%	60.9%	60.9%	0.0%	0	0	0	0	0	0	0	0	0
2015	$9,554,290									58.7%	0.0%	0.0%	67.2%	0.0%	67.2%	60.9%	60.9%	0.0%	5,611,556	0	0	0	0	0	0	0	0
2016	$39,284,815									58.7%	0.0%	0.0%	67.2%	0.0%	67.2%	60.9%	60.9%	0.0%	23,073,294	0	0	0	0	0	0	0	0
2017	$50,891,181									58.7%	0.0%	0.0%	67.2%	0.0%	67.2%	60.9%	60.9%	0.0%	29,890,103	0	0	0	0	0	0	0	0
2018	$53,348,212									58.7%	0.0%	0.0%	67.2%	0.0%	67.2%	60.9%	60.9%	0.0%	31,333,201	0	0	0	0	0	0	0	0
2019	$54,612,511									58.7%	0.0%	0.0%	67.2%	0.0%	67.2%	60.9%	60.9%	0.0%	32,075,766	0	0	0	0	0	0	0	0
2020	$23,250,621									58.7%	0.0%	0.0%	67.2%	0.0%	67.2%	60.9%	60.9%	0.0%	13,655,872	0	0	0	0	0	0	0	0
2021	$17,453,285									58.7%	0.0%	0.0%	67.2%	0.0%	67.2%	60.9%	60.9%	0.0%	10,250,902	0	0	0	0	0	0	0	0
2022	$1,314,121									58.7%	0.0%	0.0%	67.2%	0.0%	67.2%	60.9%	60.9%	0.0%	771,828	0	0	0	0	0	0	0	0
2023	$1,837,117		$1,025,000			$32,734,975			$86,430,858	58.7%	0.0%	0.0%	67.2%	0.0%	67.2%	60.9%	60.9%	58.4%	1,079,001	0	0	0	0	21,990,216	0	0	50,446,223
2024	$2,862,308		$2,009,000	$15,031,250		$32,734,975			$86,430,858	58.7%	0.0%	0.0%	67.2%	0.0%	67.2%	60.9%	60.9%	58.4%	1,681,130	0	0	10,097,470	0	21,990,216	0	0	50,446,223
2025	$1,523,186		$8,519,800	$15,031,250		$58,922,955	$15,940,600	$7,920,250	$93,709,246	58.7%	0.0%	0.0%	67.2%	0.0%	67.2%	60.9%	60.9%	58.3%	894,618	0	0	10,097,470	0	39,582,388	9,713,144	4,826,075	54,661,600
2026	$1,523,186		$4,846,200			$58,922,955		$7,920,250	$86,430,858	58.7%	0.0%	0.0%	67.2%	0.0%	67.2%	60.9%	60.9%	58.4%	894,618	0	0	0	0	39,582,388	0	4,826,075	50,446,223
2027	$1,314,121									58.7%	0.0%	0.0%	67.2%	0.0%	67.2%	60.9%	60.9%	0.0%	771,828	0	0	0	0	0	0	0	0
2028	$1,837,117									58.7%	0.0%	0.0%	50.5%	0.0%	50.5%	60.9%	60.9%	50.5%	1,079,001	0	0	0	0	0	0	0	0
2029	$2,862,308			$3,006,250						58.7%	0.0%	0.0%	50.5%	0.0%	50.5%	60.9%	60.9%	50.5%	1,681,130	0	0	1,518,944	0	0	0	0	0
2030	$1,523,186			$3,006,250		$13,093,990			$3,639,194	58.7%	0.0%	0.0%	50.5%	0.0%	50.5%	60.9%	60.9%	50.5%	894,618	0	0	1,518,944	0	6,615,894	0	0	1,838,746
2031	$1,523,186					$13,093,990				58.7%	0.0%	0.0%	50.5%	0.0%	50.5%	60.9%	60.9%	50.5%	894,618	0	0	0	0	6,615,894	0	0	0
2032										58.7%	0.0%	0.0%	50.5%	0.0%	50.5%	60.9%	60.9%	50.5%	0	0	0	0	0	0	0	0	0
2033	$1,314,121									58.7%	0.0%	0.0%	50.5%	0.0%	50.5%	60.9%	60.9%	50.5%	771,828	0	0	0	0	0	0	0	0
2034	$1,837,117									58.7%	0.0%	0.0%	50.2%	0.0%	50.2%	60.9%	60.9%	50.2%	1,079,001	0	0	0	0	0	0	0	0
2035	$2,862,308			$3,006,250						58.7%	0.0%	0.0%	50.2%	0.0%	50.2%	60.9%	60.9%	50.2%	1,681,130	0	0	1,509,606	0	0	0	0	0
2036	$1,523,186			$3,006,250		$13,093,990			$3,639,194	58.7%	0.0%	0.0%	50.2%	0.0%	50.2%	60.9%	60.9%	50.2%	894,618	0	0	1,509,606	0	6,575,226	0	0	1,827,443
2037	$1,523,186					$13,093,990				58.7%	0.0%	0.0%	50.2%	0.0%	50.2%	60.9%	60.9%	50.2%	894,618	0	0	0	0	6,575,226	0	0	0
2038										58.7%	0.0%	0.0%	50.2%	0.0%	50.2%	60.9%	60.9%	50.2%	0	0	0	0	0	0	0	0	0
2039										58.7%	0.0%	0.0%	50.2%	0.0%	50.2%	60.9%	60.9%	50.2%	0	0	0	0	0	0	0	0	0
2040										58.7%	0.0%	0.0%	50.2%	0.0%	50.2%	60.9%	60.9%	50.2%	0	0	0	0	0	0	0	0	0
2041	$1,314,121									58.7%	0.0%	0.0%	50.2%	0.0%	50.2%	60.9%	60.9%	50.2%	771,828	0	0	0	0	0	0	0	0
2042	$1,837,117									58.7%	0.0%	0.0%	49.6%	0.0%	49.6%	60.9%	60.9%	49.6%	1,079,001	0	0	0	0	0	0	0	0
2043	$2,862,308			$3,006,250						58.7%	0.0%	0.0%	49.6%	0.0%	49.6%	60.9%	60.9%	49.6%	1,681,130	0	0	1,491,745	0	0	0	0	0
2044	$1,523,186			$3,006,250		$13,093,990			$3,639,194	58.7%	0.0%	0.0%	49.6%	0.0%	49.6%	60.9%	60.9%	49.6%	894,618	0	0	1,491,745	0	6,497,428	0	0	1,805,821
2045	$1,523,186					$13,093,990				58.7%	0.0%	0.0%	49.6%	0.0%	49.6%	60.9%	60.9%	49.6%	894,618	0	0	0	0	6,497,428	0	0	0
2046										58.7%	0.0%	0.0%	49.6%	0.0%	49.6%	60.9%	60.9%	49.6%	0	0	0	0	0	0	0	0	0
2047										58.7%	0.0%	0.0%	49.6%	0.0%	49.6%	60.9%	60.9%	49.6%	0	0	0	0	0	0	0	0	0
2048										58.7%	0.0%	0.0%	49.6%	0.0%	49.6%	60.9%	60.9%	49.6%	0	0	0	0	0	0	0	0	0
2049										58.7%	0.0%	0.0%	49.6%	0.0%	49.6%	60.9%	60.9%	49.6%	0	0	0	0	0	0	0	0	0
2050										58.7%	0.0%	0.0%	49.6%	0.0%	49.6%	60.9%	60.9%	49.6%	0	0	0	0	0	0	0	0	0

Attachment D
Economic Evaluation
O&M Cash Flows for Each Option

Table 9
Tualatin Valley Water District
Source Options PV Analysis
TBWSP with Federal Cost Share - O&M Cost Projections

	Fixed Costs						Pump-Back		Pipeline Costs		Portland Costs		
Year	Annual O&M (2012 Dollars)	Annual Escalation Rate	Inflation Factor	Annual O&M	Power Costs	Chemicals Costs	Pump-Back	Annual Escalation Rate	Pipeline Costs	Annual Escalation Rate	Purchased Water	Portland Treatment	Total Costs
2012	$0	3.50%	1.000	$0	$0	$0	$0	5.23%	$0	3.50%	$6,125,133	$0	$6,125,134
2013	0	3.50%	1.035	0	0	0	0	5.23%	0	3.50%	6,422,202	0	6,422,203
2014	0	3.50%	1.071	0	0	0	0	5.23%	0	3.50%	6,733,679	0	6,733,679
2015	0	3.50%	1.109	0	0	0	0	5.23%	0	3.50%	7,060,263	0	7,060,263
2016	0	3.50%	1.148	0	0	0	0	5.23%	0	3.50%	10,857,137	0	10,857,137
2017	0	3.50%	1.188	0	0	0	0	5.23%	0	3.50%	11,383,708	0	11,383,708
2018	0	3.50%	1.229	0	0	0	0	5.23%	0	3.50%	11,935,817	0	11,935,818
2019	0	3.50%	1.272	0	0	0	0	5.23%	0	3.50%	12,514,705	0	12,514,705
2020	0	3.50%	1.317	0	0	0	0	5.23%	0	3.50%	13,121,668	0	13,121,668
2021	0	3.50%	1.363	0	0	0	0	5.23%	0	3.50%	13,758,069	0	13,758,069
2022	0	3.50%	1.411	0	0	0	0	5.23%	0	3.50%	14,425,335	2,917,634	17,342,969
2023	0	3.50%	1.460	0	0	0	0	5.23%	0	3.50%	15,124,964	3,104,287	18,229,250
2024	0	3.50%	1.511	0	0	0	0	5.23%	0	3.50%	15,858,525	3,092,770	18,951,294
2025	0	3.50%	1.564	0	0	0	0	5.23%	0	3.50%	16,627,663	3,082,211	19,709,874
2026	2,138,067	3.50%	1.619	3,460,878	1,180,775	614,244	465,884	5.23%	0	3.50%	6,957,085	1,235,672	13,914,540
2027	2,138,067	3.50%	1.675	3,582,009	1,262,532	645,958	490,265	5.23%	0	3.50%	7,294,504	1,232,254	14,507,521
2028	2,138,067	3.50%	1.734	3,707,379	1,349,978	679,323	515,921	5.23%	0	3.50%	7,648,287	1,229,280	15,130,168
2029	2,138,067	3.50%	1.795	3,837,137	1,443,119	714,233	542,919	5.23%	0	3.50%	8,019,229	1,226,771	15,783,408
2030	2,138,067	3.50%	1.857	3,971,437	1,542,311	750,754	571,331	5.23%	0	3.50%	8,408,162	1,224,751	16,468,745
2031	2,138,067	3.50%	1.923	4,110,438	1,647,932	788,957	601,229	5.23%	0	3.50%	8,815,958	1,223,243	17,187,756
2032	2,138,067	3.50%	1.990	4,254,303	1,760,385	828,914	632,692	5.23%	0	3.50%	9,243,532	1,222,272	17,942,097
2033	2,138,067	3.50%	2.059	4,403,203	1,880,094	870,702	665,801	5.23%	0	3.50%	9,691,843	1,221,863	18,733,507
2034	2,138,067	3.50%	2.132	4,557,316	2,007,511	914,399	700,644	5.23%	0	3.50%	10,161,897	1,222,045	19,563,812
2035	2,138,067	3.50%	2.206	4,716,822	2,143,116	960,089	737,309	5.23%	0	3.50%	10,654,749	1,222,846	20,434,930
2036	2,138,067	3.50%	2.283	4,881,910	2,288,340	1,008,264	775,893	5.23%	0	3.50%	12,259,949	1,342,897	22,557,254
2037	2,189,083	3.50%	2.363	5,173,339	2,439,650	1,057,229	816,496	5.23%	0	3.50%	12,854,557	1,345,233	23,686,505
2038	2,189,083	3.50%	2.446	5,354,406	2,601,555	1,108,824	859,224	5.23%	0	3.50%	13,478,003	1,348,352	24,750,363
2039	2,189,083	3.50%	2.532	5,541,810	2,773,723	1,162,735	904,188	5.23%	0	3.50%	14,131,686	1,352,291	25,866,433
2040	2,189,083	3.50%	2.620	5,735,774	2,956,787	1,219,062	951,505	5.23%	0	3.50%	14,817,072	1,357,090	27,037,289
2041	2,189,083	3.50%	2.712	5,936,526	3,151,414	1,277,907	1,001,299	5.23%	0	3.50%	15,535,700	1,362,790	28,265,636
2042	2,189,083	3.50%	2.807	6,144,304	3,358,315	1,339,377	1,053,698	5.23%	0	3.50%	16,289,182	1,369,437	29,554,313
2043	2,189,083	3.50%	2.905	6,359,355	3,578,239	1,403,586	1,108,839	5.23%	0	3.50%	17,079,207	1,377,075	30,906,301
2044	2,189,083	3.50%	3.007	6,581,932	3,811,985	1,470,648	1,166,865	5.23%	0	3.50%	17,907,549	1,385,752	32,324,731
2045	2,189,083	3.50%	3.112	6,812,300	4,060,396	1,540,685	1,227,929	5.23%	0	3.50%	18,776,065	1,395,519	33,812,894
2046	2,189,083	3.50%	3.221	7,050,730	4,326,699	1,614,694	1,292,187	5.23%	0	3.50%	20,477,130	1,462,561	36,224,001
2047	2,189,083	3.50%	3.334	7,297,506	4,600,311	1,688,530	1,359,809	5.23%	0	3.50%	21,470,270	1,475,153	37,891,579
2048	2,189,083	3.50%	3.450	7,552,919	4,893,295	1,766,489	1,430,969	5.23%	0	3.50%	22,511,578	1,489,051	39,644,301
2049	2,189,083	3.50%	3.571	7,817,271	5,204,345	1,847,837	1,505,853	5.23%	0	3.50%	23,603,390	1,504,319	41,483,014
2050	2,189,083	3.50%	3.696	8,090,875	5,534,550	1,932,715	1,584,656	5.23%	0	3.50%	24,748,154	1,521,023	43,411,973
2051	2,189,083	3.50%	3.825	8,374,056	5,824,761	2,000,560	1,667,582	5.23%	0	3.50%	25,948,440	1,539,233	45,354,632
2052	2,189,083	3.50%	3.959	8,667,148	6,130,189	2,070,787	1,754,849	5.23%	0	3.50%	27,206,939	1,559,023	47,388,934
2053	2,189,083	3.50%	4.098	8,970,498	6,451,633	2,143,479	1,846,682	5.23%	0	3.50%	28,526,476	1,580,467	49,519,235
2054	2,189,083	3.50%	4.241	9,284,465	6,789,933	2,218,722	1,943,320	5.23%	0	3.50%	29,910,010	1,603,648	51,750,099
2055	2,189,083	3.50%	4.390	9,609,422	7,145,971	2,296,607	2,045,016	5.23%	0	3.50%	31,360,645	1,628,649	54,086,310
2056	2,189,083	3.50%	4.543	9,945,752	7,520,679	2,377,226	2,152,034	5.23%	0	3.50%	32,881,637	1,655,558	56,532,885
2057	2,189,083	3.50%	4.702	10,293,853	7,915,035	2,460,675	2,264,652	5.23%	0	3.50%	34,476,396	1,684,468	59,095,079
2058	2,189,083	3.50%	4.867	10,654,138	8,330,070	2,547,053	2,383,164	5.23%	0	3.50%	36,148,501	1,715,476	61,778,401
2059	2,189,083	3.50%	5.037	11,027,032	8,766,867	2,636,464	2,507,877	5.23%	0	3.50%	37,901,703	1,748,684	64,588,627
2060	2,189,083	3.50%	5.214	11,412,979	9,226,569	2,729,013	2,639,117	5.23%	0	3.50%	39,739,936	1,784,198	67,531,811
2061	2,189,083	3.50%	5.396	11,812,433	9,710,375	2,824,811	2,777,224	5.23%	0	3.50%	41,667,323	1,822,130	70,614,296
2062	2,189,083	3.50%	5.585	12,225,868	10,219,551	2,923,972	2,922,559	5.23%	0	3.50%	43,688,188	1,862,598	73,842,735
2063	2,189,083	3.50%	5.780	12,653,773	10,755,426	3,026,613	3,075,500	5.23%	0	3.50%	45,807,065	1,905,724	77,224,101
2064	2,189,083	3.50%	5.983	13,096,655	11,319,400	3,132,858	3,236,443	5.23%	0	3.50%	48,028,708	1,951,637	80,765,702
2065	2,189,083	3.50%	6.192	13,555,038	11,912,946	3,242,832	3,405,810	5.23%	0	3.50%	50,358,100	2,000,474	84,475,201
2066	2,189,083	3.50%	6.409	14,029,465	12,537,616	3,356,667	3,584,039	5.23%	0	3.50%	52,800,468	2,052,374	88,360,630
2067	2,189,083	3.50%	6.633	14,520,496	13,195,042	3,474,498	3,771,596	5.23%	0	3.50%	55,361,291	2,107,488	92,430,410
2068	2,189,083	3.50%	6.865	15,028,713	13,886,940	3,596,465	3,968,967	5.23%	0	3.50%	58,046,313	2,165,970	96,693,369
2069	2,189,083	3.50%	7.106	15,554,718	14,615,119	3,722,713	4,176,667	5.23%	0	3.50%	60,861,560	2,227,985	101,158,762

Table 9
Tualatin Valley Water District
Source Options PV Analysis
TBWSP with Federal Cost Share - O&M Cost Projections

	Fixed Costs						Pump-Back		Pipeline Costs		Portland Costs		
Year	Annual O&M (2012 Dollars)	Annual Escalation Rate	Inflation Factor	Annual O&M	Power Costs	Chemicals Costs	Pump-Back	Annual Escalation Rate	Pipeline Costs	Annual Escalation Rate	Purchased Water	Portland Treatment	Total Costs
2070	2,189,083	3.50%	7.354	16,099,134	15,381,481	3,853,393	4,395,236	5.23%	0	3.50%	63,813,345	2,293,703	105,836,292
2071	2,189,083	3.50%	7.612	16,662,603	16,188,028	3,988,661	4,625,243	5.23%	0	3.50%	66,908,293	2,363,304	110,736,132
2072	2,189,083	3.50%	7.878	17,245,794	17,036,867	4,128,677	4,867,287	5.23%	0	3.50%	70,153,345	2,436,977	115,868,946
2073	2,189,083	3.50%	8.154	17,849,397	17,930,216	4,273,608	5,121,997	5.23%	0	3.50%	73,555,782	2,514,919	121,245,918
2074	2,189,083	3.50%	8.439	18,474,126	18,870,409	4,423,627	5,390,036	5.23%	0	3.50%	77,123,237	2,597,336	126,878,771
2075	2,189,083	3.50%	8.735	19,120,720	19,859,902	4,578,911	5,672,102	5.23%	0	3.50%	80,863,714	2,684,447	132,779,797
2076	2,189,083	3.50%	9.040	19,789,946	20,901,280	4,739,647	5,968,929	5.23%	0	3.50%	84,785,604	2,776,478	138,961,885
2077	2,189,083	3.50%	9.357	20,482,594	21,997,265	4,906,025	6,281,289	5.23%	0	3.50%	88,897,706	2,873,669	145,438,548
2078	2,189,083	3.50%	9.684	21,199,484	23,150,718	5,078,244	6,609,995	5.23%	0	3.50%	93,209,245	2,976,269	152,223,956
2079	2,189,083	3.50%	10.023	21,941,466	24,364,655	5,256,508	6,955,903	5.23%	0	3.50%	97,729,893	3,084,541	159,332,967
2080	2,189,083	3.50%	10.374	22,709,418	25,642,246	5,441,030	7,319,912	5.23%	0	3.50%	102,469,793	3,198,760	166,781,159
2081	2,189,083	3.50%	10.737	23,504,247	26,986,828	5,632,029	7,702,970	5.23%	0	3.50%	107,439,578	3,319,215	174,584,868
2082	2,189,083	3.50%	11.113	24,326,896	28,401,916	5,829,733	8,106,074	5.23%	0	3.50%	112,650,398	3,446,207	182,761,224
2083	2,189,083	3.50%	11.502	25,178,337	29,891,206	6,034,377	8,530,273	5.23%	0	3.50%	118,113,942	3,580,054	191,328,190
2084	2,189,083	3.50%	11.904	26,059,579	31,458,588	6,246,205	8,976,671	5.23%	0	3.50%	123,842,468	3,721,089	200,304,600
2085	2,189,083	3.50%	12.321	26,971,664	33,108,158	6,465,469	9,446,429	5.23%	0	3.50%	129,848,828	3,869,660	209,710,208
2086	2,189,083	3.50%	12.752	27,915,673	34,844,225	6,692,429	9,940,770	5.23%	0	3.50%	136,146,496	4,026,132	219,565,725
2087	2,189,083	3.50%	13.199	28,892,721	36,671,325	6,927,357	10,460,981	5.23%	0	3.50%	142,749,601	4,190,889	229,892,873
2088	2,189,083	3.50%	13.660	29,903,967	38,594,231	7,170,531	11,008,414	5.23%	0	3.50%	149,672,957	4,394,147	240,744,247
2089	2,189,083	3.50%	14.139	30,950,605	40,617,967	7,422,242	11,584,496	5.23%	0	3.50%	156,932,095	4,607,263	252,114,668
2090	2,189,083	3.50%	14.633	32,033,877	42,747,820	7,682,789	12,190,724	5.23%	0	3.50%	164,543,302	4,830,715	264,029,226
2091	2,189,083	3.50%	15.146	33,155,062	44,989,355	7,952,482	12,828,677	5.23%	0	3.50%	172,523,652	5,065,005	276,514,232
2092	2,189,083	3.50%	15.676	34,315,489	47,348,427	8,231,642	13,500,014	5.23%	0	3.50%	180,891,049	5,310,657	289,597,279
2093	2,189,083	3.50%	16.224	35,516,532	49,831,200	8,520,601	14,206,483	5.23%	0	3.50%	189,664,265	5,568,224	303,307,305
2094	2,189,083	3.50%	16.792	36,759,610	52,444,161	8,819,704	14,949,923	5.23%	0	3.50%	198,862,982	5,838,283	317,674,663
2095	2,189,083	3.50%	17.380	38,046,197	55,194,135	9,129,306	15,732,267	5.23%	0	3.50%	208,507,837	6,121,440	332,731,181
2096	2,189,083	3.50%	17.988	39,377,813	58,088,307	9,449,777	16,555,553	5.23%	0	3.50%	218,620,467	6,418,330	348,510,247
2097	2,189,083	3.50%	18.618	40,756,037	61,134,239	9,781,497	17,421,921	5.23%	0	3.50%	229,223,559	6,729,619	365,046,873
2098	2,189,083	3.50%	19.269	42,182,498	64,339,888	10,124,862	18,333,628	5.23%	0	3.50%	240,340,902	7,056,005	382,377,784
2099	2,189,083	3.50%	19.944	43,658,886	67,713,630	10,480,280	19,293,045	5.23%	0	3.50%	251,997,436	7,398,221	400,541,498
2100	2,189,083	3.50%	20.642	45,186,947	71,264,278	10,848,175	20,302,669	5.23%	0	3.50%	264,219,311	7,757,035	419,578,414
2101	2,189,083	3.50%	21.364	46,768,490	75,001,108	11,228,984	21,365,128	5.23%	0	3.50%	277,033,948	8,133,251	439,530,909
2102	2,189,083	3.50%	22.112	48,405,387	78,933,883	11,623,160	22,483,187	5.23%	0	3.50%	290,470,094	8,527,714	460,443,426
2103	2,189,083	3.50%	22.886	50,099,575	83,072,879	12,031,174	23,659,754	5.23%	0	3.50%	304,557,894	8,941,308	482,362,585
2104	2,189,083	3.50%	23.687	51,853,061	87,428,908	12,453,510	24,897,893	5.23%	0	3.50%	319,328,952	9,374,962	505,337,285
2105	2,189,083	3.50%	24.516	53,667,918	92,013,350	12,890,672	26,200,824	5.23%	0	3.50%	334,816,406	9,829,647	529,418,818
2106	2,189,083	3.50%	25.374	55,546,295	96,838,184	13,343,180	27,571,940	5.23%	0	3.50%	351,055,002	10,306,385	554,660,985
2107	2,189,083	3.50%	26.262	57,490,415	101,916,013	13,811,572	29,014,807	5.23%	0	3.50%	368,081,169	10,806,245	581,120,222
2108	2,189,083	3.50%	27.182	59,502,580	107,260,105	14,296,407	30,533,181	5.23%	0	3.50%	385,933,106	11,330,348	608,855,726
2109	2,189,083	3.50%	28.133	61,585,170	112,884,421	14,798,260	32,131,013	5.23%	0	3.50%	404,650,861	11,879,870	637,929,595
2110	2,189,083	3.50%	29.118	63,740,651	118,803,655	15,317,731	33,812,461	5.23%	0	3.50%	424,276,428	12,456,043	668,406,969
2111	2,189,083	3.50%	30.137	65,971,574	125,033,271	15,855,437	35,581,901	5.23%	0	3.50%	444,853,835	13,060,161	700,356,179
2112	2,189,083	3.50%	31.191	68,280,579	131,589,545	16,412,018	37,443,937	5.23%	0	3.50%	466,429,246	13,693,579	733,848,904

Table 21
Tualatin Valley Water District
Source Options PV Analysis
TBWSP without Federal Cost Share - O&M and Cost Projections

	Fixed Costs						Pump-Back		Pipeline Costs		Portland Costs		
Year	Annual O&M (2012 Dollars)	Annual Escalation Rate	Inflation Factor	Annual O&M	Power Costs	Chemicals Costs	Pump-Back	Annual Escalation Rate	Pipeline Costs	Annual Escalation Rate	Purchased Water	Portland Treatment	Total Costs
2012	$0	3.50%	1.000	$0	$0	$0	$0	5.23%	$0	3.50%	$6,125,133	$0	$6,125,134
2013	0	3.50%	1.035	0	0	0	0	5.23%	0	3.50%	6,422,202	0	6,422,203
2014	0	3.50%	1.071	0	0	0	0	5.23%	0	3.50%	6,733,679	0	6,733,679
2015	0	3.50%	1.109	0	0	0	0	5.23%	0	3.50%	7,060,263	0	7,060,263
2016	0	3.50%	1.148	0	0	0	0	5.23%	0	3.50%	10,857,137	0	10,857,137
2017	0	3.50%	1.188	0	0	0	0	5.23%	0	3.50%	11,383,708	0	11,383,708
2018	0	3.50%	1.229	0	0	0	0	5.23%	0	3.50%	11,935,817	0	11,935,818
2019	0	3.50%	1.272	0	0	0	0	5.23%	0	3.50%	12,514,705	0	12,514,705
2020	0	3.50%	1.317	0	0	0	0	5.23%	0	3.50%	13,121,668	0	13,121,668
2021	0	3.50%	1.363	0	0	0	0	5.23%	0	3.50%	13,758,069	0	13,758,069
2022	0	3.50%	1.411	0	0	0	0	5.23%	0	3.50%	14,425,335	2,917,634	17,342,969
2023	0	3.50%	1.460	0	0	0	0	5.23%	0	3.50%	15,124,964	3,104,287	18,229,250
2024	0	3.50%	1.511	0	0	0	0	5.23%	0	3.50%	15,858,525	3,092,770	18,951,294
2025	0	3.50%	1.564	0	0	0	0	5.23%	0	3.50%	16,627,663	3,082,211	19,709,874
2026	2,138,067	3.50%	1.619	3,460,878	1,180,775	614,244	465,884	5.23%	0	3.50%	6,957,085	1,235,672	13,914,540
2027	2,138,067	3.50%	1.675	3,582,009	1,262,532	645,958	490,265	5.23%	0	3.50%	7,294,504	1,232,254	14,507,521
2028	2,138,067	3.50%	1.734	3,707,379	1,349,978	679,323	515,921	5.23%	0	3.50%	7,648,287	1,229,280	15,130,168
2029	2,138,067	3.50%	1.795	3,837,137	1,443,119	714,233	542,919	5.23%	0	3.50%	8,019,229	1,226,771	15,783,408
2030	2,138,067	3.50%	1.857	3,971,437	1,542,311	750,754	571,331	5.23%	0	3.50%	8,408,162	1,224,751	16,468,745
2031	2,138,067	3.50%	1.923	4,110,438	1,647,932	788,957	601,229	5.23%	0	3.50%	8,815,958	1,223,243	17,187,756
2032	2,138,067	3.50%	1.990	4,254,303	1,760,385	828,914	632,692	5.23%	0	3.50%	9,243,532	1,222,272	17,942,097
2033	2,138,067	3.50%	2.059	4,403,203	1,880,094	870,702	665,801	5.23%	0	3.50%	9,691,843	1,221,863	18,733,507
2034	2,138,067	3.50%	2.132	4,557,316	2,007,511	914,399	700,644	5.23%	0	3.50%	10,161,897	1,222,045	19,563,812
2035	2,138,067	3.50%	2.206	4,716,822	2,143,116	960,089	737,309	5.23%	0	3.50%	10,654,749	1,222,846	20,434,930
2036	2,138,067	3.50%	2.283	4,881,910	2,288,340	1,008,264	775,893	5.23%	0	3.50%	12,259,949	1,342,897	22,557,254
2037	2,189,083	3.50%	2.363	5,173,339	2,439,650	1,057,229	816,496	5.23%	0	3.50%	12,854,557	1,345,233	23,686,505
2038	2,189,083	3.50%	2.446	5,354,406	2,601,555	1,108,824	859,224	5.23%	0	3.50%	13,478,003	1,348,352	24,750,363
2039	2,189,083	3.50%	2.532	5,541,810	2,773,723	1,162,735	904,188	5.23%	0	3.50%	14,131,686	1,352,291	25,866,433
2040	2,189,083	3.50%	2.620	5,735,774	2,956,787	1,219,062	951,505	5.23%	0	3.50%	14,817,072	1,357,090	27,037,289
2041	2,189,083	3.50%	2.712	5,936,526	3,151,414	1,277,907	1,001,299	5.23%	0	3.50%	15,535,700	1,362,790	28,265,636
2042	2,189,083	3.50%	2.807	6,144,304	3,358,315	1,339,377	1,053,698	5.23%	0	3.50%	16,289,182	1,369,437	29,554,313
2043	2,189,083	3.50%	2.905	6,359,355	3,578,239	1,403,586	1,108,839	5.23%	0	3.50%	17,079,207	1,377,075	30,906,301
2044	2,189,083	3.50%	3.007	6,581,932	3,811,985	1,470,648	1,166,865	5.23%	0	3.50%	17,907,549	1,385,752	32,324,731
2045	2,189,083	3.50%	3.112	6,812,300	4,060,396	1,540,685	1,227,929	5.23%	0	3.50%	18,776,065	1,395,519	33,812,894
2046	2,189,083	3.50%	3.221	7,050,730	4,326,699	1,614,694	1,292,187	5.23%	0	3.50%	20,477,130	1,462,561	36,224,001
2047	2,189,083	3.50%	3.334	7,297,506	4,600,311	1,688,530	1,359,809	5.23%	0	3.50%	21,470,270	1,475,153	37,891,579
2048	2,189,083	3.50%	3.450	7,552,919	4,893,295	1,766,489	1,430,969	5.23%	0	3.50%	22,511,578	1,489,051	39,644,301
2049	2,189,083	3.50%	3.571	7,817,271	5,204,345	1,847,837	1,505,853	5.23%	0	3.50%	23,603,390	1,504,319	41,483,014
2050	2,189,083	3.50%	3.696	8,090,875	5,534,550	1,932,715	1,584,656	5.23%	0	3.50%	24,748,154	1,521,023	43,411,973
2051	2,189,083	3.50%	3.825	8,374,056	5,824,761	2,000,560	1,667,582	5.23%	0	3.50%	25,948,440	1,539,233	45,354,632
2052	2,189,083	3.50%	3.959	8,667,148	6,130,189	2,070,787	1,754,849	5.23%	0	3.50%	27,206,939	1,559,023	47,388,934
2053	2,189,083	3.50%	4.098	8,970,498	6,451,633	2,143,479	1,846,682	5.23%	0	3.50%	28,526,476	1,580,467	49,519,235
2054	2,189,083	3.50%	4.241	9,284,465	6,789,933	2,218,722	1,943,320	5.23%	0	3.50%	29,910,010	1,603,648	51,750,099
2055	2,189,083	3.50%	4.390	9,609,422	7,145,971	2,296,607	2,045,016	5.23%	0	3.50%	31,360,645	1,628,649	54,086,310
2056	2,189,083	3.50%	4.543	9,945,752	7,520,679	2,377,226	2,152,034	5.23%	0	3.50%	32,881,637	1,655,558	56,532,885
2057	2,189,083	3.50%	4.702	10,293,853	7,915,035	2,460,675	2,264,652	5.23%	0	3.50%	34,476,396	1,684,468	59,095,079
2058	2,189,083	3.50%	4.867	10,654,138	8,330,070	2,547,053	2,383,164	5.23%	0	3.50%	36,148,501	1,715,476	61,778,401
2059	2,189,083	3.50%	5.037	11,027,032	8,766,867	2,636,464	2,507,877	5.23%	0	3.50%	37,901,703	1,748,684	64,588,627
2060	2,189,083	3.50%	5.214	11,412,979	9,226,569	2,729,013	2,639,117	5.23%	0	3.50%	39,739,936	1,784,198	67,531,811
2061	2,189,083	3.50%	5.396	11,812,433	9,710,375	2,824,811	2,777,224	5.23%	0	3.50%	41,667,323	1,822,130	70,614,296
2062	2,189,083	3.50%	5.585	12,225,868	10,219,551	2,923,972	2,922,559	5.23%	0	3.50%	43,688,188	1,862,598	73,842,735
2063	2,189,083	3.50%	5.780	12,653,773	10,755,426	3,026,613	3,075,500	5.23%	0	3.50%	45,807,065	1,905,724	77,224,101
2064	2,189,083	3.50%	5.983	13,096,655	11,319,400	3,132,858	3,236,443	5.23%	0	3.50%	48,028,708	1,951,637	80,765,702
2065	2,189,083	3.50%	6.192	13,555,038	11,912,946	3,242,832	3,405,810	5.23%	0	3.50%	50,358,100	2,000,474	84,475,201
2066	2,189,083	3.50%	6.409	14,029,465	12,537,616	3,356,667	3,584,039	5.23%	0	3.50%	52,800,468	2,052,374	88,360,630
2067	2,189,083	3.50%	6.633	14,520,496	13,195,042	3,474,498	3,771,596	5.23%	0	3.50%	55,361,291	2,107,488	92,430,410
2068	2,189,083	3.50%	6.865	15,028,713	13,886,940	3,596,465	3,968,967	5.23%	0	3.50%	58,046,313	2,165,970	96,693,369
2069	2,189,083	3.50%	7.106	15,554,718	14,615,119	3,722,713	4,176,667	5.23%	0	3.50%	60,861,560	2,227,985	101,158,762

Table 21
Tualatin Valley Water District
Source Options PV Analysis
TBWSP without Federal Cost Share - O&M and Cost Projections

	Fixed Costs						Pump-Back		Pipeline Costs		Portland Costs		
Year	Annual O&M (2012 Dollars)	Annual Escalation Rate	Inflation Factor	Annual O&M	Power Costs	Chemicals Costs	Pump-Back	Annual Escalation Rate	Pipeline Costs	Annual Escalation Rate	Purchased Water	Portland Treatment	Total Costs
2070	2,189,083	3.50%	7.354	16,099,134	15,381,481	3,853,393	4,395,236	5.23%	0	3.50%	63,813,345	2,293,703	105,836,292
2071	2,189,083	3.50%	7.612	16,662,603	16,188,028	3,988,661	4,625,243	5.23%	0	3.50%	66,908,293	2,363,304	110,736,132
2072	2,189,083	3.50%	7.878	17,245,794	17,036,867	4,128,677	4,867,287	5.23%	0	3.50%	70,153,345	2,436,977	115,868,946
2073	2,189,083	3.50%	8.154	17,849,397	17,930,216	4,273,608	5,121,997	5.23%	0	3.50%	73,555,782	2,514,919	121,245,918
2074	2,189,083	3.50%	8.439	18,474,126	18,870,409	4,423,627	5,390,036	5.23%	0	3.50%	77,123,237	2,597,336	126,878,771
2075	2,189,083	3.50%	8.735	19,120,720	19,859,902	4,578,911	5,672,102	5.23%	0	3.50%	80,863,714	2,684,447	132,779,797
2076	2,189,083	3.50%	9.040	19,789,946	20,901,280	4,739,647	5,968,929	5.23%	0	3.50%	84,785,604	2,776,478	138,961,885
2077	2,189,083	3.50%	9.357	20,482,594	21,997,265	4,906,025	6,281,289	5.23%	0	3.50%	88,897,706	2,873,669	145,438,548
2078	2,189,083	3.50%	9.684	21,199,484	23,150,718	5,078,244	6,609,995	5.23%	0	3.50%	93,209,245	2,976,269	152,223,956
2079	2,189,083	3.50%	10.023	21,941,466	24,364,655	5,256,508	6,955,903	5.23%	0	3.50%	97,729,893	3,084,541	159,332,967
2080	2,189,083	3.50%	10.374	22,709,418	25,642,246	5,441,030	7,319,912	5.23%	0	3.50%	102,469,793	3,198,760	166,781,159
2081	2,189,083	3.50%	10.737	23,504,247	26,986,828	5,632,029	7,702,970	5.23%	0	3.50%	107,439,578	3,319,215	174,584,868
2082	2,189,083	3.50%	11.113	24,326,896	28,401,916	5,829,733	8,106,074	5.23%	0	3.50%	112,650,398	3,446,207	182,761,224
2083	2,189,083	3.50%	11.502	25,178,337	29,891,206	6,034,377	8,530,273	5.23%	0	3.50%	118,113,942	3,580,054	191,328,190
2084	2,189,083	3.50%	11.904	26,059,579	31,458,588	6,246,205	8,976,671	5.23%	0	3.50%	123,842,468	3,721,089	200,304,600
2085	2,189,083	3.50%	12.321	26,971,664	33,108,158	6,465,469	9,446,429	5.23%	0	3.50%	129,848,828	3,869,660	209,710,208
2086	2,189,083	3.50%	12.752	27,915,673	34,844,225	6,692,429	9,940,770	5.23%	0	3.50%	136,146,496	4,026,132	219,565,725
2087	2,189,083	3.50%	13.199	28,892,721	36,671,325	6,927,357	10,460,981	5.23%	0	3.50%	142,749,601	4,190,889	229,892,873
2088	2,189,083	3.50%	13.660	29,903,967	38,594,231	7,170,531	11,008,414	5.23%	0	3.50%	149,672,957	4,394,147	240,744,247
2089	2,189,083	3.50%	14.139	30,950,605	40,617,967	7,422,242	11,584,496	5.23%	0	3.50%	156,932,095	4,607,263	252,114,668
2090	2,189,083	3.50%	14.633	32,033,877	42,747,820	7,682,789	12,190,724	5.23%	0	3.50%	164,543,302	4,830,715	264,029,226
2091	2,189,083	3.50%	15.146	33,155,062	44,989,355	7,952,482	12,828,677	5.23%	0	3.50%	172,523,652	5,065,005	276,514,232
2092	2,189,083	3.50%	15.676	34,315,489	47,348,427	8,231,642	13,500,014	5.23%	0	3.50%	180,891,049	5,310,657	289,597,279
2093	2,189,083	3.50%	16.224	35,516,532	49,831,200	8,520,601	14,206,483	5.23%	0	3.50%	189,664,265	5,568,224	303,307,305
2094	2,189,083	3.50%	16.792	36,759,610	52,444,161	8,819,704	14,949,923	5.23%	0	3.50%	198,862,982	5,838,283	317,674,663
2095	2,189,083	3.50%	17.380	38,046,197	55,194,135	9,129,306	15,732,267	5.23%	0	3.50%	208,507,837	6,121,440	332,731,181
2096	2,189,083	3.50%	17.988	39,377,813	58,088,307	9,449,777	16,555,553	5.23%	0	3.50%	218,620,467	6,418,330	348,510,247
2097	2,189,083	3.50%	18.618	40,756,037	61,134,239	9,781,497	17,421,921	5.23%	0	3.50%	229,223,559	6,729,619	365,046,873
2098	2,189,083	3.50%	19.269	42,182,498	64,339,888	10,124,862	18,333,628	5.23%	0	3.50%	240,340,902	7,056,005	382,377,784
2099	2,189,083	3.50%	19.944	43,658,886	67,713,630	10,480,280	19,293,045	5.23%	0	3.50%	251,997,436	7,398,221	400,541,498
2100	2,189,083	3.50%	20.642	45,186,947	71,264,278	10,848,175	20,302,669	5.23%	0	3.50%	264,219,311	7,757,035	419,578,414
2101	2,189,083	3.50%	21.364	46,768,490	75,001,108	11,228,984	21,365,128	5.23%	0	3.50%	277,033,948	8,133,251	439,530,909
2102	2,189,083	3.50%	22.112	48,405,387	78,933,883	11,623,160	22,483,187	5.23%	0	3.50%	290,470,094	8,527,714	460,443,426
2103	2,189,083	3.50%	22.886	50,099,575	83,072,879	12,031,174	23,659,754	5.23%	0	3.50%	304,557,894	8,941,308	482,362,585
2104	2,189,083	3.50%	23.687	51,853,061	87,428,908	12,453,510	24,897,893	5.23%	0	3.50%	319,328,952	9,374,962	505,337,285
2105	2,189,083	3.50%	24.516	53,667,918	92,013,350	12,890,672	26,200,824	5.23%	0	3.50%	334,816,406	9,829,647	529,418,818
2106	2,189,083	3.50%	25.374	55,546,295	96,838,184	13,343,180	27,571,940	5.23%	0	3.50%	351,055,002	10,306,385	554,660,985
2107	2,189,083	3.50%	26.262	57,490,415	101,916,013	13,811,572	29,014,807	5.23%	0	3.50%	368,081,169	10,806,245	581,120,222
2108	2,189,083	3.50%	27.182	59,502,580	107,260,105	14,296,407	30,533,181	5.23%	0	3.50%	385,933,106	11,330,348	608,855,726
2109	2,189,083	3.50%	28.133	61,585,170	112,884,421	14,798,260	32,131,013	5.23%	0	3.50%	404,650,861	11,879,870	637,929,595
2110	2,189,083	3.50%	29.118	63,740,651	118,803,655	15,317,731	33,812,461	5.23%	0	3.50%	424,276,428	12,456,043	668,406,969
2111	2,189,083	3.50%	30.137	65,971,574	125,033,271	15,855,437	35,581,901	5.23%	0	3.50%	444,853,835	13,060,161	700,356,179
2112	2,189,083	3.50%	31.191	68,280,579	131,589,545	16,412,018	37,443,937	5.23%	0	3.50%	466,429,246	13,693,579	733,848,904
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Table 12
Tualatin Valley Water District
Source Options PV Analysis
Mid-Willamette - O&M and Cost Projections

	Fixed Costs						Pump-Back		Pipeline Costs		Portland Costs		
Year	Annual O&M (2012 Dollars)	Annual Escalation Rate	Inflation Factor	Annual O&M	Power Costs	Chemicals Costs	Pump-Back	Annual Escalation Rate	Pipeline Costs	Annual Escalation Rate	Purchased Water	Portland Treatment	Total Costs
2012	$0	3.50%	1.000	$0	$0	$0	$0	5.23%	$0	3.50%	$6,125,133	$0	$6,125,134
2013	0	3.50%	1.035	0	0	0	0	5.23%	0	3.50%	6,422,202	0	6,422,203
2014	0	3.50%	1.071	0	0	0	0	5.23%	0	3.50%	6,733,679	0	6,733,679
2015	0	3.50%	1.109	0	0	0	0	5.23%	0	3.50%	7,060,263	0	7,060,263
2016	0	3.50%	1.148	0	0	0	0	5.23%	0	3.50%	10,857,137	0	10,857,137
2017	0	3.50%	1.188	0	0	0	0	5.23%	0	3.50%	11,383,708	0	11,383,708
2018	0	3.50%	1.229	0	0	0	0	5.23%	0	3.50%	11,935,817	0	11,935,818
2019	0	3.50%	1.272	0	0	0	0	5.23%	0	3.50%	12,514,705	0	12,514,705
2020	0	3.50%	1.317	0	0	0	0	5.23%	0	3.50%	13,121,668	0	13,121,668
2021	0	3.50%	1.363	0	0	0	0	5.23%	0	3.50%	13,758,069	0	13,758,069
2022	0	3.50%	1.411	0	0	0	0	5.23%	0	3.50%	14,425,335	2,917,634	17,342,969
2023	0	3.50%	1.460	0	0	0	0	5.23%	0	3.50%	15,124,964	3,104,287	18,229,251
2024	0	3.50%	1.511	0	0	0	0	5.23%	0	3.50%	15,858,525	3,092,770	18,951,294
2025	0	3.50%	1.564	0	0	0	0	5.23%	0	3.50%	16,627,663	3,082,211	19,709,874
2026	2,112,089	3.50%	1.619	3,418,827	2,357,688	614,244	0	5.23%	0	3.50%	6,957,085	1,235,672	14,583,518
2027	2,112,089	3.50%	1.675	3,538,486	2,520,934	645,958	0	5.23%	0	3.50%	7,294,504	1,232,254	15,232,136
2028	2,112,089	3.50%	1.734	3,662,333	2,695,540	679,323	0	5.23%	0	3.50%	7,648,287	1,229,280	15,914,763
2029	2,112,089	3.50%	1.795	3,790,515	2,881,517	714,233	0	5.23%	0	3.50%	8,019,229	1,226,771	16,632,265
2030	2,112,089	3.50%	1.857	3,923,183	3,079,576	750,754	0	5.23%	0	3.50%	8,408,162	1,224,751	17,386,426
2031	2,143,947	3.50%	1.923	4,121,742	3,290,474	788,957	0	5.23%	0	3.50%	8,815,958	1,223,243	18,240,373
2032	2,143,947	3.50%	1.990	4,266,003	3,515,011	828,914	0	5.23%	0	3.50%	9,243,532	1,222,272	19,075,731
2033	2,143,947	3.50%	2.059	4,415,313	3,754,038	870,702	0	5.23%	0	3.50%	9,691,843	1,221,863	19,953,758
2034	2,143,947	3.50%	2.132	4,569,849	4,008,456	914,399	0	5.23%	0	3.50%	10,161,897	1,222,045	20,876,646
2035	2,143,947	3.50%	2.206	4,729,793	4,279,221	960,089	0	5.23%	0	3.50%	10,654,749	1,222,846	21,846,698
2036	2,143,947	3.50%	2.283	4,895,336	4,569,196	1,008,264	0	5.23%	0	3.50%	12,259,949	1,342,897	24,075,642
2037	2,167,557	3.50%	2.363	5,122,467	4,871,320	1,057,229	0	5.23%	0	3.50%	12,854,557	1,345,233	25,250,806
2038	2,167,557	3.50%	2.446	5,301,753	5,194,599	1,108,824	0	5.23%	0	3.50%	13,478,003	1,348,352	26,431,531
2039	2,167,557	3.50%	2.532	5,487,315	5,538,373	1,162,735	0	5.23%	0	3.50%	14,131,686	1,352,291	27,672,399
2040	2,167,557	3.50%	2.620	5,679,371	5,903,902	1,219,062	0	5.23%	0	3.50%	14,817,072	1,357,090	28,976,496
2041	2,167,557	3.50%	2.712	5,878,149	6,292,520	1,277,907	0	5.23%	0	3.50%	15,535,700	1,362,790	30,347,066
2042	2,167,557	3.50%	2.807	6,083,884	6,705,644	1,339,377	0	5.23%	0	3.50%	16,289,182	1,369,437	31,787,524
2043	2,167,557	3.50%	2.905	6,296,820	7,144,774	1,403,586	0	5.23%	0	3.50%	17,079,207	1,377,075	33,301,462
2044	2,167,557	3.50%	3.007	6,517,209	7,611,500	1,470,648	0	5.23%	0	3.50%	17,907,549	1,385,752	34,892,658
2045	2,184,000	3.50%	3.112	6,796,482	8,107,509	1,540,685	0	5.23%	0	3.50%	18,776,065	1,395,519	36,616,261
2046	2,184,000	3.50%	3.221	7,034,359	8,639,246	1,614,694	0	5.23%	0	3.50%	20,477,130	1,462,561	39,227,989
2047	2,184,000	3.50%	3.334	7,280,562	9,185,575	1,688,530	0	5.23%	0	3.50%	21,470,270	1,475,153	41,100,090
2048	2,184,000	3.50%	3.450	7,535,382	9,770,584	1,766,489	0	5.23%	0	3.50%	22,511,578	1,489,051	43,073,084
2049	2,184,000	3.50%	3.571	7,799,120	10,391,667	1,847,837	0	5.23%	0	3.50%	23,603,390	1,504,319	45,146,332
2050	2,184,000	3.50%	3.696	8,072,089	11,050,996	1,932,715	0	5.23%	0	3.50%	24,748,154	1,521,023	47,324,978
2051	2,184,000	3.50%	3.825	8,354,612	11,630,469	2,000,560	0	5.23%	0	3.50%	25,948,440	1,539,233	49,473,314
2052	2,184,000	3.50%	3.959	8,647,024	12,240,327	2,070,787	0	5.23%	0	3.50%	27,206,939	1,559,023	51,724,099
2053	2,184,000	3.50%	4.098	8,949,670	12,882,163	2,143,479	0	5.23%	0	3.50%	28,526,476	1,580,467	54,082,255
2054	2,184,000	3.50%	4.241	9,262,908	13,557,656	2,218,722	0	5.23%	0	3.50%	29,910,010	1,603,648	56,552,944
2055	2,184,000	3.50%	4.390	9,587,110	14,268,568	2,296,607	0	5.23%	0	3.50%	31,360,645	1,628,649	59,141,579
2056	2,184,000	3.50%	4.543	9,922,659	15,016,758	2,377,226	0	5.23%	0	3.50%	32,881,637	1,655,558	61,853,837
2057	2,184,000	3.50%	4.702	10,269,952	15,804,180	2,460,675	0	5.23%	0	3.50%	34,476,396	1,684,468	64,695,671
2058	2,184,000	3.50%	4.867	10,629,400	16,632,892	2,547,053	0	5.23%	0	3.50%	36,148,501	1,715,476	67,673,322
2059	2,184,000	3.50%	5.037	11,001,429	17,505,058	2,636,464	0	5.23%	0	3.50%	37,901,703	1,748,684	70,793,338
2060	2,184,000	3.50%	5.214	11,386,479	18,422,957	2,729,013	0	5.23%	0	3.50%	39,739,936	1,784,198	74,062,583
2061	2,184,000	3.50%	5.396	11,785,006	19,388,988	2,824,811	0	5.23%	0	3.50%	41,667,323	1,822,130	77,488,257
2062	2,184,000	3.50%	5.585	12,197,481	20,405,673	2,923,972	0	5.23%	0	3.50%	43,688,188	1,862,598	81,077,911
2063	2,184,000	3.50%	5.780	12,624,393	21,475,670	3,026,613	0	5.23%	0	3.50%	45,807,065	1,905,724	84,839,465
2064	2,184,000	3.50%	5.983	13,066,246	22,601,773	3,132,858	0	5.23%	0	3.50%	48,028,708	1,951,637	88,781,223
2065	2,184,000	3.50%	6.192	13,523,565	23,786,925	3,242,832	0	5.23%	0	3.50%	50,358,100	2,000,474	92,911,896
2066	2,184,000	3.50%	6.409	13,996,890	25,034,222	3,356,667	0	5.23%	0	3.50%	52,800,468	2,052,374	97,240,621
2067	2,184,000	3.50%	6.633	14,486,781	26,346,922	3,474,498	0	5.23%	0	3.50%	55,361,291	2,107,488	101,776,979
2068	2,184,000	3.50%	6.865	14,993,818	27,728,455	3,596,465	0	5.23%	0	3.50%	58,046,313	2,165,970	106,531,022
2069	2,184,000	3.50%	7.106	15,518,602	29,182,431	3,722,713	0	5.23%	0	3.50%	60,861,560	2,227,985	111,513,291

Table 12
Tualatin Valley Water District
Source Options PV Analysis
Mid-Willamette - O&M and Cost Projections

	Fixed Costs						Pump-Back		Pipeline Costs		Portland Costs		
Year	Annual O&M (2012 Dollars)	Annual Escalation Rate	Inflation Factor	Annual O&M	Power Costs	Chemicals Costs	Pump-Back	Annual Escalation Rate	Pipeline Costs	Annual Escalation Rate	Purchased Water	Portland Treatment	Total Costs
2070	2,184,000	3.50%	7.354	16,061,753	30,712,648	3,853,393	0	5.23%	0	3.50%	63,813,345	2,293,703	116,734,843
2071	2,184,000	3.50%	7.612	16,623,914	32,323,104	3,988,661	0	5.23%	0	3.50%	66,908,293	2,363,304	122,207,276
2072	2,184,000	3.50%	7.878	17,205,751	34,018,005	4,128,677	0	5.23%	0	3.50%	70,153,345	2,436,977	127,942,755
2073	2,184,000	3.50%	8.154	17,807,953	35,801,781	4,273,608	0	5.23%	0	3.50%	73,555,782	2,514,919	133,954,043
2074	2,184,000	3.50%	8.439	18,431,231	37,679,092	4,423,627	0	5.23%	0	3.50%	77,123,237	2,597,336	140,254,523
2075	2,184,000	3.50%	8.735	19,076,324	39,654,842	4,578,911	0	5.23%	0	3.50%	80,863,714	2,684,447	146,858,238
2076	2,184,000	3.50%	9.040	19,743,996	41,734,192	4,739,647	0	5.23%	0	3.50%	84,785,604	2,776,478	153,779,917
2077	2,184,000	3.50%	9.357	20,435,035	43,922,576	4,906,025	0	5.23%	0	3.50%	88,897,706	2,873,669	161,035,012
2078	2,184,000	3.50%	9.684	21,150,262	46,225,710	5,078,244	0	5.23%	0	3.50%	93,209,245	2,976,269	168,639,730
2079	2,184,000	3.50%	10.023	21,890,521	48,649,612	5,256,508	0	5.23%	0	3.50%	97,729,893	3,084,541	176,611,076
2080	2,184,000	3.50%	10.374	22,656,689	51,200,615	5,441,030	0	5.23%	0	3.50%	102,469,793	3,198,760	184,966,887
2081	2,184,000	3.50%	10.737	23,449,673	53,885,382	5,632,029	0	5.23%	0	3.50%	107,439,578	3,319,215	193,725,878
2082	2,184,000	3.50%	11.113	24,270,412	56,710,929	5,829,733	0	5.23%	0	3.50%	112,650,398	3,446,207	202,907,678
2083	2,184,000	3.50%	11.502	25,119,876	59,684,636	6,034,377	0	5.23%	0	3.50%	118,113,942	3,580,054	212,532,886
2084	2,184,000	3.50%	11.904	25,999,072	62,814,274	6,246,205	0	5.23%	0	3.50%	123,842,468	3,721,089	222,623,108
2085	2,184,000	3.50%	12.321	26,909,039	66,108,018	6,465,469	0	5.23%	0	3.50%	129,848,828	3,869,660	233,201,013
2086	2,184,000	3.50%	12.752	27,850,856	69,574,473	6,692,429	0	5.23%	0	3.50%	136,146,496	4,026,132	244,290,386
2087	2,184,000	3.50%	13.199	28,825,636	73,222,696	6,927,357	0	5.23%	0	3.50%	142,749,601	4,190,889	255,916,179
2088	2,184,000	3.50%	13.660	29,834,533	77,062,219	7,170,531	0	5.23%	0	3.50%	149,672,957	4,394,147	268,134,386
2089	2,184,000	3.50%	14.139	30,878,741	81,103,071	7,422,242	0	5.23%	0	3.50%	156,932,095	4,607,263	280,943,413
2090	2,184,000	3.50%	14.633	31,959,497	85,355,811	7,682,789	0	5.23%	0	3.50%	164,543,302	4,830,715	294,372,114
2091	2,184,000	3.50%	15.146	33,078,080	89,831,548	7,952,482	0	5.23%	0	3.50%	172,523,652	5,065,005	308,450,766
2092	2,184,000	3.50%	15.676	34,235,813	94,541,976	8,231,642	0	5.23%	0	3.50%	180,891,049	5,310,657	323,211,137
2093	2,184,000	3.50%	16.224	35,434,066	99,499,401	8,520,601	0	5.23%	0	3.50%	189,664,265	5,568,224	338,686,557
2094	2,184,000	3.50%	16.792	36,674,258	104,716,775	8,819,704	0	5.23%	0	3.50%	198,862,982	5,838,283	354,912,002
2095	2,184,000	3.50%	17.380	37,957,857	110,207,728	9,129,306	0	5.23%	0	3.50%	208,507,837	6,121,440	371,924,168
2096	2,184,000	3.50%	17.988	39,286,382	115,986,606	9,449,777	0	5.23%	0	3.50%	218,620,467	6,418,330	389,761,562
2097	2,184,000	3.50%	18.618	40,661,406	122,068,507	9,781,497	0	5.23%	0	3.50%	229,223,559	6,729,619	408,464,588
2098	2,184,000	3.50%	19.269	42,084,555	128,469,319	10,124,862	0	5.23%	0	3.50%	240,340,902	7,056,005	428,075,644
2099	2,184,000	3.50%	19.944	43,557,514	135,205,767	10,480,280	0	5.23%	0	3.50%	251,997,436	7,398,221	448,639,218
2100	2,184,000	3.50%	20.642	45,082,027	142,295,448	10,848,175	0	5.23%	0	3.50%	264,219,311	7,757,035	470,201,996
2101	2,184,000	3.50%	21.364	46,659,898	149,756,885	11,228,984	0	5.23%	0	3.50%	277,033,948	8,133,251	492,812,966
2102	2,184,000	3.50%	22.112	48,292,995	157,609,572	11,623,160	0	5.23%	0	3.50%	290,470,094	8,527,714	516,523,535
2103	2,184,000	3.50%	22.886	49,983,250	165,874,024	12,031,174	0	5.23%	0	3.50%	304,557,894	8,941,308	541,387,650
2104	2,184,000	3.50%	23.687	51,732,663	174,571,833	12,453,510	0	5.23%	0	3.50%	319,328,952	9,374,962	567,461,920
2105	2,184,000	3.50%	24.516	53,543,307	183,725,722	12,890,672	0	5.23%	0	3.50%	334,816,406	9,829,647	594,805,754
2106	2,184,000	3.50%	25.374	55,417,322	193,359,607	13,343,180	0	5.23%	0	3.50%	351,055,002	10,306,385	623,481,496
2107	2,184,000	3.50%	26.262	57,356,929	203,498,657	13,811,572	0	5.23%	0	3.50%	368,081,169	10,806,245	653,554,571
2108	2,184,000	3.50%	27.182	59,364,421	214,169,360	14,296,407	0	5.23%	0	3.50%	385,933,106	11,330,348	685,093,641
2109	2,184,000	3.50%	28.133	61,442,176	225,399,594	14,798,260	0	5.23%	0	3.50%	404,650,861	11,879,870	718,170,762
2110	2,184,000	3.50%	29.118	63,592,652	237,218,700	15,317,731	0	5.23%	0	3.50%	424,276,428	12,456,043	752,861,555
2111	2,184,000	3.50%	30.137	65,818,395	249,657,555	15,855,437	0	5.23%	0	3.50%	444,853,835	13,060,161	789,245,383
2112	2,184,000	3.50%	31.191	68,122,039	262,748,657	16,412,018	0	5.23%	0	3.50%	466,429,246	13,693,579	827,405,539

Table 18
Tualatin Valley Water District
Source Options PV Analysis
Portland with Partners - O&M and Cost Projections

	Fixed Costs						Pump-Back		Pipeline Costs		Portland Costs		
Year	Annual O&M (2012 Dollars)	Annual Escalation Rate	Inflation Factor	Annual O&M	Power Costs	Chemicals Costs	Pump-Back	Annual Escalation Rate	Pipeline Costs	Annual Escalation Rate	Purchased Water	Portland Treatment	Total Costs
2012	$0	3.50%	1.000	$0	$0	$0	$0	5.23%	$0	3.50%	$6,125,133	$0	$6,125,133
2013	0	3.50%	1.035	0	0	0	0	5.23%	0	3.50%	6,422,202	0	6,422,202
2014	0	3.50%	1.071	0	0	0	0	5.23%	0	3.50%	6,733,679	0	6,733,679
2015	0	3.50%	1.109	0	0	0	0	5.23%	0	3.50%	7,060,263	0	7,060,263
2016	0	3.50%	1.148	0	0	0	0	5.23%	0	3.50%	9,933,665	0	9,933,665
2017	0	3.50%	1.188	0	0	0	0	5.23%	0	3.50%	10,415,448	0	10,415,448
2018	0	3.50%	1.229	0	0	0	0	5.23%	0	3.50%	10,920,597	0	10,920,597
2019	0	3.50%	1.272	0	0	0	0	5.23%	0	3.50%	11,450,246	0	11,450,246
2020	0	3.50%	1.317	0	0	0	0	5.23%	0	3.50%	12,005,583	0	12,005,583
2021	0	3.50%	1.363	0	0	0	0	5.23%	0	3.50%	12,587,854	0	12,587,854
2022	0	3.50%	1.411	0	0	0	0	5.23%	0	3.50%	13,198,365	2,656,893	15,855,258
2023	0	3.50%	1.460	0	0	0	0	5.23%	0	3.50%	13,838,485	2,826,866	16,665,351
2024	0	3.50%	1.511	0	0	0	0	5.23%	0	3.50%	14,509,652	2,816,378	17,326,030
2025	0	3.50%	1.564	0	0	0	0	5.23%	0	3.50%	15,213,370	2,806,763	18,020,133
2026	69,291	3.50%	1.619	112,162	0	0	0	5.23%	0	3.50%	16,835,575	2,938,487	19,886,224
2027	69,291	3.50%	1.675	116,087	0	0	0	5.23%	0	3.50%	17,652,100	2,930,358	20,698,546
2028	69,291	3.50%	1.734	120,150	0	0	0	5.23%	0	3.50%	18,508,227	2,923,285	21,551,663
2029	69,291	3.50%	1.795	124,356	0	0	0	5.23%	0	3.50%	19,405,876	2,917,320	22,447,552
2030	69,291	3.50%	1.857	128,708	0	0	0	5.23%	0	3.50%	20,347,061	2,912,516	23,388,285
2031	69,291	3.50%	1.923	133,213	0	0	0	5.23%	0	3.50%	21,333,894	2,908,929	24,376,036
2032	69,291	3.50%	1.990	137,875	0	0	0	5.23%	0	3.50%	22,368,587	2,906,620	25,413,083
2033	69,291	3.50%	2.059	142,701	0	0	0	5.23%	0	3.50%	23,453,464	2,905,649	26,501,814
2034	69,291	3.50%	2.132	147,696	0	0	0	5.23%	0	3.50%	24,590,957	2,906,081	27,644,734
2035	69,291	3.50%	2.206	152,865	0	0	0	5.23%	0	3.50%	25,783,618	2,907,985	28,844,468
2036	69,291	3.50%	2.283	158,215	0	0	0	5.23%	0	3.50%	28,854,138	3,097,688	32,110,041
2037	69,291	3.50%	2.363	163,753	0	0	0	5.23%	0	3.50%	30,253,564	3,103,077	33,520,393
2038	69,291	3.50%	2.446	169,484	0	0	0	5.23%	0	3.50%	31,720,862	3,110,270	35,000,616
2039	69,291	3.50%	2.532	175,416	0	0	0	5.23%	0	3.50%	33,259,324	3,119,356	36,554,096
2040	69,291	3.50%	2.620	181,555	0	0	0	5.23%	0	3.50%	34,872,401	3,130,426	38,184,382
2041	69,291	3.50%	2.712	187,910	0	0	0	5.23%	0	3.50%	36,563,712	3,143,576	39,895,198
2042	69,291	3.50%	2.807	194,487	0	0	0	5.23%	0	3.50%	38,337,052	3,158,908	41,690,447
2043	69,291	3.50%	2.905	201,294	0	0	0	5.23%	0	3.50%	40,196,399	3,176,526	43,574,219
2044	69,291	3.50%	3.007	208,339	0	0	0	5.23%	0	3.50%	42,145,925	3,196,542	45,550,806
2045	69,291	3.50%	3.112	215,631	0	0	0	5.23%	0	3.50%	44,190,002	3,219,073	47,624,706
2046	69,291	3.50%	3.221	223,178	0	0	0	5.23%	0	3.50%	47,604,596	3,328,794	51,156,568
2047	69,291	3.50%	3.334	230,989	0	0	0	5.23%	0	3.50%	49,913,419	3,357,453	53,501,861
2048	69,291	3.50%	3.450	239,074	0	0	0	5.23%	0	3.50%	52,334,219	3,389,085	55,962,379
2049	69,291	3.50%	3.571	247,442	0	0	0	5.23%	0	3.50%	54,872,429	3,423,835	58,543,706
2050	69,291	3.50%	3.696	256,102	0	0	0	5.23%	0	3.50%	57,533,742	3,461,854	61,251,698
2051	69,291	3.50%	3.825	265,066	0	0	0	5.23%	0	3.50%	60,324,128	3,503,301	64,092,495
2052	69,291	3.50%	3.959	274,343	0	0	0	5.23%	0	3.50%	63,249,849	3,548,341	67,072,533
2053	69,291	3.50%	4.098	283,945	0	0	0	5.23%	0	3.50%	66,317,466	3,597,150	70,198,561
2054	69,291	3.50%	4.241	293,883	0	0	0	5.23%	0	3.50%	69,533,863	3,649,909	73,477,656
2055	69,291	3.50%	4.390	304,169	0	0	0	5.23%	0	3.50%	72,906,256	3,706,811	76,917,236
2056	69,291	3.50%	4.543	314,815	0	0	0	5.23%	0	3.50%	76,442,209	3,768,057	80,525,080
2057	69,291	3.50%	4.702	325,833	0	0	0	5.23%	0	3.50%	80,149,656	3,833,856	84,309,345
2058	69,291	3.50%	4.867	337,237	0	0	0	5.23%	0	3.50%	84,036,915	3,904,430	88,278,582
2059	69,291	3.50%	5.037	349,041	0	0	0	5.23%	0	3.50%	88,112,705	3,980,011	92,441,756
2060	69,291	3.50%	5.214	361,257	0	0	0	5.23%	0	3.50%	92,386,171	4,060,841	96,808,269
2061	69,291	3.50%	5.396	373,901	0	0	0	5.23%	0	3.50%	96,866,900	4,147,175	101,387,976
2062	69,291	3.50%	5.585	386,988	0	0	0	5.23%	0	3.50%	101,564,945	4,239,279	106,191,212
2063	69,291	3.50%	5.780	400,532	0	0	0	5.23%	0	3.50%	106,490,845	4,337,435	111,228,812
2064	69,291	3.50%	5.983	414,551	0	0	0	5.23%	0	3.50%	111,655,651	4,441,934	116,512,136
2065	69,291	3.50%	6.192	429,060	0	0	0	5.23%	0	3.50%	117,070,950	4,553,086	122,053,096
2066	69,291	3.50%	6.409	444,077	0	0	0	5.23%	0	3.50%	122,748,891	4,671,212	127,864,180
2067	69,291	3.50%	6.633	459,620	0	0	0	5.23%	0	3.50%	128,702,212	4,796,651	133,958,483
2068	69,291	3.50%	6.865	475,707	0	0	0	5.23%	0	3.50%	134,944,270	4,929,757	140,349,733
2069	69,291	3.50%	7.106	492,356	0	0	0	5.23%	0	3.50%	141,489,067	5,070,902	147,052,325

Table 18
Tualatin Valley Water District
Source Options PV Analysis
Portland with Partners - O&M and Cost Projections

	Fixed Costs						Pump-Back		Pipeline Costs		Portland Costs		
Year	Annual O&M (2012 Dollars)	Annual Escalation Rate	Inflation Factor	Annual O&M	Power Costs	Chemicals Costs	Pump-Back	Annual Escalation Rate	Pipeline Costs	Annual Escalation Rate	Purchased Water	Portland Treatment	Total Costs
2070	69,291	3.50%	7.354	509,589	0	0	0	5.23%	0	3.50%	148,351,286	5,220,477	154,081,352
2071	69,291	3.50%	7.612	527,424	0	0	0	5.23%	0	3.50%	155,546,324	5,378,890	161,452,638
2072	69,291	3.50%	7.878	545,884	0	0	0	5.23%	0	3.50%	163,090,320	5,546,569	169,182,774
2073	69,291	3.50%	8.154	564,990	0	0	0	5.23%	0	3.50%	171,000,201	5,723,965	177,289,156
2074	69,291	3.50%	8.439	584,765	0	0	0	5.23%	0	3.50%	179,293,711	5,911,547	185,790,023
2075	69,291	3.50%	8.735	605,232	0	0	0	5.23%	0	3.50%	187,989,456	6,109,812	194,704,499
2076	69,291	3.50%	9.040	626,415	0	0	0	5.23%	0	3.50%	197,106,944	6,319,275	204,052,634
2077	69,291	3.50%	9.357	648,339	0	0	0	5.23%	0	3.50%	206,666,631	6,540,482	213,855,452
2078	69,291	3.50%	9.684	671,031	0	0	0	5.23%	0	3.50%	216,689,963	6,774,000	224,134,994
2079	69,291	3.50%	10.023	694,517	0	0	0	5.23%	0	3.50%	227,199,426	7,020,428	234,914,371
2080	69,291	3.50%	10.374	718,825	0	0	0	5.23%	0	3.50%	238,218,598	7,280,391	246,217,814
2081	69,291	3.50%	10.737	743,984	0	0	0	5.23%	0	3.50%	249,772,200	7,554,546	258,070,730
2082	69,291	3.50%	11.113	770,024	0	0	0	5.23%	0	3.50%	261,886,152	7,843,581	270,499,756
2083	69,291	3.50%	11.502	796,975	0	0	0	5.23%	0	3.50%	274,587,630	8,148,218	283,532,822
2084	69,291	3.50%	11.904	824,869	0	0	0	5.23%	0	3.50%	287,905,130	8,469,213	297,199,212
2085	69,291	3.50%	12.321	853,739	0	0	0	5.23%	0	3.50%	301,868,529	8,807,361	311,529,629
2086	69,291	3.50%	12.752	883,620	0	0	0	5.23%	0	3.50%	316,509,153	9,163,492	326,556,264
2087	69,291	3.50%	13.199	914,547	0	0	0	5.23%	0	3.50%	331,859,847	9,538,479	342,312,872
2088	69,291	3.50%	13.660	946,556	0	0	0	5.23%	0	3.50%	347,955,049	10,001,095	358,902,700
2089	69,291	3.50%	14.139	979,685	0	0	0	5.23%	0	3.50%	364,830,869	10,486,148	376,296,703
2090	69,291	3.50%	14.633	1,013,974	0	0	0	5.23%	0	3.50%	382,525,166	10,994,727	394,533,867
2091	69,291	3.50%	15.146	1,049,463	0	0	0	5.23%	0	3.50%	401,077,637	11,527,971	413,655,071
2092	69,291	3.50%	15.676	1,086,194	0	0	0	5.23%	0	3.50%	420,529,902	12,087,077	433,703,174
2093	69,291	3.50%	16.224	1,124,211	0	0	0	5.23%	0	3.50%	440,925,602	12,673,301	454,723,114
2094	69,291	3.50%	16.792	1,163,559	0	0	0	5.23%	0	3.50%	462,310,494	13,287,956	476,762,008
2095	69,291	3.50%	17.380	1,204,283	0	0	0	5.23%	0	3.50%	484,732,553	13,932,422	499,869,258
2096	69,291	3.50%	17.988	1,246,433	0	0	0	5.23%	0	3.50%	508,242,082	14,608,144	524,096,659
2097	69,291	3.50%	18.618	1,290,058	0	0	0	5.23%	0	3.50%	532,891,823	15,316,639	549,498,520
2098	69,291	3.50%	19.269	1,335,210	0	0	0	5.23%	0	3.50%	558,737,076	16,059,496	576,131,782
2099	69,291	3.50%	19.944	1,381,943	0	0	0	5.23%	0	3.50%	585,835,824	16,838,382	604,056,149
2100	69,291	3.50%	20.642	1,430,311	0	0	0	5.23%	0	3.50%	614,248,862	17,655,043	633,334,216
2101	69,291	3.50%	21.364	1,480,372	0	0	0	5.23%	0	3.50%	644,039,932	18,511,313	664,031,616
2102	69,291	3.50%	22.112	1,532,185	0	0	0	5.23%	0	3.50%	675,275,868	19,409,111	696,217,164
2103	69,291	3.50%	22.886	1,585,811	0	0	0	5.23%	0	3.50%	708,026,748	20,350,453	729,963,012
2104	69,291	3.50%	23.687	1,641,314	0	0	0	5.23%	0	3.50%	742,366,045	21,337,450	765,344,810
2105	69,291	3.50%	24.516	1,698,760	0	0	0	5.23%	0	3.50%	778,370,798	22,372,317	802,441,875
2106	69,291	3.50%	25.374	1,758,217	0	0	0	5.23%	0	3.50%	816,121,782	23,457,374	841,337,373
2107	69,291	3.50%	26.262	1,819,755	0	0	0	5.23%	0	3.50%	855,703,688	24,595,057	882,118,500
2108	69,291	3.50%	27.182	1,883,446	0	0	0	5.23%	0	3.50%	897,205,317	25,787,917	924,876,680
2109	69,291	3.50%	28.133	1,949,367	0	0	0	5.23%	0	3.50%	940,719,775	27,038,631	969,707,773
2110	69,291	3.50%	29.118	2,017,595	0	0	0	5.23%	0	3.50%	986,344,684	28,350,004	1,016,712,283
2111	69,291	3.50%	30.137	2,088,210	0	0	0	5.23%	0	3.50%	1,034,182,402	29,724,980	1,065,995,591
2112	69,291	3.50%	31.191	2,161,298	0	0	0	5.23%	0	3.50%	1,084,340,248	31,166,641	1,117,668,187

Table 15
Tualatin Valley Water District
Source Options PV Analysis
Portland without Partners - O&M and Cost Projections

	Fixed Costs						Pump-Back		Pipeline Costs		Portland Costs		
Year	Annual O&M (2012 Dollars)	Annual Escalation Rate	Inflation Factor	Annual O&M	Power Costs	Chemicals Costs	Pump-Back	Annual Escalation Rate	Pipeline Costs	Annual Escalation Rate	Purchased Water	Portland Treatment	Total Costs
2012	$0	3.50%	1.000	$0	$0	$0	$0	5.23%	$0	3.50%	$6,125,133	$0	$6,125,133
2013	0	3.50%	1.035	0	0	0	0	5.23%	0	3.50%	6,422,202	0	6,422,202
2014	0	3.50%	1.071	0	0	0	0	5.23%	0	3.50%	6,733,679	0	6,733,679
2015	0	3.50%	1.109	0	0	0	0	5.23%	0	3.50%	7,060,263	0	7,060,263
2016	0	3.50%	1.148	0	0	0	0	5.23%	0	3.50%	10,857,137	0	10,857,137
2017	0	3.50%	1.188	0	0	0	0	5.23%	0	3.50%	11,383,708	0	11,383,708
2018	0	3.50%	1.229	0	0	0	0	5.23%	0	3.50%	11,935,817	0	11,935,817
2019	0	3.50%	1.272	0	0	0	0	5.23%	0	3.50%	12,514,705	0	12,514,705
2020	0	3.50%	1.317	0	0	0	0	5.23%	0	3.50%	13,121,668	0	13,121,668
2021	0	3.50%	1.363	0	0	0	0	5.23%	0	3.50%	13,758,069	0	13,758,069
2022	0	3.50%	1.411	0	0	0	0	5.23%	0	3.50%	14,425,335	2,917,634	17,342,969
2023	0	3.50%	1.460	0	0	0	0	5.23%	0	3.50%	15,124,964	3,104,287	18,229,250
2024	0	3.50%	1.511	0	0	0	0	5.23%	0	3.50%	15,858,525	3,092,770	18,951,294
2025	0	3.50%	1.564	0	0	0	0	5.23%	0	3.50%	16,627,663	3,082,211	19,709,874
2026	69,291	3.50%	1.619	112,162	0	0	0	5.23%	0	3.50%	19,498,647	3,430,155	23,040,964
2027	69,291	3.50%	1.675	116,087	0	0	0	5.23%	0	5.16%	20,444,332	3,420,665	23,981,084
2028	69,291	3.50%	1.734	120,150	0	0	0	5.23%	0	5.17%	21,435,882	3,412,409	24,968,441
2029	69,291	3.50%	1.795	124,356	0	0	0	5.23%	0	5.14%	22,475,522	3,405,446	26,005,323
2030	69,291	3.50%	1.857	128,708	0	0	0	5.23%	0	5.11%	23,565,585	3,399,838	27,094,131
2031	69,291	3.50%	1.923	133,213	0	0	0	5.23%	0	5.09%	24,708,516	3,395,651	28,237,380
2032	69,291	3.50%	1.990	137,875	0	0	0	5.23%	0	5.06%	25,906,879	3,392,955	29,437,709
2033	69,291	3.50%	2.059	142,701	0	0	0	5.23%	0	5.04%	27,163,362	3,391,822	30,697,885
2034	69,291	3.50%	2.132	147,696	0	0	0	5.23%	0	5.02%	28,480,785	3,392,326	32,020,807
2035	69,291	3.50%	2.206	152,865	0	0	0	5.23%	0	5.00%	29,862,103	3,394,549	33,409,517
2036	69,291	3.50%	2.283	158,215	0	0	0	5.23%	0	5.02%	34,316,222	3,718,381	38,192,818
2037	69,291	3.50%	2.363	163,753	0	0	0	5.23%	0	4.86%	35,980,558	3,724,850	39,869,161
2038	69,291	3.50%	2.446	169,484	0	0	0	5.23%	0	4.88%	37,725,616	3,733,485	41,628,584
2039	69,291	3.50%	2.532	175,416	0	0	0	5.23%	0	4.86%	39,555,308	3,744,391	43,475,115
2040	69,291	3.50%	2.620	181,555	0	0	0	5.23%	0	4.84%	41,473,740	3,757,679	45,412,975
2041	69,291	3.50%	2.712	187,910	0	0	0	5.23%	0	4.83%	43,485,217	3,773,464	47,446,591
2042	69,291	3.50%	2.807	194,487	0	0	0	5.23%	0	4.81%	45,594,250	3,791,868	49,580,604
2043	69,291	3.50%	2.905	201,294	0	0	0	5.23%	0	4.79%	47,805,571	3,813,016	51,819,881
2044	69,291	3.50%	3.007	208,339	0	0	0	5.23%	0	4.78%	50,124,141	3,837,043	54,169,524
2045	69,291	3.50%	3.112	215,631	0	0	0	5.23%	0	4.76%	52,555,162	3,864,088	56,634,881
2046	69,291	3.50%	3.221	223,178	0	0	0	5.23%	0	4.80%	57,237,375	4,041,918	61,502,471
2047	69,291	3.50%	3.334	230,989	0	0	0	5.23%	0	4.57%	60,013,388	4,076,716	64,321,093
2048	69,291	3.50%	3.450	239,074	0	0	0	5.23%	0	4.62%	62,924,037	4,115,125	67,278,236
2049	69,291	3.50%	3.571	247,442	0	0	0	5.23%	0	4.61%	65,975,853	4,157,320	70,380,614
2050	69,291	3.50%	3.696	256,102	0	0	0	5.23%	0	4.59%	69,175,682	4,203,484	73,635,267
2051	69,291	3.50%	3.825	265,066	0	0	0	5.23%	0	3.51%	72,530,702	4,253,809	77,049,577
2052	69,291	3.50%	3.959	274,343	0	0	0	5.23%	0	3.51%	76,048,441	4,308,499	80,631,283
2053	69,291	3.50%	4.098	283,945	0	0	0	5.23%	0	3.51%	79,736,791	4,367,763	84,388,499
2054	69,291	3.50%	4.241	293,883	0	0	0	5.23%	0	3.51%	83,604,025	4,431,825	88,329,733
2055	69,291	3.50%	4.390	304,169	0	0	0	5.23%	0	3.51%	87,658,820	4,500,917	92,463,906
2056	69,291	3.50%	4.543	314,815	0	0	0	5.23%	0	3.51%	91,910,273	4,575,283	96,800,371
2057	69,291	3.50%	4.702	325,833	0	0	0	5.23%	0	3.51%	96,367,921	4,655,178	101,348,933
2058	69,291	3.50%	4.867	337,237	0	0	0	5.23%	0	3.51%	101,041,765	4,740,872	106,119,875
2059	69,291	3.50%	5.037	349,041	0	0	0	5.23%	0	3.51%	105,942,291	4,832,644	111,123,976
2060	69,291	3.50%	5.214	361,257	0	0	0	5.23%	0	3.51%	111,080,492	4,930,790	116,372,539
2061	69,291	3.50%	5.396	373,901	0	0	0	5.23%	0	3.51%	116,467,896	5,035,619	121,877,416
2062	69,291	3.50%	5.585	386,988	0	0	0	5.23%	0	3.51%	122,116,589	5,147,455	127,651,032
2063	69,291	3.50%	5.780	400,532	0	0	0	5.23%	0	3.51%	128,039,244	5,266,639	133,706,414
2064	69,291	3.50%	5.983	414,551	0	0	0	5.23%	0	3.51%	134,249,147	5,393,525	140,057,223
2065	69,291	3.50%	6.192	429,060	0	0	0	5.23%	0	3.51%	140,760,231	5,528,489	146,717,779
2066	69,291	3.50%	6.409	444,077	0	0	0	5.23%	0	3.51%	147,587,102	5,671,921	153,703,100
2067	69,291	3.50%	6.633	459,620	0	0	0	5.23%	0	3.51%	154,745,076	5,824,232	161,028,928
2068	69,291	3.50%	6.865	475,707	0	0	0	5.23%	0	3.51%	162,250,212	5,985,853	168,711,772
2069	69,291	3.50%	7.106	492,356	0	0	0	5.23%	0	3.51%	170,119,348	6,157,236	176,768,940

Table 15
Tualatin Valley Water District
Source Options PV Analysis
Portland without Partners - O&M and Cost Projections

	Fixed Costs						Pump-Back		Pipeline Costs		Portland Costs		
Year	Annual O&M (2012 Dollars)	Annual Escalation Rate	Inflation Factor	Annual O&M	Power Costs	Chemicals Costs	Pump-Back	Annual Escalation Rate	Pipeline Costs	Annual Escalation Rate	Purchased Water	Portland Treatment	Total Costs
2070	69,291	3.50%	7.354	509,589	0	0	0	5.23%	0	3.51%	178,370,136	6,338,854	185,218,579
2071	69,291	3.50%	7.612	527,424	0	0	0	5.23%	0	3.51%	187,021,088	6,531,203	194,079,715
2072	69,291	3.50%	7.878	545,884	0	0	0	5.23%	0	3.51%	196,091,610	6,734,805	203,372,299
2073	69,291	3.50%	8.154	564,990	0	0	0	5.23%	0	3.51%	205,602,053	6,950,203	213,117,247
2074	69,291	3.50%	8.439	584,765	0	0	0	5.23%	0	3.51%	215,573,753	7,177,972	223,336,490
2075	69,291	3.50%	8.735	605,232	0	0	0	5.23%	0	3.51%	226,029,080	7,418,710	234,053,022
2076	69,291	3.50%	9.040	626,415	0	0	0	5.23%	0	3.51%	236,991,490	7,673,047	245,290,952
2077	69,291	3.50%	9.357	648,339	0	0	0	5.23%	0	3.51%	248,485,578	7,941,642	257,075,559
2078	69,291	3.50%	9.684	671,031	0	0	0	5.23%	0	3.51%	260,537,128	8,225,186	269,433,346
2079	69,291	3.50%	10.023	694,517	0	0	0	5.23%	0	3.51%	273,173,179	8,524,406	282,392,102
2080	69,291	3.50%	10.374	718,825	0	0	0	5.23%	0	3.51%	286,422,078	8,840,061	295,980,964
2081	69,291	3.50%	10.737	743,984	0	0	0	5.23%	0	3.51%	300,313,549	9,172,948	310,230,481
2082	69,291	3.50%	11.113	770,024	0	0	0	5.23%	0	3.51%	314,878,756	9,523,902	325,172,682
2083	69,291	3.50%	11.502	796,975	0	0	0	5.23%	0	3.51%	330,150,376	9,893,801	340,841,152
2084	69,291	3.50%	11.904	824,869	0	0	0	5.23%	0	3.51%	346,162,669	10,283,563	357,271,101
2085	69,291	3.50%	12.321	853,739	0	0	0	5.23%	0	3.51%	362,951,558	10,694,152	374,499,449
2086	69,291	3.50%	12.752	883,620	0	0	0	5.23%	0	3.51%	380,554,709	11,126,576	392,564,905
2087	69,291	3.50%	13.199	914,547	0	0	0	5.23%	0	3.51%	399,011,612	11,581,897	411,508,056
2088	69,291	3.50%	13.660	946,556	0	0	0	5.23%	0	3.51%	418,363,676	12,143,619	431,453,850
2089	69,291	3.50%	14.139	979,685	0	0	0	5.23%	0	3.51%	438,654,314	12,732,584	452,366,583
2090	69,291	3.50%	14.633	1,013,974	0	0	0	5.23%	0	3.51%	459,929,048	13,350,114	474,293,137
2091	69,291	3.50%	15.146	1,049,463	0	0	0	5.23%	0	3.51%	482,235,607	13,997,595	497,282,665
2092	69,291	3.50%	15.676	1,086,194	0	0	0	5.23%	0	3.51%	505,624,034	14,676,478	521,386,707
2093	69,291	3.50%	16.224	1,124,211	0	0	0	5.23%	0	3.51%	530,146,800	15,388,288	546,659,298
2094	69,291	3.50%	16.792	1,163,559	0	0	0	5.23%	0	3.51%	555,858,919	16,134,620	573,157,098
2095	69,291	3.50%	17.380	1,204,283	0	0	0	5.23%	0	3.51%	582,818,077	16,917,149	600,939,509
2096	69,291	3.50%	17.988	1,246,433	0	0	0	5.23%	0	3.51%	611,084,754	17,737,630	630,068,817
2097	69,291	3.50%	18.618	1,290,058	0	0	0	5.23%	0	3.51%	640,722,364	18,597,905	660,610,328
2098	69,291	3.50%	19.269	1,335,210	0	0	0	5.23%	0	3.51%	671,797,399	19,499,904	692,632,513
2099	69,291	3.50%	19.944	1,381,943	0	0	0	5.23%	0	3.51%	704,379,573	20,445,649	726,207,165
2100	69,291	3.50%	20.642	1,430,311	0	0	0	5.23%	0	3.51%	738,541,982	21,437,263	761,409,556
2101	69,291	3.50%	21.364	1,480,372	0	0	0	5.23%	0	3.51%	774,361,268	22,476,970	798,318,610
2102	69,291	3.50%	22.112	1,532,185	0	0	0	5.23%	0	3.51%	811,917,790	23,567,103	837,017,078
2103	69,291	3.50%	22.886	1,585,811	0	0	0	5.23%	0	3.51%	851,295,802	24,710,108	877,591,721
2104	69,291	3.50%	23.687	1,641,314	0	0	0	5.23%	0	3.51%	892,583,649	25,908,548	920,133,511
2105	69,291	3.50%	24.516	1,698,760	0	0	0	5.23%	0	3.51%	935,873,956	27,165,113	964,737,829
2106	69,291	3.50%	25.374	1,758,217	0	0	0	5.23%	0	3.51%	981,263,843	28,482,621	1,011,504,680
2107	69,291	3.50%	26.262	1,819,755	0	0	0	5.23%	0	3.51%	1,028,855,139	29,864,028	1,060,538,922
2108	69,291	3.50%	27.182	1,883,446	0	0	0	5.23%	0	3.51%	1,078,754,613	31,312,433	1,111,950,493
2109	69,291	3.50%	28.133	1,949,367	0	0	0	5.23%	0	3.51%	1,131,074,212	32,831,086	1,165,854,665
2110	69,291	3.50%	29.118	2,017,595	0	0	0	5.23%	0	3.51%	1,185,931,311	34,423,394	1,222,372,300
2111	69,291	3.50%	30.137	2,088,210	0	0	0	5.23%	0	3.51%	1,243,448,980	36,092,929	1,281,630,119
2112	69,291	3.50%	31.191	2,161,298	0	0	0	5.23%	0	3.51%	1,303,756,255	37,843,436	1,343,760,989

Table 24
Tualatin Valley Water District
Source Options PV Analysis
Northern Groundwater - O&M and Cost Projections

	Fixed Costs						Pump-Back		Pipeline Costs		Portland Costs		
Year	Annual O&M (2012 Dollars)	Annual Escalation Rate	Inflation Factor	Annual O&M	Power Costs	Chemicals Costs	Pump-Back	Annual Escalation Rate	Pipeline Costs	Annual Escalation Rate	Purchased Water	Portland Treatment	Total Costs
2012	$0	3.50%	1.000	$0	$0	$0	$0	5.23%	$0	3.50%	$6,125,133	$0	$6,125,134
2013	0	3.50%	1.035	0	0	0	0	5.23%	0	3.50%	6,422,202	0	6,422,203
2014	0	3.50%	1.071	0	0	0	0	5.23%	0	3.50%	6,733,679	0	6,733,679
2015	0	3.50%	1.109	0	0	0	0	5.23%	0	3.50%	7,060,263	0	7,060,263
2016	0	3.50%	1.148	0	0	0	0	5.23%	0	3.50%	10,857,137	0	10,857,137
2017	0	3.50%	1.188	0	0	0	0	5.23%	0	3.50%	11,383,708	0	11,383,708
2018	0	3.50%	1.229	0	0	0	0	5.23%	0	3.50%	11,935,817	0	11,935,818
2019	0	3.50%	1.272	0	0	0	0	5.23%	0	3.50%	12,514,705	0	12,514,705
2020	0	3.50%	1.317	0	0	0	0	5.23%	0	3.50%	13,121,668	0	13,121,668
2021	0	3.50%	1.363	0	0	0	0	5.23%	0	3.50%	13,758,069	0	13,758,069
2022	0	3.50%	1.411	0	0	0	0	5.23%	0	3.50%	14,425,335	2,917,634	17,342,969
2023	0	3.50%	1.460	0	0	0	0	5.23%	0	3.50%	15,124,964	3,104,287	18,229,251
2024	0	3.50%	1.511	0	0	0	0	5.23%	0	3.50%	15,858,525	3,092,770	18,951,295
2025	0	3.50%	1.564	0	0	0	0	5.23%	0	3.50%	16,627,663	3,082,211	19,709,874
2026	2,112,089	3.50%	1.619	3,418,827	3,002,977	614,244	0	5.23%	0	3.50%	6,957,085	1,235,672	15,228,806
2027	2,112,089	3.50%	1.675	3,538,486	3,210,902	645,958	0	5.23%	0	3.50%	7,294,504	1,232,254	15,922,104
2028	2,112,089	3.50%	1.734	3,662,333	3,433,296	679,323	0	5.23%	0	3.50%	7,648,287	1,229,280	16,652,520
2029	2,112,089	3.50%	1.795	3,790,515	3,670,174	714,233	0	5.23%	0	3.50%	8,019,229	1,226,771	17,420,922
2030	2,112,089	3.50%	1.857	3,923,183	3,922,442	750,754	0	5.23%	0	3.50%	8,408,162	1,224,751	18,229,292
2031	2,143,947	3.50%	1.923	4,121,742	4,191,061	788,957	0	5.23%	0	3.50%	8,815,958	1,223,243	19,140,960
2032	2,143,947	3.50%	1.990	4,266,003	4,477,053	828,914	0	5.23%	0	3.50%	9,243,532	1,222,272	20,037,773
2033	2,143,947	3.50%	2.059	4,415,313	4,781,501	870,702	0	5.23%	0	3.50%	9,691,843	1,221,863	20,981,221
2034	2,143,947	3.50%	2.132	4,569,849	5,105,551	914,399	0	5.23%	0	3.50%	10,161,897	1,222,045	21,973,741
2035	2,143,947	3.50%	2.206	4,729,793	5,450,423	960,089	0	5.23%	0	3.50%	10,654,749	1,222,846	23,017,901
2036	2,143,947	3.50%	2.283	4,895,336	5,819,763	1,008,264	0	5.23%	0	3.50%	12,259,949	1,342,897	25,326,209
2037	2,167,557	3.50%	2.363	5,122,467	6,204,577	1,057,229	0	5.23%	0	3.50%	12,854,557	1,345,233	26,584,064
2038	2,167,557	3.50%	2.446	5,301,753	6,616,337	1,108,824	0	5.23%	0	3.50%	13,478,003	1,348,352	27,853,268
2039	2,167,557	3.50%	2.532	5,487,315	7,054,200	1,162,735	0	5.23%	0	3.50%	14,131,686	1,352,291	29,188,226
2040	2,167,557	3.50%	2.620	5,679,371	7,519,772	1,219,062	0	5.23%	0	3.50%	14,817,072	1,357,090	30,592,366
2041	2,167,557	3.50%	2.712	5,878,149	8,014,753	1,277,907	0	5.23%	0	3.50%	15,535,700	1,362,790	32,069,299
2042	2,167,557	3.50%	2.807	6,083,884	8,540,947	1,339,377	0	5.23%	0	3.50%	16,289,182	1,369,437	33,622,827
2043	2,167,557	3.50%	2.905	6,296,820	9,100,265	1,403,586	0	5.23%	0	3.50%	17,079,207	1,377,075	35,256,953
2044	2,167,557	3.50%	3.007	6,517,209	9,694,732	1,470,648	0	5.23%	0	3.50%	17,907,549	1,385,752	36,975,890
2045	2,184,000	3.50%	3.112	6,796,482	10,326,497	1,540,685	0	5.23%	0	3.50%	18,776,065	1,395,519	38,835,249
2046	2,184,000	3.50%	3.221	7,034,359	11,003,767	1,614,694	0	5.23%	0	3.50%	20,477,130	1,462,561	41,592,510
2047	2,184,000	3.50%	3.334	7,280,562	11,699,624	1,688,530	0	5.23%	0	3.50%	21,470,270	1,475,153	43,614,139
2048	2,184,000	3.50%	3.450	7,535,382	12,444,747	1,766,489	0	5.23%	0	3.50%	22,511,578	1,489,051	45,747,247
2049	2,184,000	3.50%	3.571	7,799,120	13,235,817	1,847,837	0	5.23%	0	3.50%	23,603,390	1,504,319	47,990,483
2050	2,184,000	3.50%	3.696	8,072,089	14,075,602	1,932,715	0	5.23%	0	3.50%	24,748,154	1,521,023	50,349,583
2051	2,184,000	3.50%	3.825	8,354,612	14,813,673	2,000,560	0	5.23%	0	3.50%	25,948,440	1,539,233	52,656,519
2052	2,184,000	3.50%	3.959	8,647,024	15,590,447	2,070,787	0	5.23%	0	3.50%	27,206,939	1,559,023	55,074,219
2053	2,184,000	3.50%	4.098	8,949,670	16,407,951	2,143,479	0	5.23%	0	3.50%	28,526,476	1,580,467	57,608,042
2054	2,184,000	3.50%	4.241	9,262,908	17,268,322	2,218,722	0	5.23%	0	3.50%	29,910,010	1,603,648	60,263,610
2055	2,184,000	3.50%	4.390	9,587,110	18,173,808	2,296,607	0	5.23%	0	3.50%	31,360,645	1,628,649	63,046,819
2056	2,184,000	3.50%	4.543	9,922,659	19,126,774	2,377,226	0	5.23%	0	3.50%	32,881,637	1,655,558	65,963,853
2057	2,184,000	3.50%	4.702	10,269,952	20,129,710	2,460,675	0	5.23%	0	3.50%	34,476,396	1,684,468	69,021,200
2058	2,184,000	3.50%	4.867	10,629,400	21,185,236	2,547,053	0	5.23%	0	3.50%	36,148,501	1,715,476	72,225,666
2059	2,184,000	3.50%	5.037	11,001,429	22,296,110	2,636,464	0	5.23%	0	3.50%	37,901,703	1,748,684	75,584,390
2060	2,184,000	3.50%	5.214	11,386,479	23,465,234	2,729,013	0	5.23%	0	3.50%	39,739,936	1,784,198	79,104,860
2061	2,184,000	3.50%	5.396	11,785,006	24,695,663	2,824,811	0	5.23%	0	3.50%	41,667,323	1,822,130	82,794,932
2062	2,184,000	3.50%	5.585	12,197,481	25,990,610	2,923,972	0	5.23%	0	3.50%	43,688,188	1,862,598	86,662,848
2063	2,184,000	3.50%	5.780	12,624,393	27,353,460	3,026,613	0	5.23%	0	3.50%	45,807,065	1,905,724	90,717,255
2064	2,184,000	3.50%	5.983	13,066,246	28,787,772	3,132,858	0	5.23%	0	3.50%	48,028,708	1,951,637	94,967,222
2065	2,184,000	3.50%	6.192	13,523,565	30,297,295	3,242,832	0	5.23%	0	3.50%	50,358,100	2,000,474	99,422,266
2066	2,184,000	3.50%	6.409	13,996,890	31,885,971	3,356,667	0	5.23%	0	3.50%	52,800,468	2,052,374	104,092,370
2067	2,184,000	3.50%	6.633	14,486,781	33,557,951	3,474,498	0	5.23%	0	3.50%	55,361,291	2,107,488	108,988,008
2068	2,184,000	3.50%	6.865	14,993,818	35,317,603	3,596,465	0	5.23%	0	3.50%	58,046,313	2,165,970	114,120,170
2069	2,184,000	3.50%	7.106	15,518,602	37,169,525	3,722,713	0	5.23%	0	3.50%	60,861,560	2,227,985	119,500,385

Table 24
Tualatin Valley Water District
Source Options PV Analysis
Northern Groundwater - O&M and Cost Projections

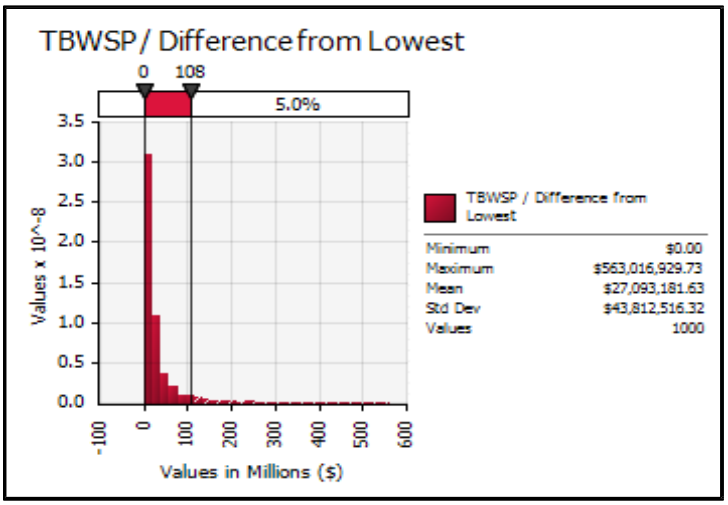
	Fixed Costs						Pump-Back		Pipeline Costs		Portland Costs		
Year	Annual O&M (2012 Dollars)	Annual Escalation Rate	Inflation Factor	Annual O&M	Power Costs	Chemicals Costs	Pump-Back	Annual Escalation Rate	Pipeline Costs	Annual Escalation Rate	Purchased Water	Portland Treatment	Total Costs
2070	2,184,000	3.50%	7.354	16,061,753	39,118,555	3,853,393	0	5.23%	0	3.50%	63,813,345	2,293,703	125,140,750
2071	2,184,000	3.50%	7.612	16,623,914	41,169,785	3,988,661	0	5.23%	0	3.50%	66,908,293	2,363,304	131,053,957
2072	2,184,000	3.50%	7.878	17,205,751	43,328,573	4,128,677	0	5.23%	0	3.50%	70,153,345	2,436,977	137,253,323
2073	2,184,000	3.50%	8.154	17,807,953	45,600,561	4,273,608	0	5.23%	0	3.50%	73,555,782	2,514,919	143,752,822
2074	2,184,000	3.50%	8.439	18,431,231	47,991,682	4,423,627	0	5.23%	0	3.50%	77,123,237	2,597,336	150,567,113
2075	2,184,000	3.50%	8.735	19,076,324	50,508,185	4,578,911	0	5.23%	0	3.50%	80,863,714	2,684,447	157,711,582
2076	2,184,000	3.50%	9.040	19,743,996	53,156,644	4,739,647	0	5.23%	0	3.50%	84,785,604	2,776,478	165,202,370
2077	2,184,000	3.50%	9.357	20,435,035	55,943,978	4,906,025	0	5.23%	0	3.50%	88,897,706	2,873,669	173,056,414
2078	2,184,000	3.50%	9.684	21,150,262	58,877,470	5,078,244	0	5.23%	0	3.50%	93,209,245	2,976,269	181,291,490
2079	2,184,000	3.50%	10.023	21,890,521	61,964,783	5,256,508	0	5.23%	0	3.50%	97,729,893	3,084,541	189,926,246
2080	2,184,000	3.50%	10.374	22,656,689	65,213,982	5,441,030	0	5.23%	0	3.50%	102,469,793	3,198,760	198,980,255
2081	2,184,000	3.50%	10.737	23,449,673	68,633,558	5,632,029	0	5.23%	0	3.50%	107,439,578	3,319,215	208,474,053
2082	2,184,000	3.50%	11.113	24,270,412	72,232,443	5,829,733	0	5.23%	0	3.50%	112,650,398	3,446,207	218,429,193
2083	2,184,000	3.50%	11.502	25,119,876	76,020,040	6,034,377	0	5.23%	0	3.50%	118,113,942	3,580,054	228,868,290
2084	2,184,000	3.50%	11.904	25,999,072	80,006,245	6,246,205	0	5.23%	0	3.50%	123,842,468	3,721,089	239,815,079
2085	2,184,000	3.50%	12.321	26,909,039	84,201,471	6,465,469	0	5.23%	0	3.50%	129,848,828	3,869,660	251,294,467
2086	2,184,000	3.50%	12.752	27,850,856	88,616,679	6,692,429	0	5.23%	0	3.50%	136,146,496	4,026,132	263,332,592
2087	2,184,000	3.50%	13.199	28,825,636	93,263,404	6,927,357	0	5.23%	0	3.50%	142,749,601	4,190,889	275,956,886
2088	2,184,000	3.50%	13.660	29,834,533	98,153,785	7,170,531	0	5.23%	0	3.50%	149,672,957	4,394,147	289,225,953
2089	2,184,000	3.50%	14.139	30,878,741	103,300,600	7,422,242	0	5.23%	0	3.50%	156,932,095	4,607,263	303,140,942
2090	2,184,000	3.50%	14.633	31,959,497	108,717,295	7,682,789	0	5.23%	0	3.50%	164,543,302	4,830,715	317,733,598
2091	2,184,000	3.50%	15.146	33,078,080	114,418,020	7,952,482	0	5.23%	0	3.50%	172,523,652	5,065,005	333,037,238
2092	2,184,000	3.50%	15.676	34,235,813	120,417,670	8,231,642	0	5.23%	0	3.50%	180,891,049	5,310,657	349,086,831
2093	2,184,000	3.50%	16.224	35,434,066	126,731,919	8,520,601	0	5.23%	0	3.50%	189,664,265	5,568,224	365,919,075
2094	2,184,000	3.50%	16.792	36,674,258	133,377,263	8,819,704	0	5.23%	0	3.50%	198,862,982	5,838,283	383,572,491
2095	2,184,000	3.50%	17.380	37,957,857	140,371,065	9,129,306	0	5.23%	0	3.50%	208,507,837	6,121,440	402,087,505
2096	2,184,000	3.50%	17.988	39,286,382	147,731,594	9,449,777	0	5.23%	0	3.50%	218,620,467	6,418,330	421,506,550
2097	2,184,000	3.50%	18.618	40,661,406	155,478,083	9,781,497	0	5.23%	0	3.50%	229,223,559	6,729,619	441,874,164
2098	2,184,000	3.50%	19.269	42,084,555	163,630,768	10,124,862	0	5.23%	0	3.50%	240,340,902	7,056,005	463,237,092
2099	2,184,000	3.50%	19.944	43,557,514	172,210,949	10,480,280	0	5.23%	0	3.50%	251,997,436	7,398,221	485,644,401
2100	2,184,000	3.50%	20.642	45,082,027	181,241,042	10,848,175	0	5.23%	0	3.50%	264,219,311	7,757,035	509,147,591
2101	2,184,000	3.50%	21.364	46,659,898	190,744,640	11,228,984	0	5.23%	0	3.50%	277,033,948	8,133,251	533,800,721
2102	2,184,000	3.50%	22.112	48,292,995	200,746,570	11,623,160	0	5.23%	0	3.50%	290,470,094	8,527,714	559,660,534
2103	2,184,000	3.50%	22.886	49,983,250	211,272,964	12,031,174	0	5.23%	0	3.50%	304,557,894	8,941,308	586,786,590
2104	2,184,000	3.50%	23.687	51,732,663	222,351,323	12,453,510	0	5.23%	0	3.50%	319,328,952	9,374,962	615,241,410
2105	2,184,000	3.50%	24.516	53,543,307	234,010,588	12,890,672	0	5.23%	0	3.50%	334,816,406	9,829,647	645,090,620
2106	2,184,000	3.50%	25.374	55,417,322	246,281,222	13,343,180	0	5.23%	0	3.50%	351,055,002	10,306,385	676,403,111
2107	2,184,000	3.50%	26.262	57,356,929	259,195,282	13,811,572	0	5.23%	0	3.50%	368,081,169	10,806,245	709,251,196
2108	2,184,000	3.50%	27.182	59,364,421	272,786,506	14,296,407	0	5.23%	0	3.50%	385,933,106	11,330,348	743,710,787
2109	2,184,000	3.50%	28.133	61,442,176	287,090,403	14,798,260	0	5.23%	0	3.50%	404,650,861	11,879,870	779,861,570
2110	2,184,000	3.50%	29.118	63,592,652	302,144,342	15,317,731	0	5.23%	0	3.50%	424,276,428	12,456,043	817,787,197
2111	2,184,000	3.50%	30.137	65,818,395	317,987,653	15,855,437	0	5.23%	0	3.50%	444,853,835	13,060,161	857,575,482
2112	2,184,000	3.50%	31.191	68,122,039	334,661,728	16,412,018	0	5.23%	0	3.50%	466,429,246	13,693,579	899,318,610

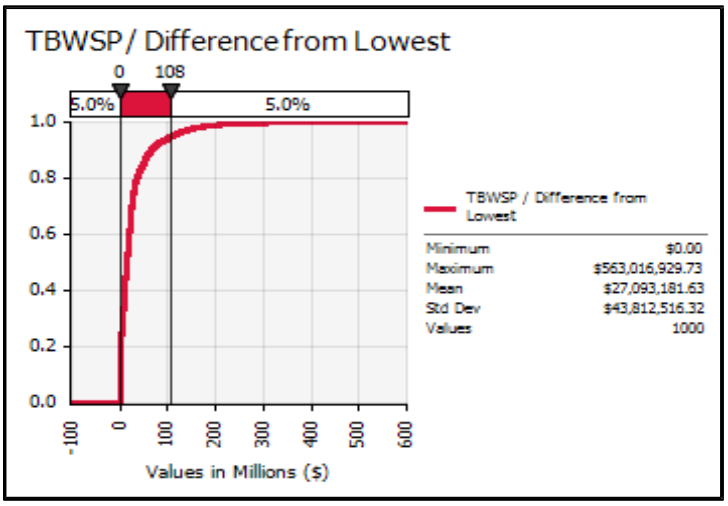
Attachment E
Monte Carlo Analysis Results

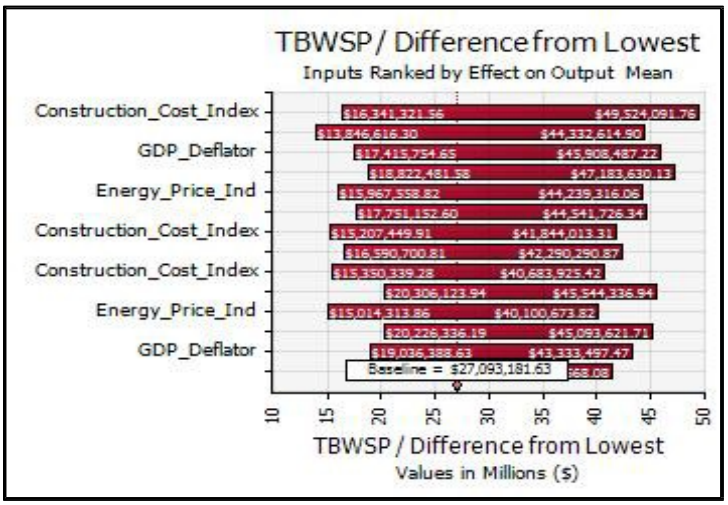
@RISK Output Report for TBWSP / Difference from Lowest

Performed By: Paul Matthews

Date: Thursday, November 08, 2012 1:04:04 PM







Workbook Name	TVWD NPV 20121026ExpValues v7-Risk-x.xlsm
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	687
Number of Outputs	18
Sampling Type	Latin Hypercube
Simulation Start Time	11/8/2012 8:44
Simulation Duration	04:09:44
Random # Generator	Mersenne Twister
Random Seed	250320905

Summary Statistics for TBWSP / Difference from Lowest

Statistics		Percentile	
Minimum	$0	**5%**	$0
Maximum	$563,016,930	**10%**	$0
Mean	$27,093,182	**15%**	$0
Std Dev	$43,812,516	**20%**	$1,053,384
Variance	1.91954E+15	**25%**	$3,729,384
Skewness	4.571600986	**30%**	$6,126,268
Kurtosis	37.11635727	**35%**	$8,148,194
Median	$14,657,965	**40%**	$10,008,134
Mode	$0	**45%**	$11,937,467
Left X	$0	**50%**	$14,657,965
Left P	5%	**55%**	$16,953,321
Right X	$107,654,067	**60%**	$19,345,977
Right P	95%	**65%**	$21,780,204
Diff X	$107,654,067	**70%**	$24,600,461
Diff P	90%	**75%**	$28,430,856
#Errors	0	**80%**	$35,646,721
Filter Min	Off	**85%**	$48,417,459
Filter Max	Off	**90%**	$66,166,754
#Filtered	0	**95%**	$107,654,067

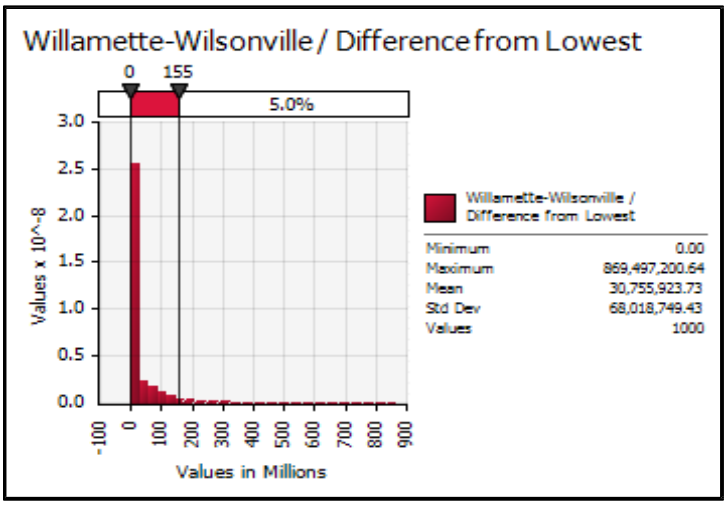
Change in Output Statistic for TBWSP / Difference from Lo

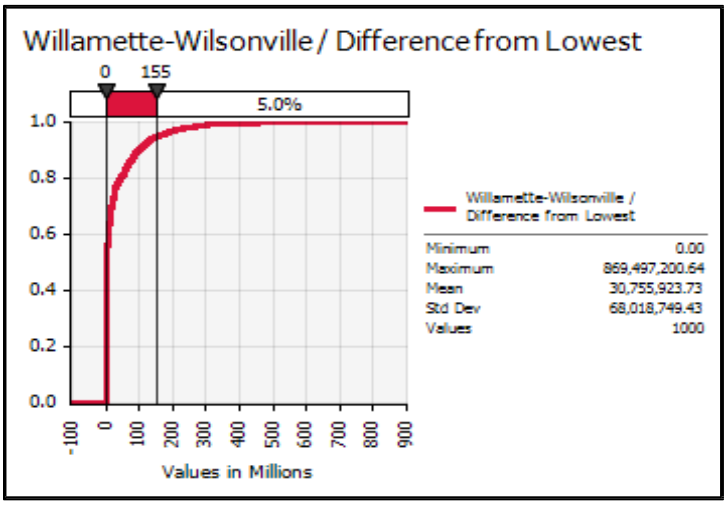
Rank	Name	Lower	Upper
1	Construction_Cost_Index	$16,341,322	$49,524,092
2	GDP_Deflator	$13,846,616	$44,332,615
3	GDP_Deflator	$17,415,755	$45,908,487
4	Energy_Price_Ind	$18,822,482	$47,183,630
5	Energy_Price_Ind	$15,967,559	$44,239,316
6	Construction_Cost_	$17,751,153	$44,541,726
7	Construction_Cost_Index	$15,207,450	$41,844,013
8	GDP_Deflator	$16,590,701	$42,290,291
9	Construction_Cost_	$15,350,339	$40,683,925
10	Energy_Price_Ind	$20,306,124	$45,544,337
11	Energy_Price_Ind	$15,014,314	$40,100,674
12	GDP_Deflator	$20,226,336	$45,093,622
13	GDP_Deflator	$19,036,389	$43,333,497
14	Energy_Price_Ind	$17,628,979	$41,337,568

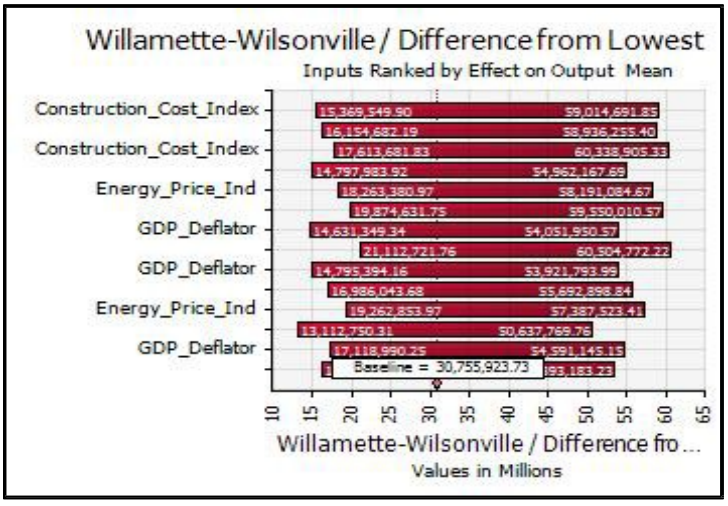
@RISK Output Report for Willamette-Wilsonville / Difference from Lowest

Performed By: Paul Matthews

Date: Thursday, November 08, 2012 1:04:09 PM







Workbook Name	TVWD NPV 20121026ExpValues v7-Risk-x.xlsm
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	687
Number of Outputs	18
Sampling Type	Latin Hypercube
Simulation Start Time	11/8/2012 8:44
Simulation Duration	04:09:44
Random # Generator	Mersenne Twister
Random Seed	250320905

Summary Statistics for Willamette-Wilsonville / Difference from Lowest

Statistics		Percentile	
Minimum	0	**5%**	0
Maximum	869,497,201	**10%**	0
Mean	30,755,924	**15%**	0
Std Dev	68,018,749	**20%**	0
Variance	4.62655E+15	**25%**	0
Skewness	4.666165326	**30%**	0
Kurtosis	38.10009873	**35%**	0
Median	1,050,329	**40%**	0
Mode	0	**45%**	0
Left X	0	**50%**	1,050,329
Left P	5%	**55%**	4,584,082
Right X	154,572,377	**60%**	7,703,104
Right P	95%	**65%**	12,914,112
Diff X	154,572,377	**70%**	17,499,890
Diff P	90%	**75%**	27,129,798
#Errors	0	**80%**	44,620,169
Filter Min	Off	**85%**	68,760,986
Filter Max	Off	**90%**	99,730,705
#Filtered	0	**95%**	154,572,377

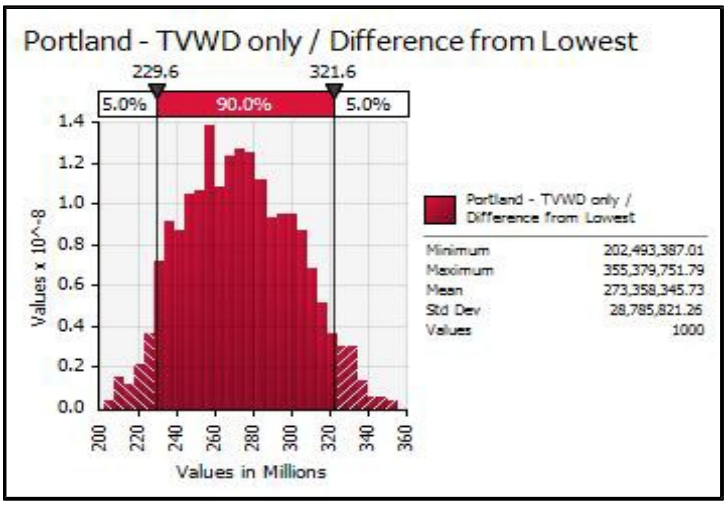
Change in Output Statistic for Willamette-Wilsonville / Diff e

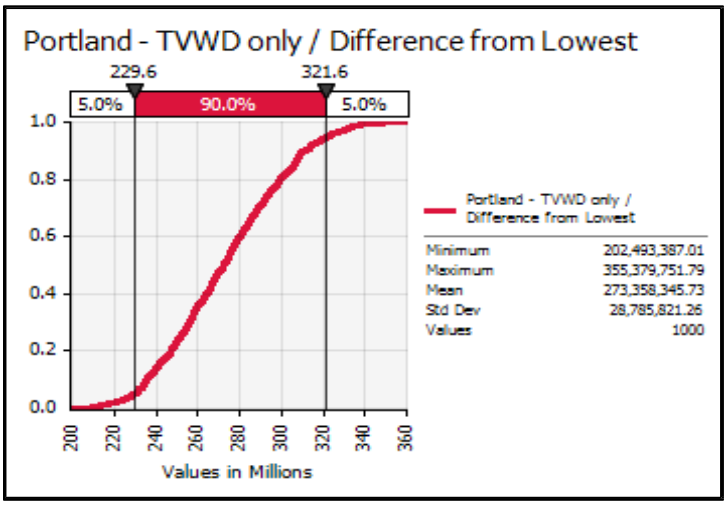
Rank	Name	Lower	Upper
1	Construction_Cost_Index	15,369,550	59,014,692
2	Energy_Price_Ind	16,154,682	58,936,255
3	Construction_Cost_	17,613,682	60,338,905
4	GDP_Deflator	14,797,984	54,962,168
5	Energy_Price_Ind	18,263,381	58,191,085
6	Energy_Price_Ind	19,874,632	59,550,011
7	GDP_Deflator	14,631,349	54,051,951
8	GDP_Deflator	21,112,722	60,504,772
9	GDP_Deflator	14,795,394	53,921,794
10	Energy_Price_Ind	16,986,044	55,692,899
11	Energy_Price_Ind	19,262,854	57,387,523
12	Energy_Price_Ind	13,112,750	50,637,770
13	GDP_Deflator	17,118,990	54,591,145
14	GDP_Deflator	16,088,100	53,393,183

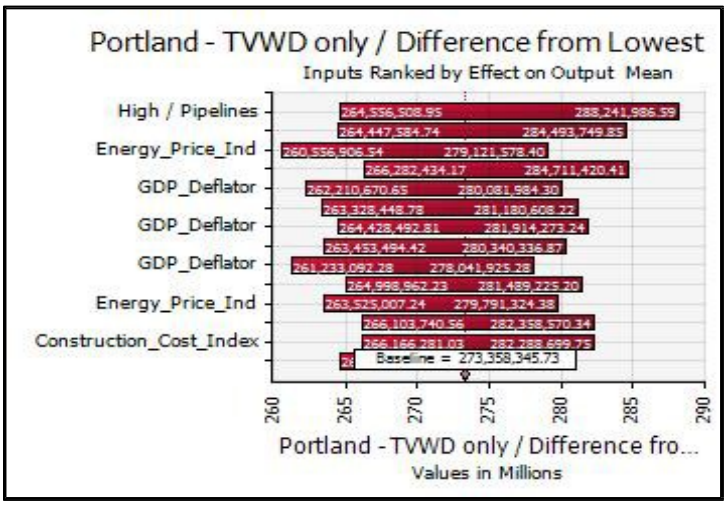
@RISK Output Report for Portland - TVWD only / Difference from Lowest

Performed By: Paul Matthews

Date: Thursday, November 08, 2012 1:04:12 PM







Workbook Name	TVWD NPV 20121026ExpValues v7-Risk-x.xlsm
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	687
Number of Outputs	18
Sampling Type	Latin Hypercube
Simulation Start Time	11/8/2012 8:44
Simulation Duration	04:09:44
Random # Generator	Mersenne Twister
Random Seed	250320905

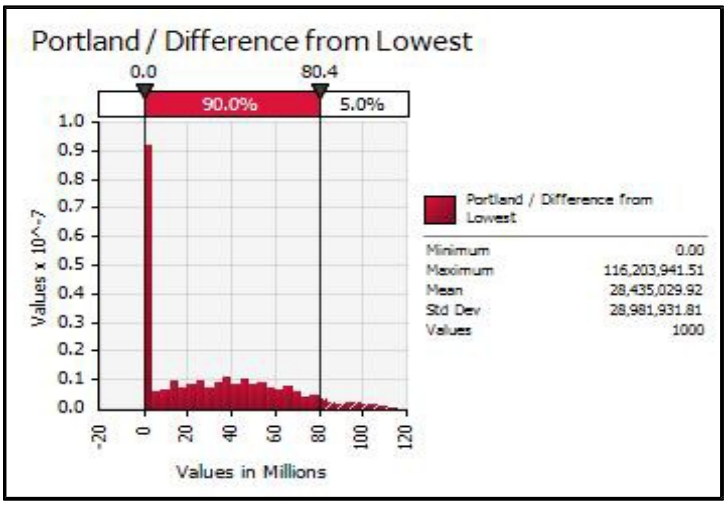
Summary Statistics for Portland - TVWD only / Difference fr			
Statistics		**Percentile**	
Minimum	202,493,387	**5%**	229,586,837
Maximum	355,379,752	**10%**	235,765,043
Mean	273,358,346	**15%**	241,472,997
Std Dev	28,785,821	**20%**	247,289,571
Variance	8.28624E+14	**25%**	251,677,402
Skewness	0.167733233	**30%**	255,943,357
Kurtosis	2.458759521	**35%**	259,631,477
Median	272,442,271	**40%**	264,055,979
Mode	257,779,263	**45%**	268,153,432
Left X	229,586,837	**50%**	272,442,271
Left P	5%	**55%**	276,158,293
Right X	321,603,767	**60%**	279,987,754
Right P	95%	**65%**	284,662,146
Diff X	92,016,930	**70%**	288,946,125
Diff P	90%	**75%**	293,994,332
#Errors	0	**80%**	299,345,473
Filter Min	Off	**85%**	306,193,981
Filter Max	Off	**90%**	310,706,280
#Filtered	0	**95%**	321,603,767

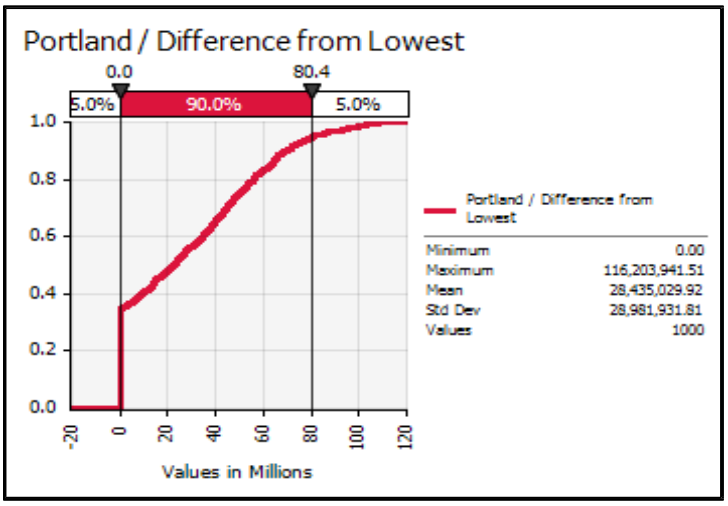
Change in Output Statistic for Portland - TVWD only / Differ			ence from Lo
Rank	**Name**	**Lower**	**Upper**
1	High / Pipelines	264,556,509	288,241,987
2	High / Pipelines	264,447,585	284,493,750
3	Energy_Price_Ind	260,556,907	279,121,578
4	High / Pipelines	266,282,434	284,711,420
5	GDP_Deflator	262,210,671	280,081,984
6	Energy_Price_Ind	263,328,449	281,180,608
7	GDP_Deflator	264,428,493	281,914,273
8	Construction_Cost_Index	263,453,494	280,340,337
9	GDP_Deflator	261,233,092	278,041,925
10	Construction_Cost_	264,998,962	281,489,225
11	Energy_Price_Ind	263,525,007	279,791,324
12	GDP_Deflator	266,103,741	282,358,570
13	Construction_Cost_Index	266,166,281	282,288,700
14	Energy_Price_Ind	264,561,449	280,530,985

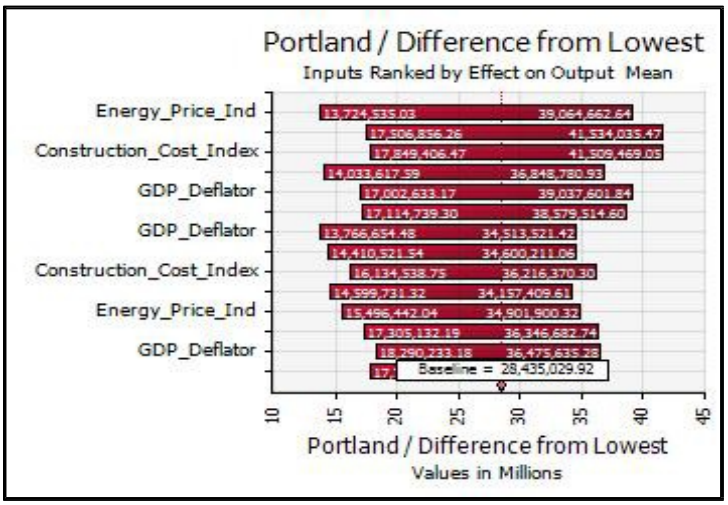
@RISK Output Report for Portland / Difference from Lowest

Performed By: Paul Matthews

Date: Thursday, November 08, 2012 1:04:14 PM







Workbook Name	TVWD NPV 20121026ExpValues v7-Risk-x.xlsm
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	687
Number of Outputs	18
Sampling Type	Latin Hypercube
Simulation Start Time	11/8/2012 8:44
Simulation Duration	04:09:44
Random # Generator	Mersenne Twister
Random Seed	250320905

Summary Statistics for Portland / Difference from Lowest

Statistics		Percentile	
Minimum	0	**5%**	0
Maximum	116,203,942	**10%**	0
Mean	28,435,030	**15%**	0
Std Dev	28,981,932	**20%**	0
Variance	8.39952E+14	**25%**	0
Skewness	0.694576051	**30%**	0
Kurtosis	2.454240342	**35%**	1,213,546
Median	22,580,400	**40%**	9,160,966
Mode	0	**45%**	15,150,047
Left X	0	**50%**	22,580,400
Left P	5%	**55%**	27,766,944
Right X	80,446,915	**60%**	34,814,466
Right P	95%	**65%**	39,595,146
Diff X	80,446,915	**70%**	44,847,116
Diff P	90%	**75%**	50,318,894
#Errors	0	**80%**	55,896,605
Filter Min	Off	**85%**	63,047,077
Filter Max	Off	**90%**	69,772,083
#Filtered	0	**95%**	80,446,915

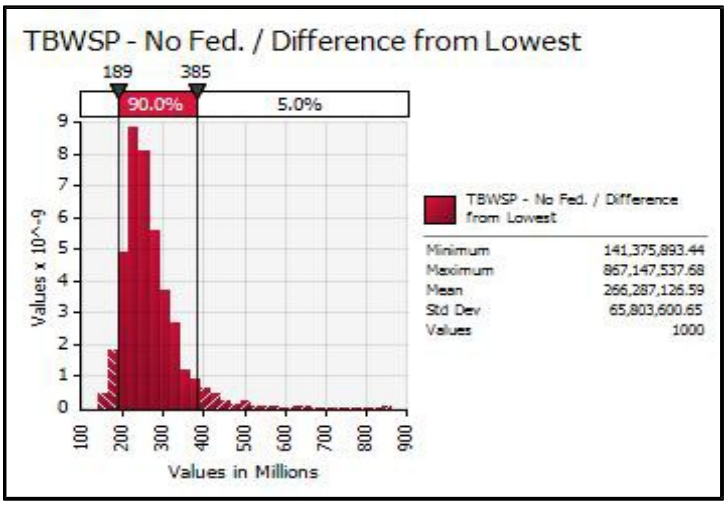
Change in Output Statistic for Portland / Difference from Lowest

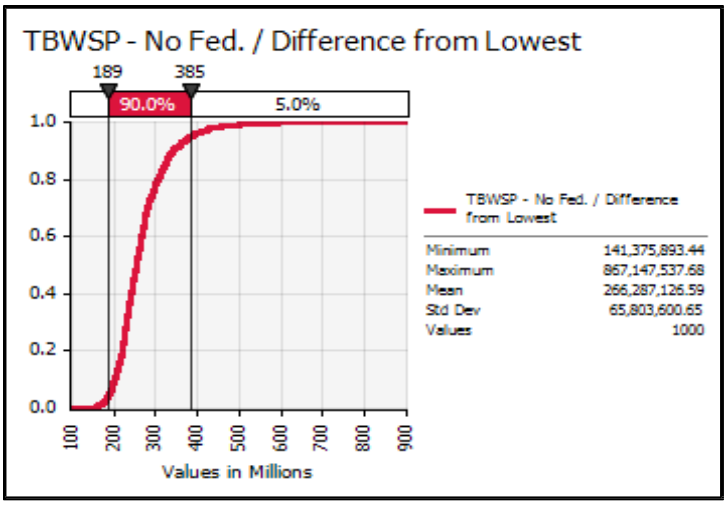
Rank	Name	Lower	Upper
1	Energy_Price_Ind	13,724,535	39,064,663
2	Construction_Cost_Index	17,506,856	41,534,035
3	Construction_Cost_	17,849,406	41,509,469
4	GDP_Deflator	14,033,618	36,848,781
5	GDP_Deflator	17,002,633	39,037,602
6	Energy_Price_Ind	17,114,739	38,579,515
7	GDP_Deflator	13,766,654	34,513,521
8	Energy_Price_Ind	14,410,522	34,600,211
9	Construction_Cost_Index	16,134,539	36,216,370
10	Energy_Price_Ind	14,599,731	34,157,410
11	Energy_Price_Ind	15,496,442	34,901,900
12	Energy_Price_Ind	17,305,132	36,346,683
13	GDP_Deflator	18,290,233	36,475,635
14	Energy_Price_Ind	17,776,421	35,391,917

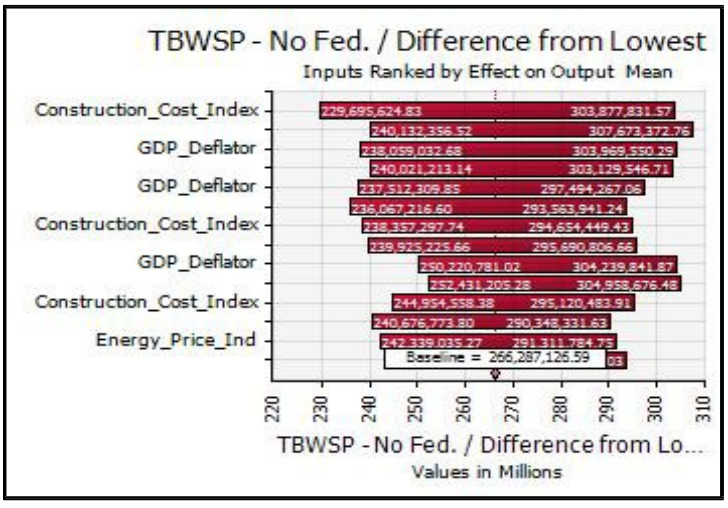
@RISK Output Report for TBWSP - No Fed. / Difference from Lowest

Performed By: Paul Matthews

Date: Thursday, November 08, 2012 1:04:18 PM







Workbook Name	TVWD NPV 20121026ExpValues v7-Risk-x.xlsm
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	687
Number of Outputs	18
Sampling Type	Latin Hypercube
Simulation Start Time	11/8/2012 8:44
Simulation Duration	04:09:44
Random # Generator	Mersenne Twister
Random Seed	250320905

Summary Statistics for TBWSP - No Fed. / Difference from Lowest

Statistics		Percentile	
Minimum	141,375,893	**5%**	189,115,048
Maximum	867,147,538	**10%**	200,845,274
Mean	266,287,127	**15%**	211,878,940
Std Dev	65,803,601	**20%**	219,514,417
Variance	4.33011E+15	**25%**	225,203,947
Skewness	2.180881763	**30%**	229,771,102
Kurtosis	13.48759345	**35%**	235,401,849
Median	254,063,379	**40%**	241,486,190
Mode	230,068,553	**45%**	246,792,638
Left X	189,115,048	**50%**	254,063,379
Left P	5%	**55%**	260,691,614
Right X	385,145,149	**60%**	266,375,262
Right P	95%	**65%**	272,503,703
Diff X	196,030,102	**70%**	280,367,730
Diff P	90%	**75%**	293,501,995
#Errors	0	**80%**	304,937,022
Filter Min	Off	**85%**	321,892,921
Filter Max	Off	**90%**	341,354,574
#Filtered	0	**95%**	385,145,149

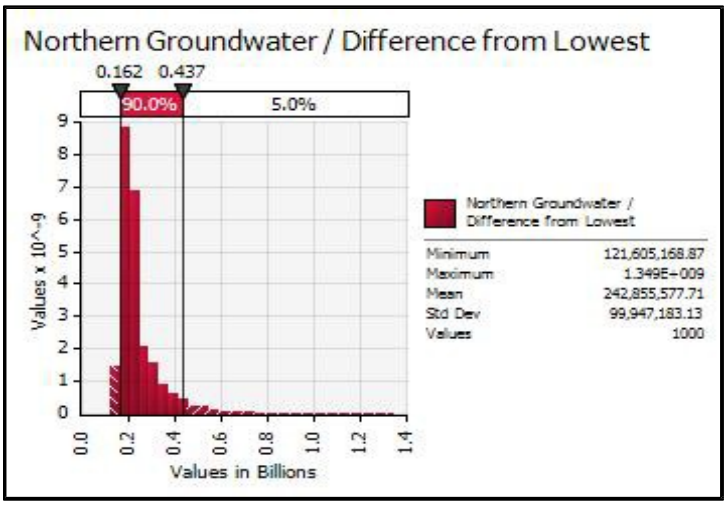
Change in Output Statistic for TBWSP - No Fed. / Difference

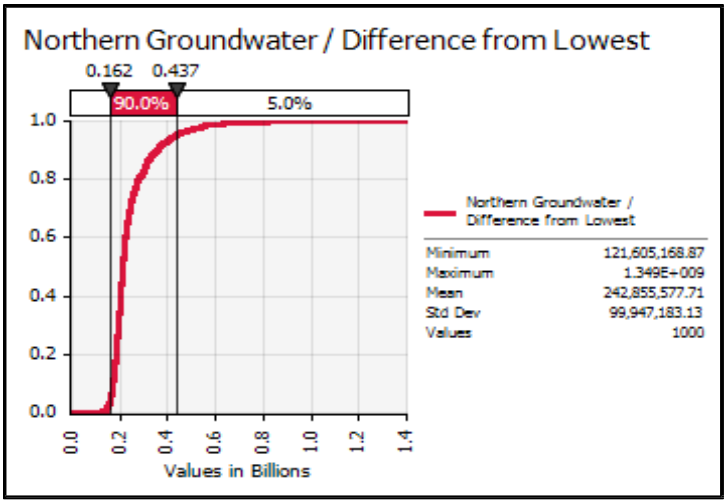
Rank	Name	Lower	Upper
1	Construction_Cost_Index	229,695,625	303,877,832
2	Construction_Cost_	240,132,357	307,673,373
3	GDP_Deflator	238,059,033	303,969,550
4	Construction_Cost_Index	240,021,213	303,129,547
5	GDP_Deflator	237,512,310	297,494,267
6	Construction_Cost_	236,067,217	293,563,941
7	Construction_Cost_Index	238,357,298	294,654,449
8	Construction_Cost_	239,925,226	295,690,807
9	GDP_Deflator	250,220,781	304,239,842
10	Energy_Price_Ind	252,431,205	304,958,676
11	Construction_Cost_Index	244,954,558	295,120,484
12	Construction_Cost_	240,676,774	290,348,332
13	Energy_Price_Ind	242,339,035	291,311,785
14	GDP_Deflator	246,039,104	293,468,880

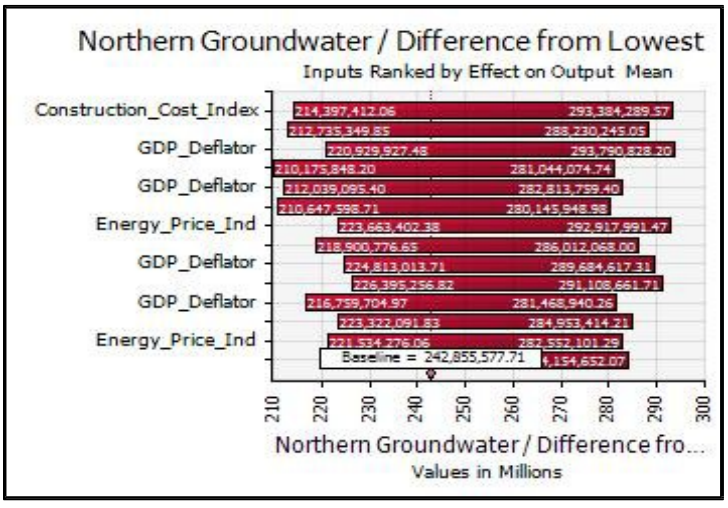
@RISK Output Report for Northern Groundwater / Difference from Lowest

Performed By: Paul Matthews

Date: Thursday, November 08, 2012 1:04:23 PM







Workbook Name	TVWD NPV 20121026ExpValues v7-Risk-x.xlsm
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	687
Number of Outputs	18
Sampling Type	Latin Hypercube
Simulation Start Time	11/8/2012 8:44
Simulation Duration	04:09:44
Random # Generator	Mersenne Twister
Random Seed	250320905

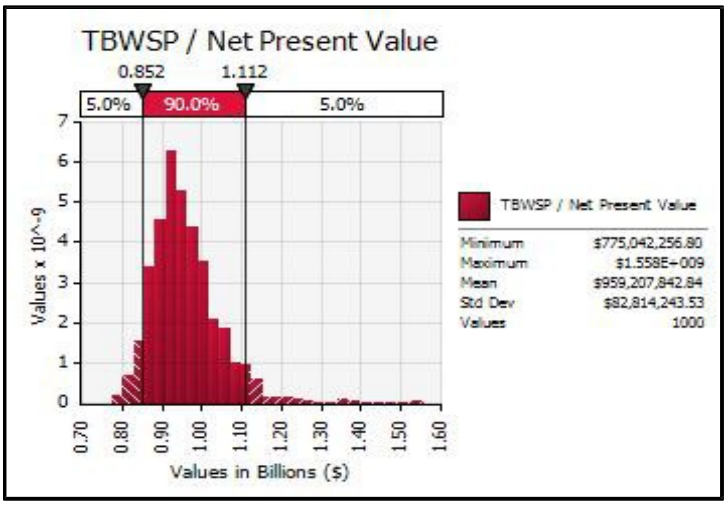
Summary Statistics for Northern Groundwater / Difference from Lowest			
Statistics		**Percentile**	
Minimum	121,605,169	**5%**	161,664,026
Maximum	1,348,780,046	**10%**	171,019,752
Mean	242,855,578	**15%**	178,596,301
Std Dev	99,947,183	**20%**	183,819,125
Variance	9.98944E+15	**25%**	188,738,340
Skewness	3.629160731	**30%**	194,521,567
Kurtosis	26.02250458	**35%**	198,770,865
Median	212,812,215	**40%**	203,517,942
Mode	186,261,620	**45%**	207,145,750
Left X	161,664,026	**50%**	212,812,215
Left P	5%	**55%**	218,254,988
Right X	436,661,500	**60%**	223,009,120
Right P	95%	**65%**	231,914,989
Diff X	274,997,474	**70%**	242,056,789
Diff P	90%	**75%**	255,760,251
#Errors	0	**80%**	277,269,743
Filter Min	Off	**85%**	310,483,474
Filter Max	Off	**90%**	355,483,198
#Filtered	0	**95%**	436,661,500

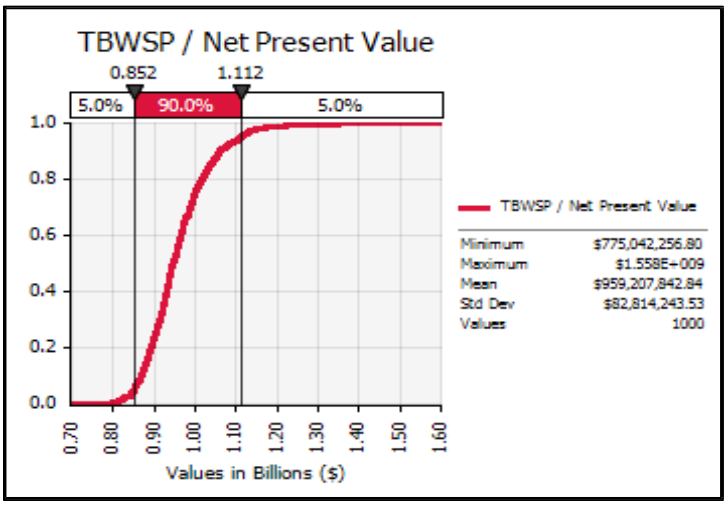
Change in Output Statistic for Northern Groundwater / Diff			
Rank	**Name**	**Lower**	**Upper**
1	Construction_Cost_Index	214,397,412	293,384,290
2	GDP_Deflator	212,735,350	288,230,245
3	GDP_Deflator	220,929,927	293,790,828
4	Energy_Price_Ind	210,175,848	281,044,075
5	GDP_Deflator	212,039,095	282,813,759
6	Construction_Cost_	210,647,599	280,145,949
7	Energy_Price_Ind	223,663,402	292,917,991
8	Energy_Price_Ind	218,900,777	286,012,068
9	GDP_Deflator	224,813,014	289,684,617
10	Energy_Price_Ind	226,395,257	291,108,662
11	GDP_Deflator	216,759,705	281,468,940
12	Construction_Cost_	223,322,092	284,953,414
13	Energy_Price_Ind	221,534,276	282,552,101
14	Construction_Cost_	223,601,470	284,154,652

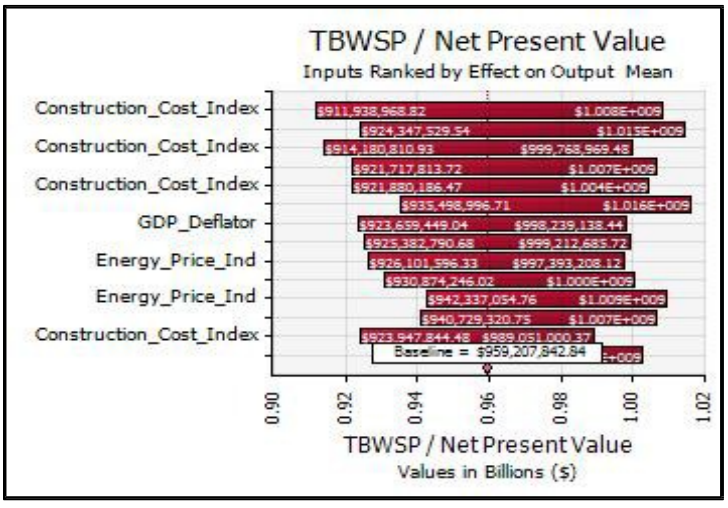
@RISK Output Report for TBWSP / Net Present Value

Performed By: Paul Matthews

Date: Thursday, November 08, 2012 1:04:29 PM







Workbook Name	TVWD NPV 20121026ExpValues v7-Risk-x.xlsm
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	687
Number of Outputs	18
Sampling Type	Latin Hypercube
Simulation Start Time	11/8/2012 8:44
Simulation Duration	04:09:44
Random # Generator	Mersenne Twister
Random Seed	250320905

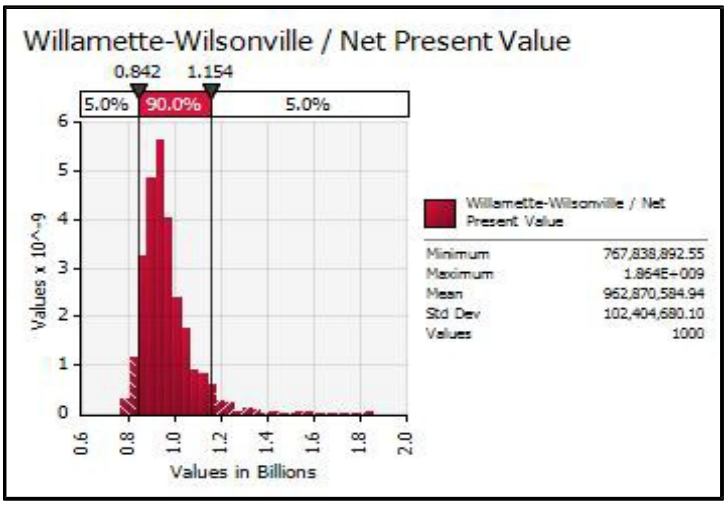
Summary Statistics for TBWSP / Net Present Value			
Statistics		**Percentile**	
Minimum	$775,042,257	**5%**	$851,910,103
Maximum	$1,557,744,931	**10%**	$869,141,814
Mean	$959,207,843	**15%**	$882,173,634
Std Dev	$82,814,244	**20%**	$892,533,156
Variance	6.8582E+15	**25%**	$903,610,532
Skewness	1.335496613	**30%**	$914,943,117
Kurtosis	7.532169889	**35%**	$922,420,408
Median	$944,978,267	**40%**	$931,324,838
Mode	$935,661,547	**45%**	$937,086,807
Left X	$851,910,103	**50%**	$944,978,267
Left P	5%	**55%**	$956,284,336
Right X	$1,111,663,331	**60%**	$965,295,332
Right P	95%	**65%**	$973,482,632
Diff X	$259,753,228	**70%**	$988,304,888
Diff P	90%	**75%**	$999,805,170
#Errors	0	**80%**	$1,017,238,773
Filter Min	Off	**85%**	$1,036,080,503
Filter Max	Off	**90%**	$1,058,990,150
#Filtered	0	**95%**	$1,111,663,331

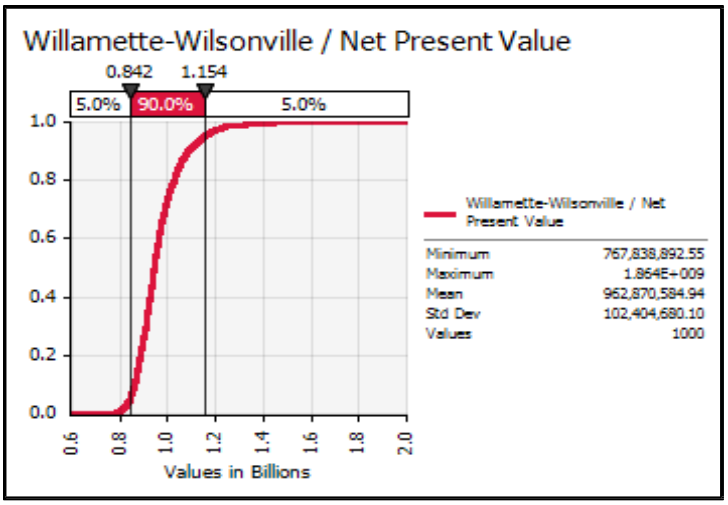
Change in Output Statistic for TBWSP / Net Present Value			
Rank	**Name**	**Lower**	**Upper**
1	Construction_Cost_Index	$911,938,969	$1,007,972,802
2	Construction_Cost_Index	$924,347,530	$1,014,566,488
3	Construction_Cost_Index	$914,180,811	$999,768,969
4	GDP_Deflator	$921,717,814	$1,006,752,480
5	Construction_Cost_Index	$921,880,186	$1,004,263,234
6	GDP_Deflator	$935,498,997	$1,016,075,105
7	GDP_Deflator	$923,659,449	$998,239,138
8	GDP_Deflator	$925,382,791	$999,212,686
9	Energy_Price_Ind	$926,101,596	$997,393,208
10	Construction_Cost_Index	$930,874,246	$1,000,298,745
11	Energy_Price_Ind	$942,337,055	$1,009,405,976
12	Energy_Price_Ind	$940,729,321	$1,006,782,765
13	Construction_Cost_Index	$923,947,844	$989,051,000
14	GDP_Deflator	$939,020,492	$1,002,673,806

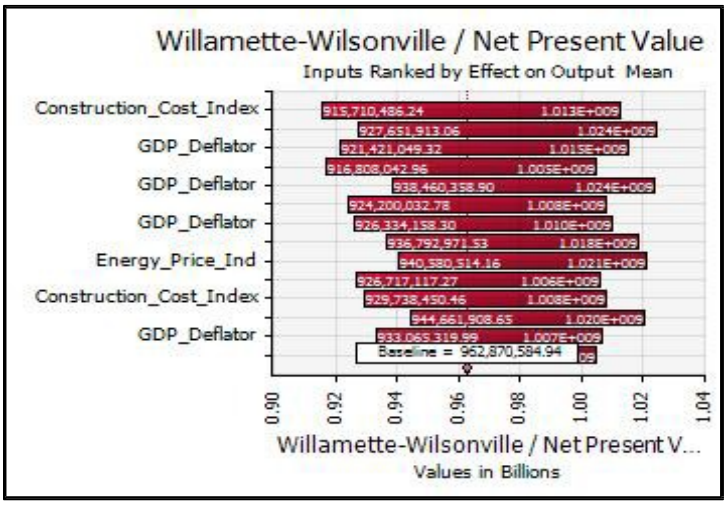
@RISK Output Report for Willamette-Wilsonville / Net Present Value

Performed By: Paul Matthews

Date: Thursday, November 08, 2012 1:04:33 PM







Workbook Name	TVWD NPV 20121026ExpValues v7-Risk[illegible]x.xlsm
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	687
Number of Outputs	18
Sampling Type	Latin Hypercube
Simulation Start Time	11/8/2012 8:44
Simulation Duration	04:09:44
Random # Generator	Mersenne Twister
Random Seed	250320905

Summary Statistics for Willamette-Wilsonville / Net Present Value

Statistics		Percentile	
Minimum	767,838,893	**5%**	841,993,242
Maximum	1,864,225,202	**10%**	861,624,013
Mean	962,870,585	**15%**	875,829,778
Std Dev	102,404,680	**20%**	885,623,800
Variance	1.04867E+16	**25%**	896,219,553
Skewness	2.024792872	**30%**	909,172,380
Kurtosis	12.2593656	**35%**	916,492,681
Median	943,496,233	**40%**	926,628,498
Mode	938,574,801	**45%**	935,595,206
Left X	841,993,242	**50%**	943,496,233
Left P	5%	**55%**	952,499,259
Right X	1,154,040,814	**60%**	963,468,556
Right P	95%	**65%**	973,486,694
Diff X	312,047,572	**70%**	988,418,956
Diff P	90%	**75%**	1,003,543,304
#Errors	0	**80%**	1,026,252,233
Filter Min	Off	**85%**	1,049,871,417
Filter Max	Off	**90%**	1,086,648,372
#Filtered	0	**95%**	1,154,040,814

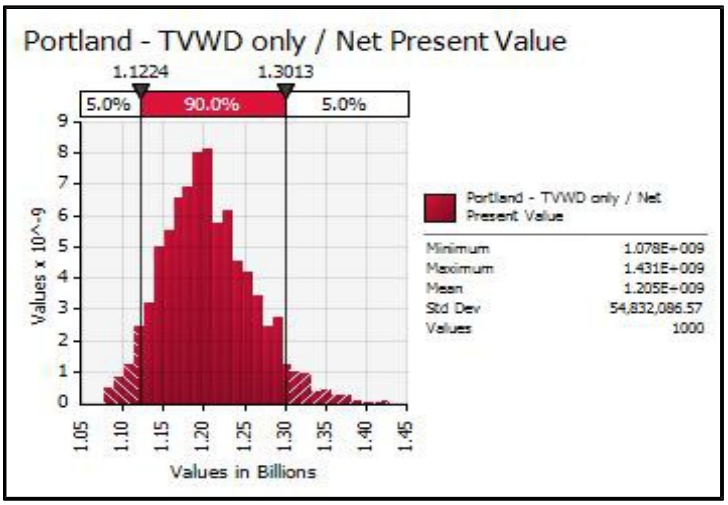
Change in Output Statistic for Willamette-Wilsonville / Net Value

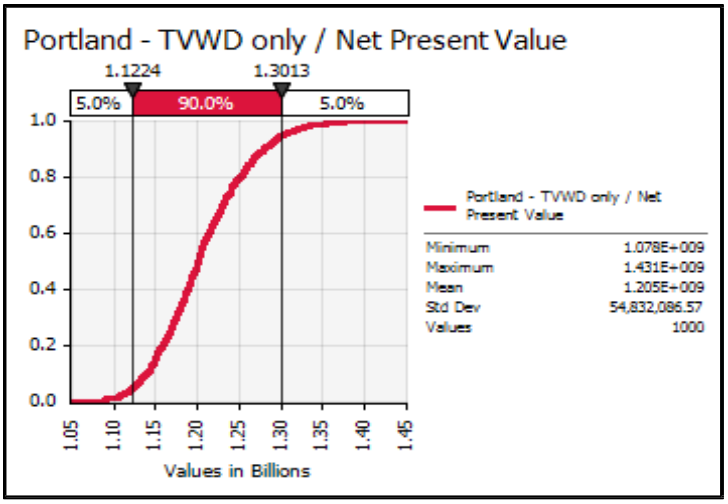
Rank	Name	Lower	Upper
1	Construction_Cost_Index	915,710,486	1,012,614,000
2	Construction_Cost_	927,651,913	1,024,057,089
3	GDP_Deflator	921,421,049	1,015,435,138
4	Construction_Cost_Index	916,808,043	1,004,543,171
5	GDP_Deflator	938,460,359	1,023,693,500
6	Energy_Price_Ind	924,200,033	1,007,930,304
7	GDP_Deflator	926,334,158	1,009,842,239
8	GDP_Deflator	936,792,972	1,018,084,957
9	Energy_Price_Ind	940,580,514	1,020,788,438
10	GDP_Deflator	926,717,117	1,006,039,246
11	Construction_Cost_	929,738,450	1,007,861,493
12	Energy_Price_Ind	944,661,909	1,020,413,430
13	GDP_Deflator	933,065,320	1,006,699,952
14	Energy_Price_Ind	935,928,274	1,004,508,492

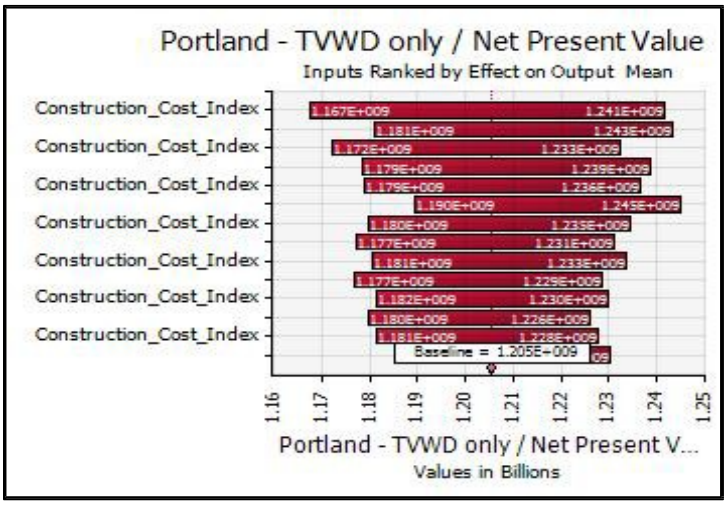
@RISK Output Report for Portland - TVWD only / Net Present Value

Performed By: Paul Matthews

Date: Thursday, November 08, 2012 1:04:39 PM







Workbook Name	TVWD NPV 20121026ExpValues v7-Risk-x.xlsm
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	687
Number of Outputs	18
Sampling Type	Latin Hypercube
Simulation Start Time	11/8/2012 8:44
Simulation Duration	04:09:44
Random # Generator	Mersenne Twister
Random Seed	250320905

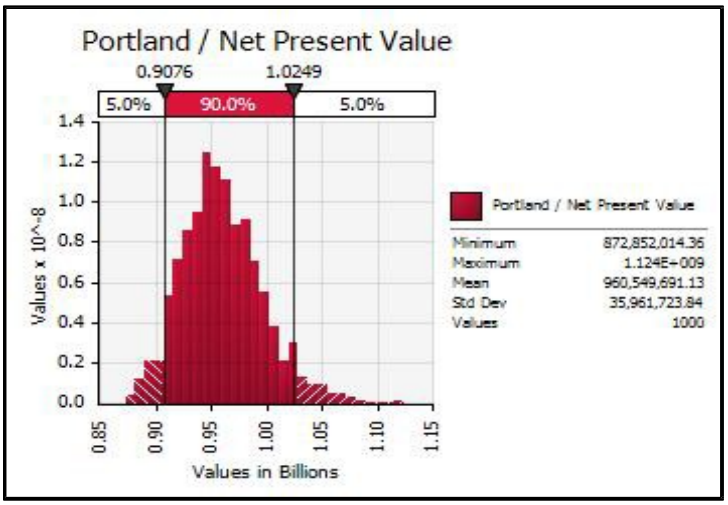
Summary Statistics for Portland - TVWD only / Net Present V alue			
Statistics		**Percentile**	
Minimum	1,077,882,491	**5%**	1,122,362,111
Maximum	1,431,300,368	**10%**	1,138,163,388
Mean	1,205,473,007	**15%**	1,149,678,372
Std Dev	54,832,087	**20%**	1,158,109,532
Variance	3.00656E+15	**25%**	1,167,179,319
Skewness	0.459817082	**30%**	1,174,030,481
Kurtosis	3.215090707	**35%**	1,181,803,207
Median	1,200,929,377	**40%**	1,188,790,369
Mode	1,202,059,314	**45%**	1,194,737,242
Left X	1,122,362,111	**50%**	1,200,929,377
Left P	5%	**55%**	1,205,962,814
Right X	1,301,312,733	**60%**	1,213,880,676
Right P	95%	**65%**	1,222,382,707
Diff X	178,950,622	**70%**	1,229,525,594
Diff P	90%	**75%**	1,240,106,835
#Errors	0	**80%**	1,250,263,731
Filter Min	Off	**85%**	1,263,990,966
Filter Max	Off	**90%**	1,279,454,797
#Filtered	0	**95%**	1,301,312,733

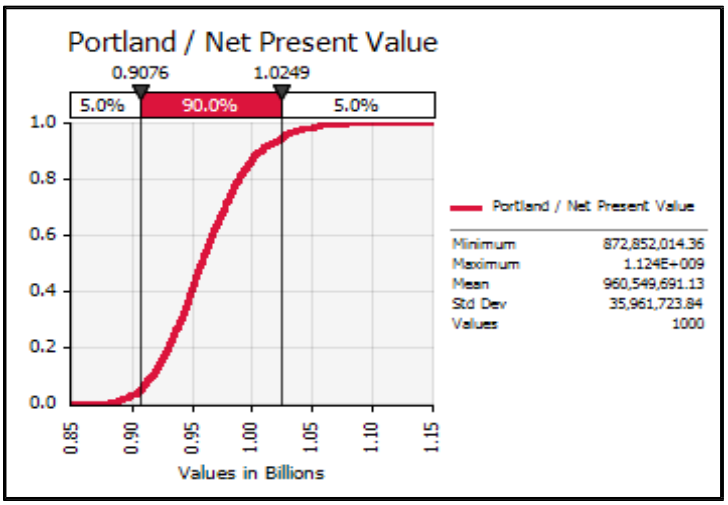
Change in Output Statistic for Portland - TVWD only / Net P			
Rank	**Name**	**Lower**	**Upper**
1	Construction_Cost_	1,167,439,721	1,241,382,375
2	Construction_Cost_	1,181,143,218	1,243,256,950
3	Construction_Cost_	1,172,363,916	1,232,516,062
4	Construction_Cost_	1,178,702,035	1,238,540,763
5	Construction_Cost_	1,178,912,372	1,236,464,875
6	GDP_Deflator	1,189,548,865	1,244,963,175
7	Construction_Cost_	1,179,959,489	1,234,643,377
8	GDP_Deflator	1,177,054,436	1,231,218,935
9	Construction_Cost_	1,180,610,539	1,233,451,907
10	Construction_Cost_	1,176,827,831	1,228,609,850
11	Construction_Cost_	1,181,531,083	1,229,654,389
12	GDP_Deflator	1,179,765,426	1,226,087,182
13	Construction_Cost_	1,181,349,013	1,227,546,775
14	GDP_Deflator	1,185,368,824	1,230,253,803

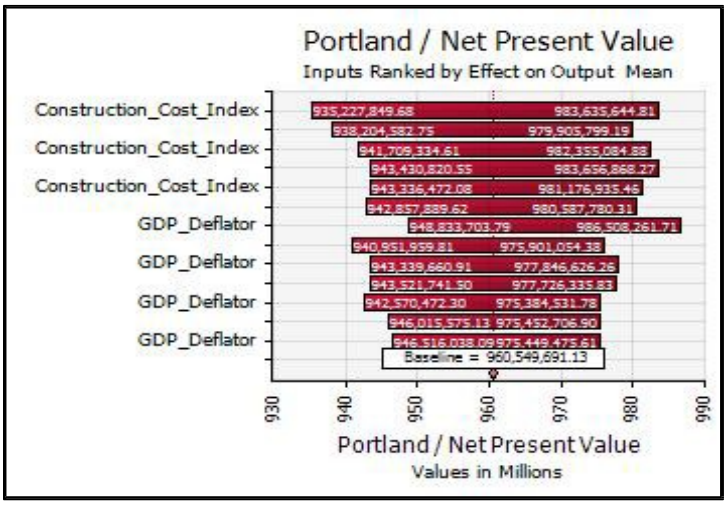
@RISK Output Report for Portland / Net Present Value

Performed By: Paul Matthews

Date: Thursday, November 08, 2012 1:04:44 PM







Workbook Name	TVWD NPV 20121026ExpValues v7-Risk[illegible]x.xlsm
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	687
Number of Outputs	18
Sampling Type	Latin Hypercube
Simulation Start Time	11/8/2012 8:44
Simulation Duration	04:09:44
Random # Generator	Mersenne Twister
Random Seed	250320905

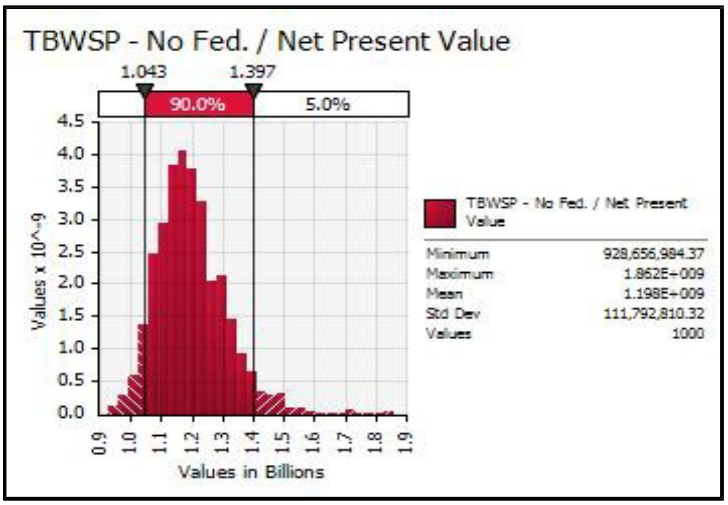
Summary Statistics for Portland / Net Present Value			
Statistics		**Percentile**	
Minimum	872,852,014	**5%**	907,570,620
Maximum	1,124,173,279	**10%**	917,205,163
Mean	960,549,691	**15%**	923,884,050
Std Dev	35,961,724	**20%**	930,196,658
Variance	1.29325E+15	**25%**	935,016,186
Skewness	0.503233727	**30%**	940,960,643
Kurtosis	3.515716384	**35%**	945,386,603
Median	957,618,373	**40%**	949,144,510
Mode	943,211,876	**45%**	953,052,999
Left X	907,570,620	**50%**	957,618,373
Left P	5%	**55%**	962,128,102
Right X	1,024,877,946	**60%**	966,535,459
Right P	95%	**65%**	971,582,620
Diff X	117,307,326	**70%**	977,067,344
Diff P	90%	**75%**	982,746,933
#Errors	0	**80%**	988,856,579
Filter Min	Off	**85%**	996,384,305
Filter Max	Off	**90%**	1,007,001,841
#Filtered	0	**95%**	1,024,877,946

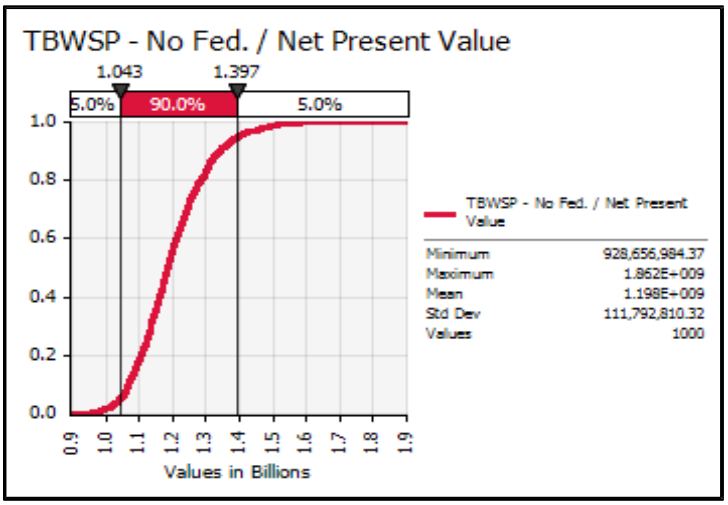
Change in Output Statistic for Portland / Net Present Value			
Rank	**Name**	**Lower**	**Upper**
1	Construction_Cost_Index	935,227,850	983,635,645
2	Construction_Cost_Index	938,204,583	979,905,799
3	Construction_Cost_Index	941,709,335	982,355,085
4	Construction_Cost_Index	943,430,821	983,656,868
5	Construction_Cost_Index	943,336,472	981,176,935
6	Construction_Cost_Index	942,857,890	980,587,780
7	GDP_Deflator	948,833,704	986,508,262
8	Construction_Cost_Index	940,951,960	975,901,054
9	GDP_Deflator	943,339,661	977,846,626
10	Construction_Cost_Index	943,521,741	977,726,336
11	GDP_Deflator	942,570,472	975,384,532
12	Construction_Cost_Index	946,015,575	975,452,707
13	GDP_Deflator	946,516,038	975,449,476
14	Construction_Cost_Index	945,395,917	974,255,380

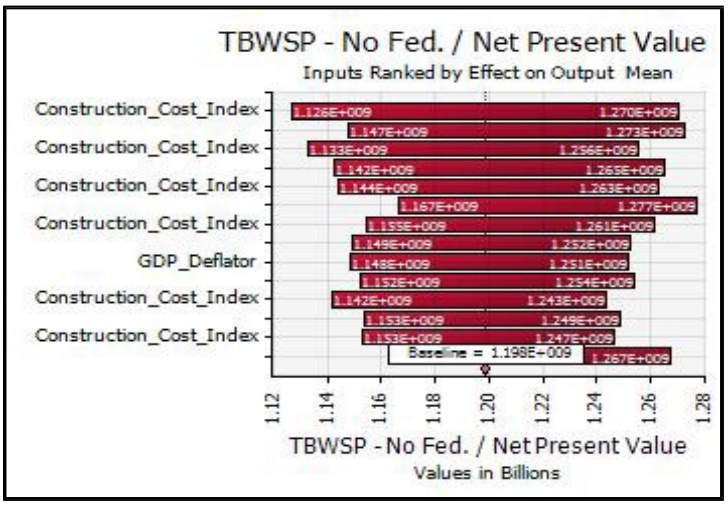
@RISK Output Report for TBWSP - No Fed. / Net Present Value

Performed By: Paul Matthews

Date: Thursday, November 08, 2012 1:04:48 PM







Workbook Name	TVWD NPV 20121026ExpValues v7-Risk[illegible]x.xlsm
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	687
Number of Outputs	18
Sampling Type	Latin Hypercube
Simulation Start Time	11/8/2012 8:44
Simulation Duration	04:09:44
Random # Generator	Mersenne Twister
Random Seed	250320905

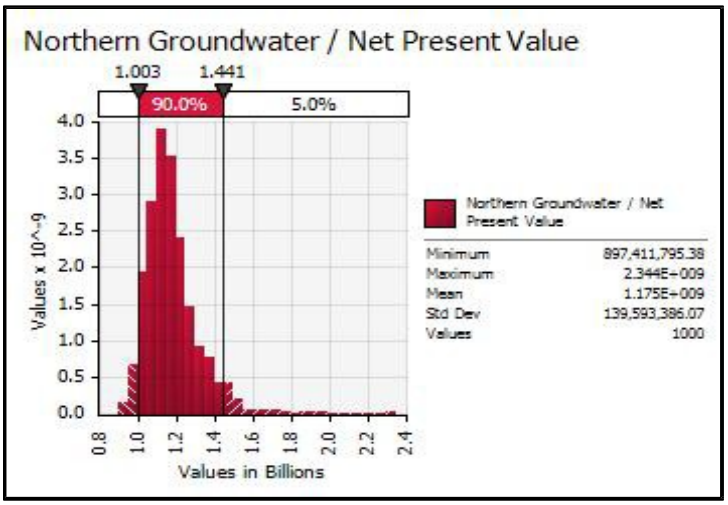
Summary Statistics for TBWSP - No Fed. / Net Present Value			
Statistics		**Percentile**	
Minimum	928,656,984	**5%**	1,042,551,051
Maximum	1,861,875,539	**10%**	1,067,209,135
Mean	1,198,401,788	**15%**	1,088,522,952
Std Dev	111,792,810	**20%**	1,105,407,187
Variance	1.24976E+16	**25%**	1,121,899,473
Skewness	0.881726208	**30%**	1,134,861,697
Kurtosis	5.074847431	**35%**	1,148,739,253
Median	1,185,551,250	**40%**	1,161,605,600
Mode	1,132,443,552	**45%**	1,174,066,987
Left X	1,042,551,051	**50%**	1,185,551,250
Left P	5%	**55%**	1,196,578,812
Right X	1,396,776,507	**60%**	1,210,992,333
Right P	95%	**65%**	1,226,340,214
Diff X	354,225,456	**70%**	1,243,926,664
Diff P	90%	**75%**	1,259,208,112
#Errors	0	**80%**	1,285,013,681
Filter Min	Off	**85%**	1,309,022,088
Filter Max	Off	**90%**	1,340,459,309
#Filtered	0	**95%**	1,396,776,507

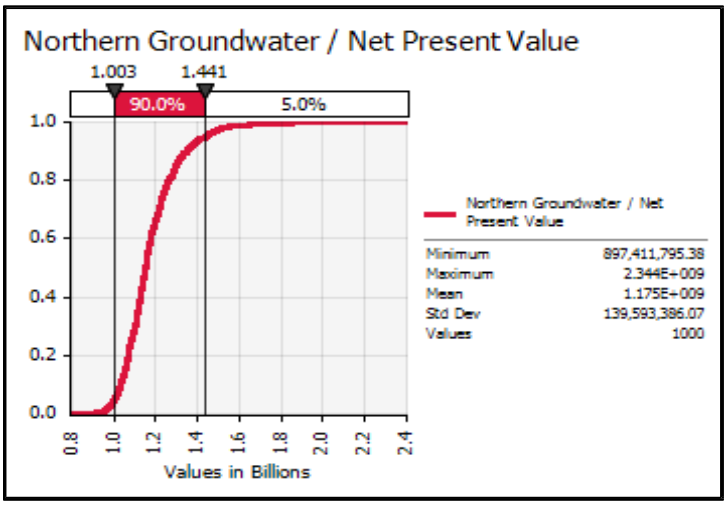
Change in Output Statistic for TBWSP - No Fed. / Net Prese			
Rank	**Name**	**Lower**	**Upper**
1	Construction_Cost_	1,126,427,144	1,270,006,620
2	Construction_Cost_	1,147,318,360	1,272,715,769
3	Construction_Cost_	1,132,762,330	1,255,620,334
4	GDP_Deflator	1,142,361,092	1,264,813,543
5	Construction_Cost_	1,144,150,247	1,262,851,055
6	GDP_Deflator	1,166,683,389	1,276,981,449
7	Construction_Cost_	1,154,726,893	1,261,387,109
8	GDP_Deflator	1,149,048,484	1,252,374,338
9	GDP_Deflator	1,148,299,318	1,251,218,502
10	Construction_Cost_	1,151,966,435	1,254,193,813
11	Construction_Cost_	1,141,997,015	1,243,021,524
12	Energy_Price_Ind	1,153,426,318	1,248,604,319
13	Construction_Cost_	1,152,718,157	1,246,647,690
14	Energy_Price_Ind	1,174,224,202	1,267,181,022

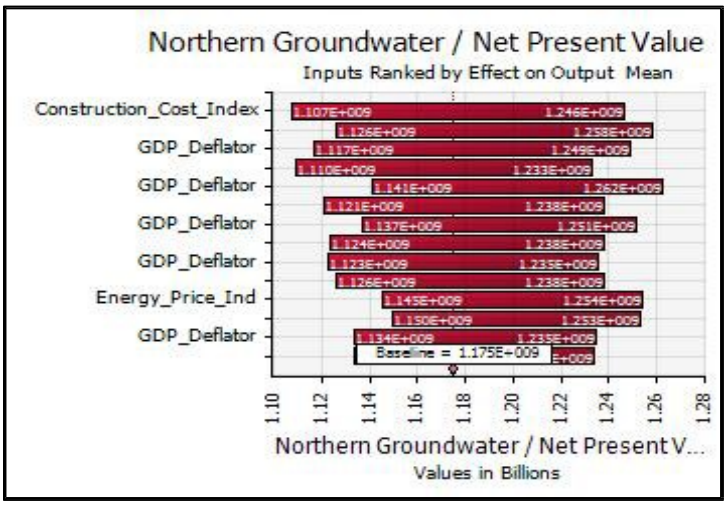
@RISK Output Report for Northern Groundwater / Net Present Value

Performed By: Paul Matthews

Date: Thursday, November 08, 2012 1:04:53 PM







Workbook Name	TVWD NPV 20121026ExpValues v7-Risk[illegible]x.xlsm
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	687
Number of Outputs	18
Sampling Type	Latin Hypercube
Simulation Start Time	11/8/2012 8:44
Simulation Duration	04:09:44
Random # Generator	Mersenne Twister
Random Seed	250320905

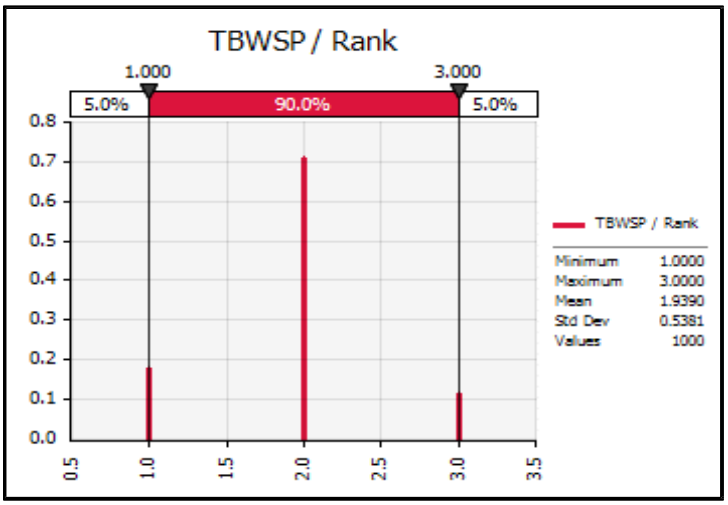
Summary Statistics for Northern Groundwater / Net Present			
Statistics		**Percentile**	
Minimum	897,411,795	**5%**	1,003,442,980
Maximum	2,343,508,048	**10%**	1,030,528,065
Mean	1,174,970,239	**15%**	1,052,991,416
Std Dev	139,593,386	**20%**	1,068,347,882
Variance	1.94863E+16	**25%**	1,081,937,482
Skewness	1.812932724	**30%**	1,102,996,382
Kurtosis	10.67793897	**35%**	1,113,913,206
Median	1,151,167,028	**40%**	1,125,255,383
Mode	1,156,987,821	**45%**	1,137,549,659
Left X	1,003,442,980	**50%**	1,151,167,028
Left P	5%	**55%**	1,161,011,981
Right X	1,440,565,819	**60%**	1,173,815,516
Right P	95%	**65%**	1,193,999,566
Diff X	437,122,839	**70%**	1,214,707,620
Diff P	90%	**75%**	1,233,906,671
#Errors	0	**80%**	1,264,764,445
Filter Min	Off	**85%**	1,296,995,733
Filter Max	Off	**90%**	1,350,081,521
#Filtered	0	**95%**	1,440,565,819

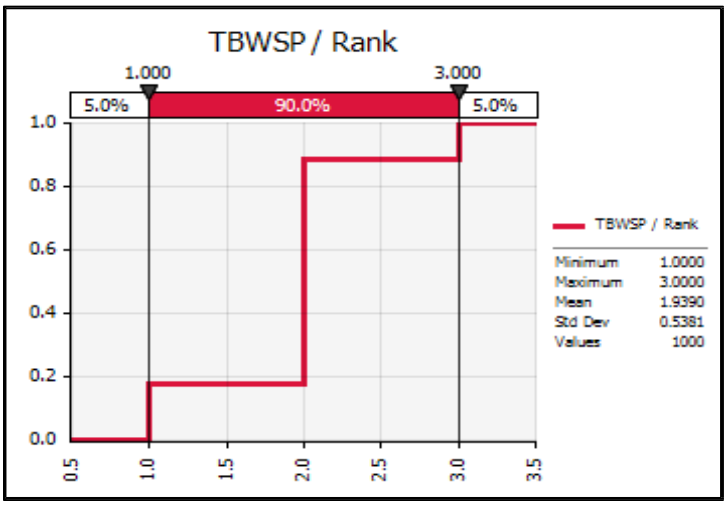
Change in Output Statistic for Northern Groundwater / Net Present Value			
Rank	**Name**	**Lower**	**Upper**
1	Construction_Cost_Index	1,107,379,118	1,246,274,738
2	Construction_Cost_	1,126,356,347	1,258,426,686
3	GDP_Deflator	1,117,037,409	1,249,074,238
4	Construction_Cost_Index	1,109,554,617	1,232,614,748
5	GDP_Deflator	1,141,275,622	1,262,426,225
6	Energy_Price_Ind	1,121,263,131	1,238,336,609
7	GDP_Deflator	1,136,610,177	1,251,371,012
8	GDP_Deflator	1,123,575,270	1,237,693,830
9	GDP_Deflator	1,122,731,355	1,235,074,404
10	Construction_Cost_	1,126,407,729	1,238,211,961
11	Energy_Price_Ind	1,145,085,588	1,254,156,419
12	Energy_Price_Ind	1,149,946,735	1,253,331,007
13	GDP_Deflator	1,133,736,925	1,234,775,709
14	Construction_Cost_Index	1,123,617,244	1,233,405,201

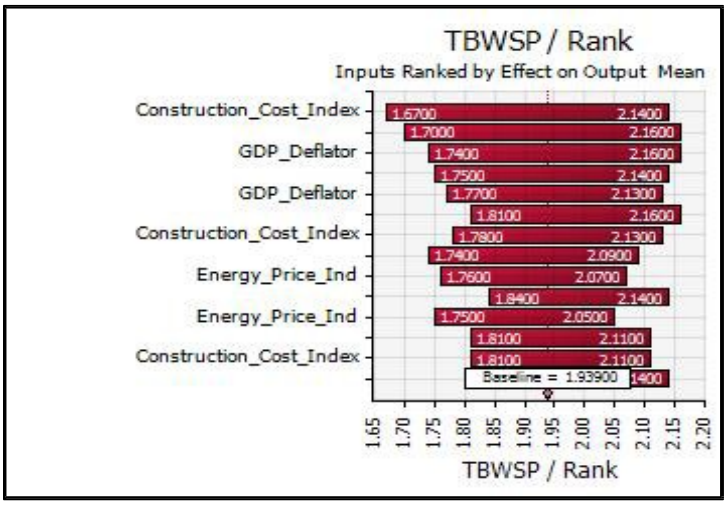
@RISK Output Report for TBWSP / Rank

Performed By: Paul Matthews

Date: Thursday, November 08, 2012 1:04:58 PM







Workbook Name	TVWD NPV 20121026ExpValues v7-Risk[illegible]x.xlsm
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	687
Number of Outputs	18
Sampling Type	Latin Hypercube
Simulation Start Time	11/8/2012 8:44
Simulation Duration	04:09:44
Random # Generator	Mersenne Twister
Random Seed	250320905

Summary Statistics for TBWSP / Rank

Statistics		Percentile	
Minimum	1	**5%**	1
Maximum	3	**10%**	1
Mean	1.939	**15%**	1
Std Dev	0.538115758	**20%**	2
Variance	0.289568569	**25%**	2
Skewness	-0.050432876	**30%**	2
Kurtosis	3.409184561	**35%**	2
Median	2	**40%**	2
Mode	2	**45%**	2
Left X	1	**50%**	2
Left P	5%	**55%**	2
Right X	3	**60%**	2
Right P	95%	**65%**	2
Diff X	2	**70%**	2
Diff P	90%	**75%**	2
#Errors	0	**80%**	2
Filter Min	Off	**85%**	2
Filter Max	Off	**90%**	3
#Filtered	0	**95%**	3

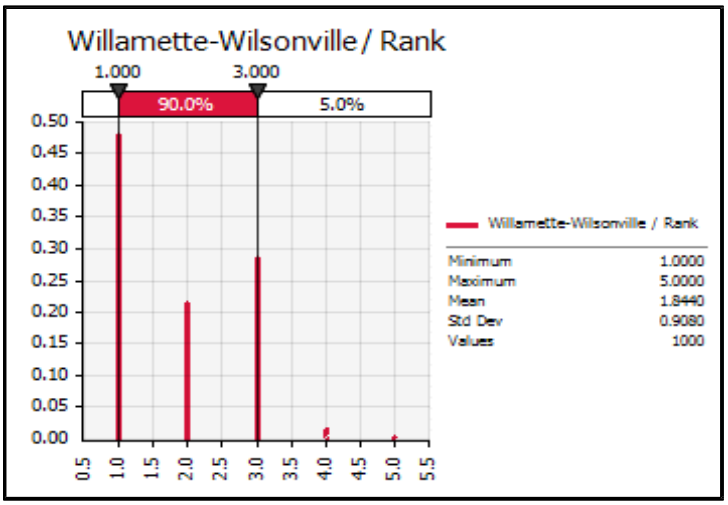
Change in Output Statistic for TBWSP / Rank

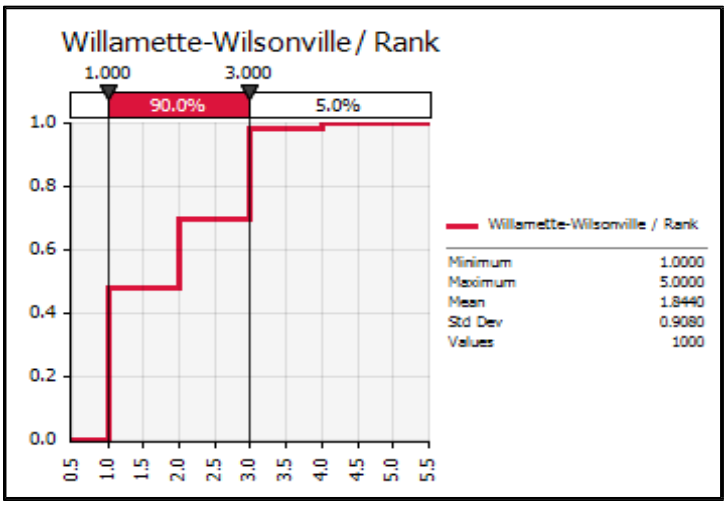
Rank	Name	Lower	Upper
1	Construction_Cost_Index	1.67	2.14
2	Construction_Cost_	1.7	2.16
3	GDP_Deflator	1.74	2.16
4	GDP_Deflator	1.75	2.14
5	GDP_Deflator	1.77	2.13
6	GDP_Deflator	1.81	2.16
7	Construction_Cost_Index	1.78	2.13
8	Construction_Cost_	1.74	2.09
9	Energy_Price_Ind	1.76	2.07
10	Medium / River Intake and Pumping	1.84	2.14
11	Energy_Price_Ind	1.75	2.05
12	GDP_Deflator	1.81	2.11
13	Construction_Cost_	1.81	2.11
14	Construction_Cost_Index	1.85	2.14

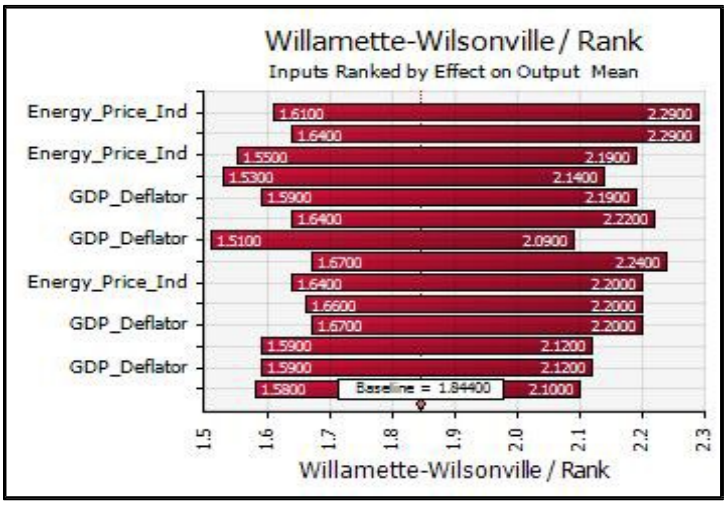
@RISK Output Report for Willamette-Wilsonville / Rank

Performed By: Paul Matthews

Date: Thursday, November 08, 2012 1:05:04 PM







Workbook Name	TVWD NPV 20121026ExpValues v7-Risk fx.xlsm
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	687
Number of Outputs	18
Sampling Type	Latin Hypercube
Simulation Start Time	11/8/2012 8:44
Simulation Duration	04:09:44
Random # Generator	Mersenne Twister
Random Seed	250320905

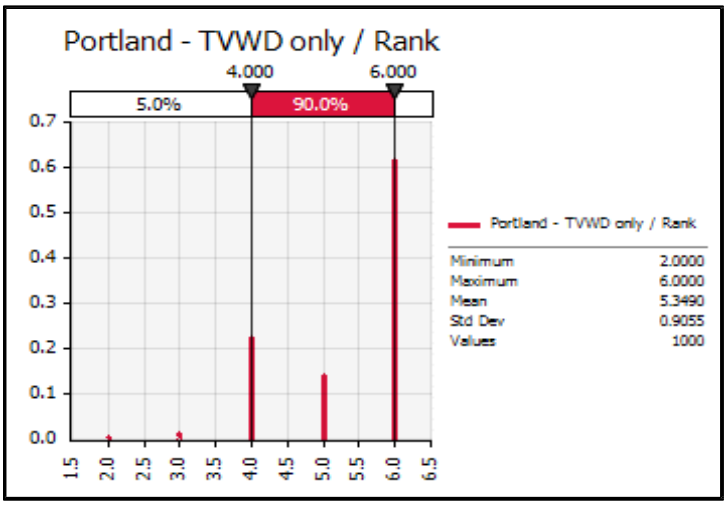
Summary Statistics for Willamette-Wilsonville / Rank			
Statistics		**Percentile**	
Minimum	1	**5%**	1
Maximum	5	**10%**	1
Mean	1.844	**15%**	1
Std Dev	0.908013485	**20%**	1
Variance	0.824488488	**25%**	1
Skewness	0.489375777	**30%**	1
Kurtosis	1.832457843	**35%**	1
Median	2	**40%**	1
Mode	1	**45%**	1
Left X	1	**50%**	2
Left P	5%	**55%**	2
Right X	3	**60%**	2
Right P	95%	**65%**	2
Diff X	2	**70%**	3
Diff P	90%	**75%**	3
#Errors	0	**80%**	3
Filter Min	Off	**85%**	3
Filter Max	Off	**90%**	3
#Filtered	0	**95%**	3

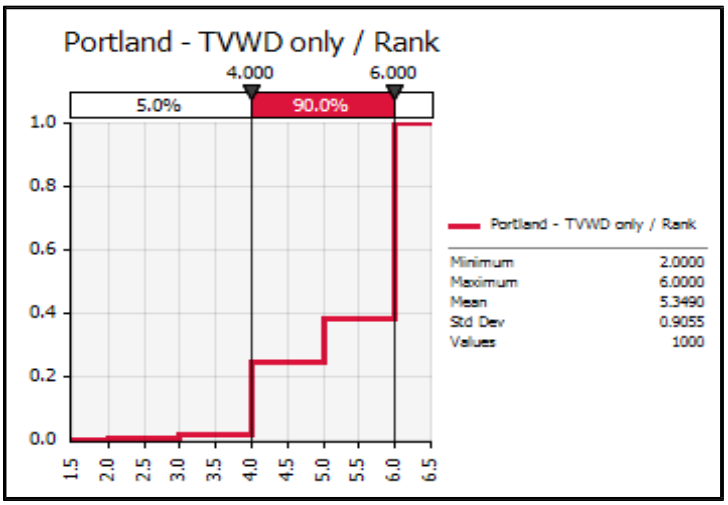
Change in Output Statistic for Willamette-Wilsonville / Ran			
Rank	**Name**	**Lower**	**Upper**
1	Energy_Price_Ind	1.61	2.29
2	Energy_Price_Ind	1.64	2.29
3	Energy_Price_Ind	1.55	2.19
4	Energy_Price_Ind	1.53	2.14
5	GDP_Deflator	1.59	2.19
6	Energy_Price_Ind	1.64	2.22
7	GDP_Deflator	1.51	2.09
8	Energy_Price_Ind	1.67	2.24
9	Energy_Price_Ind	1.64	2.2
10	Energy_Price_Ind	1.66	2.2
11	GDP_Deflator	1.67	2.2
12	Energy_Price_Ind	1.59	2.12
13	GDP_Deflator	1.59	2.12
14	Energy_Price_Ind	1.58	2.1

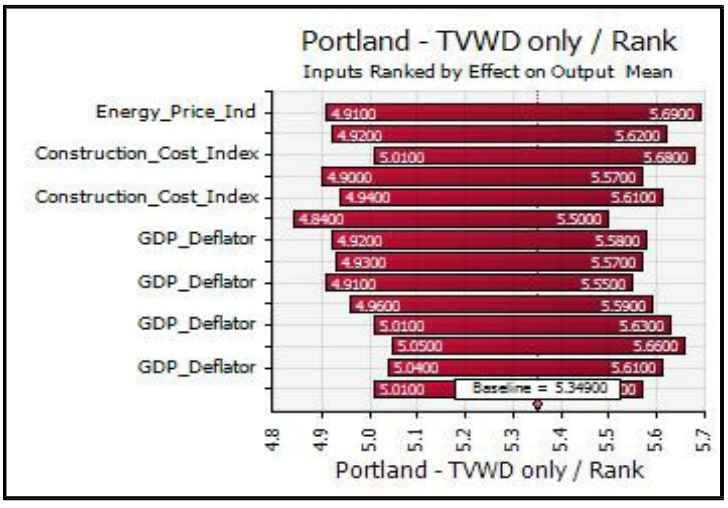
@RISK Output Report for Portland - TVWD only / Rank

Performed By: Paul Matthews

Date: Thursday, November 08, 2012 1:05:10 PM







Workbook Name	TVWD NPV 20121026ExpValues v7-Risk-x.xlsm
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	687
Number of Outputs	18
Sampling Type	Latin Hypercube
Simulation Start Time	11/8/2012 8:44
Simulation Duration	04:09:44
Random # Generator	Mersenne Twister
Random Seed	250320905

Summary Statistics for Portland - TVWD only / Rank

Statistics		Percentile	
Minimum	2	**5%**	4
Maximum	6	**10%**	4
Mean	5.349	**15%**	4
Std Dev	0.905549015	**20%**	4
Variance	0.820019019	**25%**	5
Skewness	-1.020083583	**30%**	5
Kurtosis	2.85102425	**35%**	5
Median	6	**40%**	6
Mode	6	**45%**	6
Left X	4	**50%**	6
Left P	5%	**55%**	6
Right X	6	**60%**	6
Right P	95%	**65%**	6
Diff X	2	**70%**	6
Diff P	90%	**75%**	6
#Errors	0	**80%**	6
Filter Min	Off	**85%**	6
Filter Max	Off	**90%**	6
#Filtered	0	**95%**	6

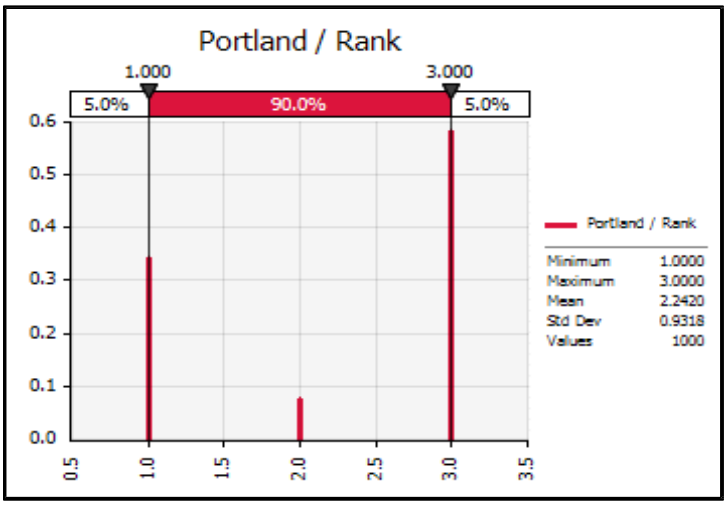
Change in Output Statistic for Portland - TVWD only / Rank

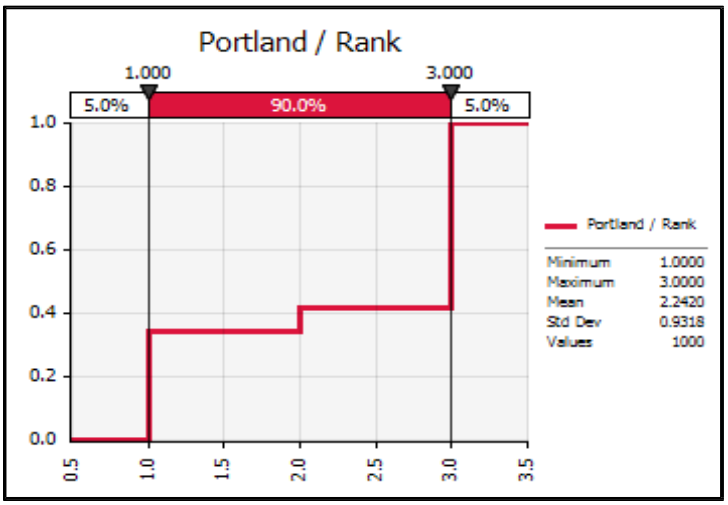
Rank	Name	Lower	Upper
1	Energy_Price_Ind	4.91	5.69
2	GDP_Deflator	4.92	5.62
3	Construction_Cost_Index	5.01	5.68
4	GDP_Deflator	4.9	5.57
5	Construction_Cost_	4.94	5.61
6	Energy_Price_Ind	4.84	5.5
7	GDP_Deflator	4.92	5.58
8	Energy_Price_Ind	4.93	5.57
9	GDP_Deflator	4.91	5.55
10	Energy_Price_Ind	4.96	5.59
11	GDP_Deflator	5.01	5.63
12	Construction_Cost_Index	5.05	5.66
13	GDP_Deflator	5.04	5.61
14	Construction_Cost_	5.01	5.57

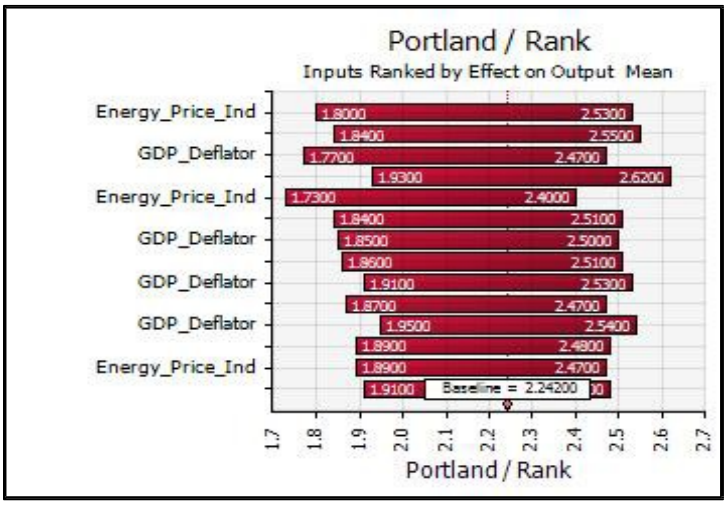
@RISK Output Report for Portland / Rank

Performed By: Paul Matthews

Date: Thursday, November 08, 2012 1:05:15 PM







Workbook Name	TVWD NPV 20121026ExpValues v7-Risk[illegible]x.xlsm
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	687
Number of Outputs	18
Sampling Type	Latin Hypercube
Simulation Start Time	11/8/2012 8:44
Simulation Duration	04:09:44
Random # Generator	Mersenne Twister
Random Seed	250320905

Summary Statistics for Portland / Rank

Statistics		Percentile	
Minimum	1	**5%**	1
Maximum	3	**10%**	1
Mean	2.242	**15%**	1
Std Dev	0.931828474	**20%**	1
Variance	0.868304304	**25%**	1
Skewness	-0.4982503	**30%**	1
Kurtosis	1.335770434	**35%**	2
Median	3	**40%**	2
Mode	3	**45%**	3
Left X	1	**50%**	3
Left P	5%	**55%**	3
Right X	3	**60%**	3
Right P	95%	**65%**	3
Diff X	2	**70%**	3
Diff P	90%	**75%**	3
#Errors	0	**80%**	3
Filter Min	Off	**85%**	3
Filter Max	Off	**90%**	3
#Filtered	0	**95%**	3

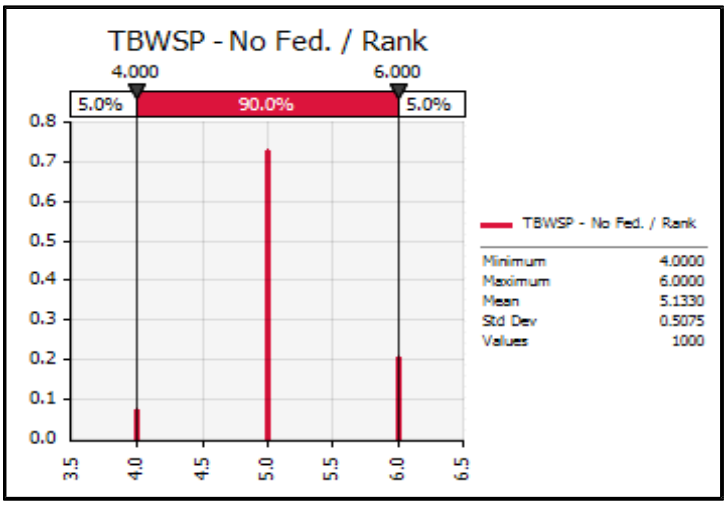
Change in Output Statistic for Portland / Rank

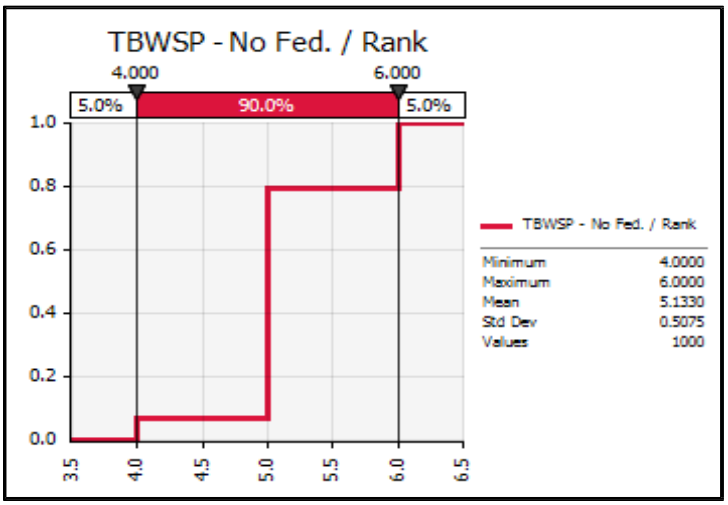
Rank	Name	Lower	Upper
1	Energy_Price_Ind	1.8	2.53
2	GDP_Deflator	1.84	2.55
3	GDP_Deflator	1.77	2.47
4	Construction_Cost_Index	1.93	2.62
5	Energy_Price_Ind	1.73	2.4
6	Construction_Cost_	1.84	2.51
7	GDP_Deflator	1.85	2.5
8	Construction_Cost_Index	1.86	2.51
9	GDP_Deflator	1.91	2.53
10	Energy_Price_Ind	1.87	2.47
11	GDP_Deflator	1.95	2.54
12	GDP_Deflator	1.89	2.48
13	Energy_Price_Ind	1.89	2.47
14	Energy_Price_Ind	1.91	2.48

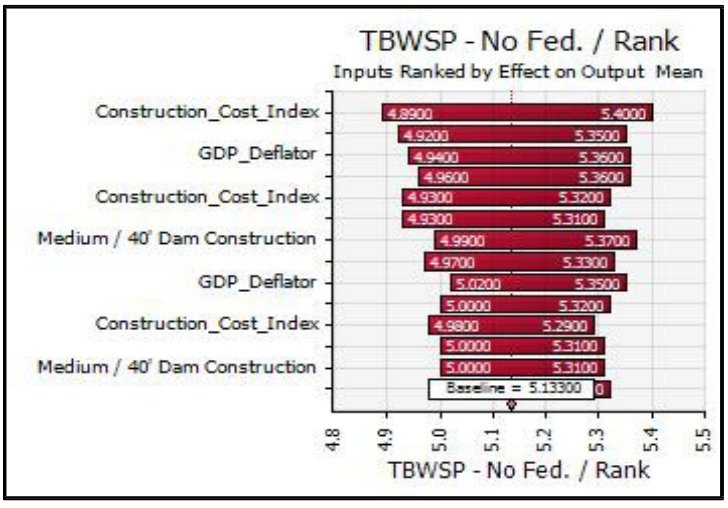
@RISK Output Report for TBWSP - No Fed. / Rank

Performed By: Paul Matthews

Date: Thursday, November 08, 2012 1:05:21 PM







Workbook Name	TVWD NPV 20121026ExpValues v7-Risk[illegible]x.xlsm
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	687
Number of Outputs	18
Sampling Type	Latin Hypercube
Simulation Start Time	11/8/2012 8:44
Simulation Duration	04:09:44
Random # Generator	Mersenne Twister
Random Seed	250320905

Summary Statistics for TBWSP - No Fed. / Rank

Statistics		Percentile	
Minimum	4	**5%**	4
Maximum	6	**10%**	5
Mean	5.133	**15%**	5
Std Dev	0.507512136	**20%**	5
Variance	0.257568569	**25%**	5
Skewness	0.214692383	**30%**	5
Kurtosis	3.520081978	**35%**	5
Median	5	**40%**	5
Mode	5	**45%**	5
Left X	4	**50%**	5
Left P	5%	**55%**	5
Right X	6	**60%**	5
Right P	95%	**65%**	5
Diff X	2	**70%**	5
Diff P	90%	**75%**	5
#Errors	0	**80%**	6
Filter Min	Off	**85%**	6
Filter Max	Off	**90%**	6
#Filtered	0	**95%**	6

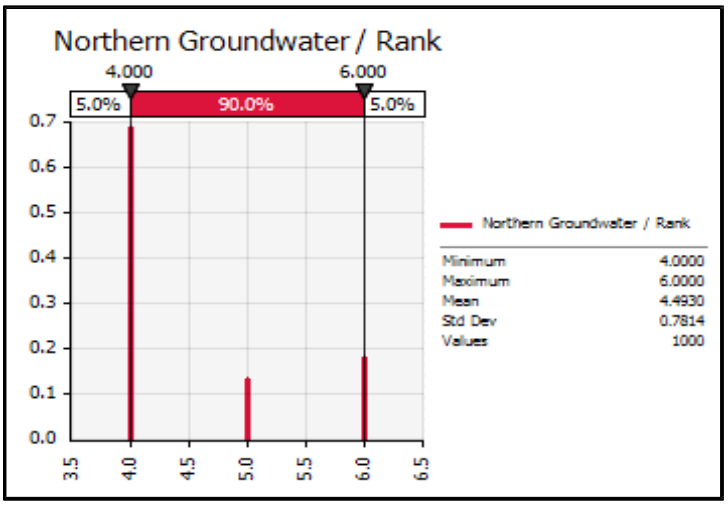
Change in Output Statistic for TBWSP - No Fed. / Rank

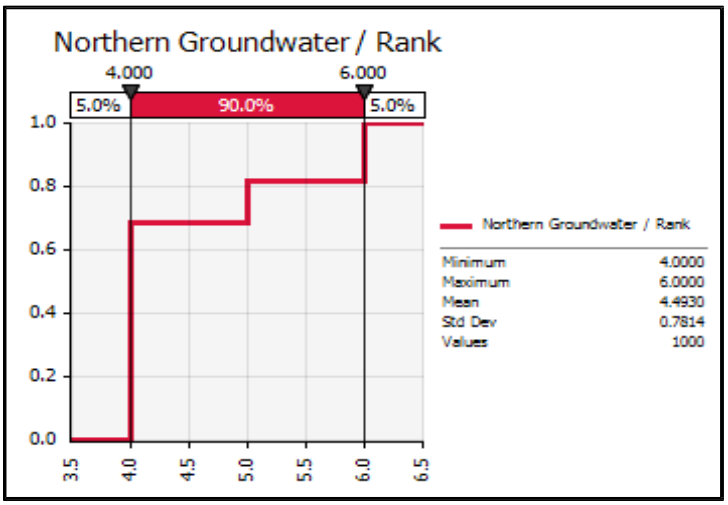
Rank	Name	Lower	Upper
1	Construction_Cost_Index	4.89	5.4
2	Construction_Cost_	4.92	5.35
3	GDP_Deflator	4.94	5.36
4	Construction_Cost_Index	4.96	5.36
5	Construction_Cost_	4.93	5.32
6	Construction_Cost_Index	4.93	5.31
7	Medium / 40' Dam	4.99	5.37
8	Energy_Price_Ind	4.97	5.33
9	GDP_Deflator	5.02	5.35
10	Construction_Cost_Index	5	5.32
11	Construction_Cost_	4.98	5.29
12	Construction_Cost_Index	5	5.31
13	Medium / 40' Dam	5	5.31
14	GDP_Deflator	5.03	5.32

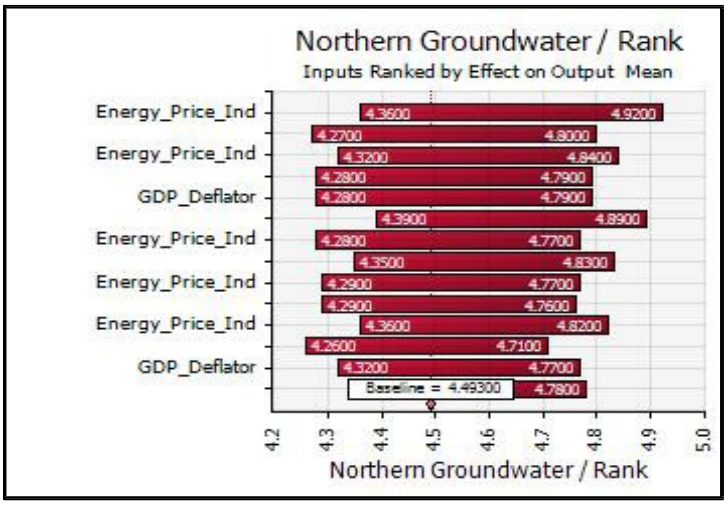
@RISK Output Report for Northern Groundwater / Rank

Performed By: Paul Matthews

Date: Thursday, November 08, 2012 1:05:25 PM







Workbook Name	TVWD NPV 20121026ExpValues v7-Risk[illegible]x.xlsm
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	687
Number of Outputs	18
Sampling Type	Latin Hypercube
Simulation Start Time	11/8/2012 8:44
Simulation Duration	04:09:44
Random # Generator	Mersenne Twister
Random Seed	250320905

Summary Statistics for Northern Groundwater / Rank

Statistics		Percentile	
Minimum	4	**5%**	4
Maximum	6	**10%**	4
Mean	4.493	**15%**	4
Std Dev	0.781384388	**20%**	4
Variance	0.610561562	**25%**	4
Skewness	1.158532252	**30%**	4
Kurtosis	2.632234702	**35%**	4
Median	4	**40%**	4
Mode	4	**45%**	4
Left X	4	**50%**	4
Left P	5%	**55%**	4
Right X	6	**60%**	4
Right P	95%	**65%**	4
Diff X	2	**70%**	5
Diff P	90%	**75%**	5
#Errors	0	**80%**	5
Filter Min	Off	**85%**	6
Filter Max	Off	**90%**	6
#Filtered	0	**95%**	6

Change in Output Statistic for Northern Groundwater / Ran

Rank	Name	Lower	Upper
1	Energy_Price_Ind	4.36	4.92
2	Energy_Price_Ind	4.27	4.8
3	Energy_Price_Ind	4.32	4.84
4	Energy_Price_Ind	4.28	4.79
5	GDP_Deflator	4.28	4.79
6	Energy_Price_Ind	4.39	4.89
7	Energy_Price_Ind	4.28	4.77
8	Construction_Cost_Index	4.35	4.83
9	Energy_Price_Ind	4.29	4.77
10	Energy_Price_Ind	4.29	4.76
11	Energy_Price_Ind	4.36	4.82
12	Construction_Cost_	4.26	4.71
13	GDP_Deflator	4.32	4.77
14	GDP_Deflator	4.34	4.78